

BUILDING STRONGER CARE SYSTEMS AND TEAMS: PURSUING PERSONALIZED MATERNAL CARE

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Society for Obstetric Anesthesia and Perinatology



SYLLABUS

SOAP 55th Annual Meeting

Building Stronger Care Systems and Teams: Pursuing Personalized Maternal Care

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Wednesday, May 3 Thursday, May 4 Friday, May 5 Saturday, May 6 Sunday, May 7

Welcome!

On behalf of the SOAP Board of Directors and the 2022-2023 Annual Meeting and Live Events Committee, we are delighted to invite you to New Orleans for the 2023 SOAP 55th Annual Meeting. This year, we welcome you to the Big Easy, a city where food, music and culture prevail. Get ready to learn, play and eat!

The meeting theme of *"Building Stronger Care Systems and Teams: Pursing Personalized Maternal Care."* We are excited to feature themed lectures and panels to explore this topic as well as our historical educational sessions.

Pre-meeting workshops continue this year and feature hands-on sessions including an all-day **Focused Assessed Transthoracic Echocardiography (FATE)** and a half day **Perioperative Point of Care Ultrasound Workshop (POCUS)**. Other featured workshops address creating transformational change and enhancing wellness and resilience. Following the workshops, please join our community in the beautiful Sheraton Hotel for our Welcome Reception where friends and colleagues can reunite prior to the start of the meeting.

Our meeting will open on May 4th, 2023 with a featured keynote lecture "Teaming: How Organizations Learn, Innovate and Compete in Knowledge Economy" by renowned speaker, Dr. Amy Edmondson, PhD, who is a Professor of Leadership and Management at the Harvard Business School. This will be followed by a special President's panel "Optimizing Anesthesia Teams: Stories from the Front Line" that will address the interprofessional approach to teaming in the care of obstetric patients. This will be followed by another meeting-themed panel with special guests from the OAA, Drs. Chris Elton, and the specialty of Obstetrics, Dr. Veronica Gillispie-Bell. Next, the best research of the meeting will be highlighted in the Best Paper Competition. Finally, Dr. Veronica Gillispie-Bell will be featured in our Society of Maternal Fetal Medicine Session "What's New in Obstetrics?" touching on "Obstetric Team Care in the post-Dobbs Era". Then join us for a very exciting Case Report Session where our members highlight some of the challenging cases we face in obstetric anesthesiology.

On Friday, May 5th, 2023, we start the day focusing on Research. First, explore the high-quality research our members are presenting in moderated breakout room sessions followed by the beloved Gertie Marx competition, moderated by Dr. Brian Bateman, which highlights trainee research endeavors. Following lunch, join a moderated member discussion forum on Reproductive Access Considerations for clinicians or attend the Oral Research Poster presentations on the main stage. This year, the Fred Hehre lecture will be given by honoree Dr. Vernon Ross. Following these sessions, our Sol Shnider Clinical Track begins on the main stage and features clinical talks on customization vs protocolization, drug and equipment shortages, and opioids in obstetrics. Concurrently, our new Research Track will feature a Journal Editors Panel from some of the top names in the field. At the end of the day, all Obstetric Anesthesiology Fellows and Residents are welcome to join us for a Special Reception.

Saturday May 6th, 2023, starts with bright an early with **The Research Network Symposium** from 7am-10am. Registration for this session is required. Our main stage program starts the day with a continuation of the **Sol Shnider Clinical Track** with practical talks and discussions on Intraoperative Pain, PDPH and Getting Resources to Your Unit. These sessions are followed by the popular "Best Case Reports" session featuring a panel of SOAP Past Presidents to add to the commentary. Lunch features some sponsored options or venture out with friends. Following lunch, join us for the **Annual ASA Update** from ASA President Michael Champeau. Next, we offer the most anticipated annual lecture, The Gerard W. Ostheimer Lecture led by Dr. Pervez Sultan which offers a year of review of the best papers in our field. Following this lecture, please join us for several important announcements on SOAP initiatives and the annual award presentations. To finish our educational day, we feature a case report breakout room session with presentations highlighting severe comorbidities

On our last day of the meeting, Sunday May 7th, don't miss our **SOAP/ASRA panel** exploring different perspectives on the thrombocytopenic patient. This will be followed by our last concurrent sessions of the meeting, the **Sol Shnider Track** and the final **Oral Poster Presentation** sessions. Our meeting concludes with a joint Research Abstract and Case Report presentation sessions in our breakout rooms.

Want opportunities to Collaborate and Network at the Meeting?

New this year, our **Special Interest Groups (SIGs)** will have an opportunity to meet during the continental breakfast period in the Exhibit Hall on both May 4th and 5th prior to the start of the presentation. If you are a member of one of these groups, please join in on the discussion and for any attendee interested in joining one of these groups, please grab some breakfast and pull up a chair to one of the tables.

Want to Explore New Orleans?

Consider forming a team (up to 5 people) and participating in our first ever **SOAP Scavenger Hunt**, where teams compete by venturing to and capturing photos of various New Orleans iconic areas and places. Watch your email for more information on how to sign up and competition rules.

If you are looking to network and have a great meal, look on our website for more information about **"SOAP Dine Arounds"**.

Can't Make it the Meeting this Year?

Register for our Virtual Highlights session and capture some of the meetings best sessions without the travel.

Sincerely, Heather C. Nixon, MD Annual Meeting and Live Events Committee, Chair

Klaus Kjaer, MD, MBA President





On behalf of the SOAP Board of Directors and the 2023 Annual Meeting & Live Events Committee, we are delighted to welcome you to the Society for Obstetric Anesthesia and Perinatology (SOAP) 55th Annual Meeting, May 3-7, 2023.

Educational Program

This meeting is dedicated to Building Stronger Care Systems and Teams: Pursuing Personalized Maternal Care.

Heather C. Nixon, MD Chair, Annual Meeting and Live Events Committee

Klaus Kjaer, MD, MBA President



DON'T FORGET!

Your registration also includes the Virtual Highlights event, June 3-4, 2023.

The virtual event will leverage a curated offering of popular recorded content from this in-person event plus new, original content.

Thank You Planning Committees

ANNUAL MEETING AND LIVE EVENTS

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Rebecca D. Minehart, MD, MEd

Vice Chair

David Gambling, MB, BS, FRCPC

Tom Klumpner, MD

Amy Lee, MD

Pervez Sultan, MD

Brandon Togioka, MD

With special thanks to members of the following subcommittees who volunteered their time and expertise to the planning of the 55th Annual Meeting.

Locations and Logistics Subcommittee (Chair: Amy Lee, MD)

Platforms and Technology Subcommittee (Chair: **Tom Klumpner, MD**)

Annual Curricular Planning Subcommittee (Chair: **Rebecca D. Minehart, MD, MEd**)

CME Subcommittee (Chair: Robert R. Gaiser, MD, FASA)

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Kaede Watanabe, MD Saitama Medical Center, Saitama Medical University Saitama, Japan

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Rachel Weeks, MS2 Long Island Jewish Medical Center New Hyde Park, New York

Amber Wesoloski, BS/BSc Vanderbilt University Medical Center Nashville, Tennessee

Cynthia Wong, MD University of Iowa Iowa City, Iowa

Cristina Wood, MD Colorado Fetal Care Center, Children's Hospital Colorado Aurora, Colorado

Annastacia Woytash, DO Vanderbilt University Medical Center Nashville, Tennessee **Amy Yan, MD** Northwestern University Feinberg School of Medicine Chicago, Illinois

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Alla Yarmosh, MD, MCR Stanford University Stanford, California

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Mary Yurashevich, MD, MPH Duke University Medical Center Department of Anesthesiology

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Jack Zeitz, BSA Texas A&M Health Science Center College of Medicine Bryan, Texas Kalissa Zhang, MD Stony Brook University Hospital Stony Brook, New York

NA ZHAO, MD Beijing Obstetrics and Gynecology Hospital, Capital Medical University Beijing, China

Jie Zhou, MD, MS, MBA University of Massachusetts Chan School of Medicine, USA Worcester, Massachusetts

Khader Zimmo, MD Western University London, Ontario



Program Information

Overall Accreditation Statement

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American Society of Anesthesiologists and the Society for Obstetric Anesthesia & Perinatology.

The American Society of Anesthesiologists is accredited by the ACCME to provide continuing medical education for physicians.

Workshops WEDNESDAY

Optional Workshops

8:00am - 5:00pm

Focused Assessed Transthoratcic Echocardiography (FATE) Course

The American Society of Anesthesiologists designates this live activity for a maximum of 8.0 AMA PRA Category 1 CreditsTM. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

1:00pm - 5:00pm

Concurrent - workshops (optional)

Peri-Operative Point-of-Care (POCUS) Ultrasound

The American Society of Anesthesiologists designates this live activity for a maximum of 4.0 AMA PRA Category 1 CreditsTM. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

2023 SOAP Annual Meeting

The American Society of Anesthesiologists designates this live activity for a maximum of 26.50 AMA PRA Category 1 CreditsTM. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

About This Meeting

The Biden administration has made a major push to address the nation's maternal health crisis. A 70-page plan has been developed that is aimed at taking the United States from being the worst place to give birth, to the best. The plan provides a set of 50 actions and a \$470 million budget request to expand the workforce. As such, anesthesiologists will play a major role in the plan. This learning activity will prepare the anesthesiologist to assume the role needed to enact and to complete the plan, with a resulting improvement in maternal mortality.

Target Audience

This meeting is intended for Anesthesiologists, Anesthesiologists Assistants, CRNAs, Nurses, Resident/ Fellows, and Medical Students interested in the recent advances in obstetric anesthesia and the application of these advances to their practice.

Mission of the SOAP Annual Meeting and Live Events Committee

The mission of the AMLE Committee is to provide anesthesiologists, obstetricians, and other physicians and members of related allied health specialties with the knowledge that will reinforce past learning as well as disseminate new concepts, practices, and skills involving anesthesia and analgesia for the pregnant patient.

Participation in the SOAP 55th Annual Meeting

Attendance is open to all health practitioners, provided that they have registered for the meeting. CME credit will only be offered to those with an MD, DO or equivalent.

Educational Format

CME activities may include the following formats: plenary sessions, debates, lectures, poster discussions, oral abstracts, problem-based learning, and skill-set workshops.

Annual Meeting Objectives

At the completion of this conference the participants should be able to:

- 1. Improve the care of the parturient through better understanding of the physiology of pregnancy and the impact of maternal disease especially in regard to the hematologic system, incorporating point-of-care testing.
- 2. Impact positively maternal mortality in the United States through improved collaboration and team work with all members who work on labor and delivery
- 3. Utilize an evidence-based approach when caring for the pregnant patient in the development of an analgesic plan that optimizes both analgesia and patient safety
- 4. Implement practices in the anesthetic management of the parturient undergoing cesarean section that will enhance recovery and provide postpartum analgesia using minimal opioids.
- 5. Advocate on behalf of the parturient as governmental legislation has greater impact on maternity care in the United States
- 6. Incorporate recommendations in the management of the pregnant patient who requires analgesia/anesthesia and who is considered a high risk patient because of abnormalities in the cardiovascular or hematologic system.

Special Needs Statement

The American Society of Anesthesiologists and the Society for Obstetric Anesthesia and Perinatology are committed to making its activities accessible to all individuals and fully comply with the legal requirements of the Americans with Disabilities Act and the rules and regulations thereof. If you are in need of an accommodation, please do not hesitate to submit a description of your needs in writing to membership@soap. org.

Disclosure Policy

The American Society of Anesthesiologists remains strongly committed to providing the best available evidence-based clinical information to participants of this educational activity and requires an open disclosure of any potential conflict of interest identified by our faculty members. It is not the intent of the American Society of Anesthesiologists to eliminate all situations of potential conflict of interest, but rather to enable those who are working with the American Society of Anesthesiologists to recognize situations that may be subject to question by others. All disclosed conflicts of interest are reviewed by the educational activity course director/chair to ensure that such situations are properly evaluated and, if necessary, resolved. The American Society of Anesthesiologists educational standards pertaining to conflict of interest are intended to maintain the professional autonomy of the clinical experts inherent in promoting abalanced presentation of science. Through our review process, all American Society of Anesthesiologists of independent, objective, scientifically balanced presentations. Disclosure of any or no relationships will be made available for all educational activities.

How to Receive CME Credit

To receive credit, participants must access the ASA Education Center, review the meeting information, and complete the evaluation. Further instructions will be emailed to each participant immediately prior to and after the activity.

Disclaimer Statement

The information provided at this accredited activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a healthcare provider relative to diagnostic and treatment options of a specific patient's medical condition.



SESSION DESCRIPTIONS

Pre-Meeting Workshops

Focused Assessment Transthoracic Echocardiography (FATE) Course

This hands-on workshop will include a practice of standard TTE windows on patient models and a review of the pre-course materials. Attendees will review 4-5 clinical OB-Anesthesia related cases (1-Pulmonary Embolism, 2-Preeclampsia, 3-Peripartum CMP, 4-Amniotic Fluid Embolism, 5-Hypovolemic shock/PPH) and rotate through stations.'

Peri-operative Point of Care Ultrasound (POCUS)

POCUS workshop covering Gastric-, Neuraxial-, Airway-, and FAST(abdominal) ultrasound. Focus of the workshop will be hands-on training on patient models with brief, 10-15 minutes lectures on each topic.

Sessions

Best Case Reports

This live presentation highlights some of the most well-written and interesting case reports submitted to the Annual Meeting. Cases were selected to represent a wide range of topics from various institutions and are sure to foster lively discussions among the panelists. There will be author and audience participation, via virtual chat function, to encourage interactive discussion. This engaging session will be moderated by Dr. Jennifer Dominguez, and will feature panelists Dr. Bill Camann, Dr. Joy Hawkins, and Dr. Barbara Scavone.

Best Paper Competition

This curated session includes presentations from the top rated and most impactful research abstracts submitted this year. Presenters compete for the title of SOAP Annual Meeting Best Paper via presentations and a questionand-answer session. This competition will be moderated by Dr. Ashraf Habib, Research Committee Chair and distinguished researcher in the obstetric anesthesiology field.

Case Reports Abstract Sessions

These moderated sessions, scheduled for Thursday, Saturday, and Sunday, are designed to highlight educationally valuable case reports submitted and presented by obstetric anesthesiology fellows and residents across the country. There will be opportunities to participate and ask questions regarding some of the most challenging clinical scenarios our presenters have encountered.

Research Abstracts Sessions

These moderated sessions, scheduled for Friday and Sunday, showcase the state-of- the-art research being conducted in obstetric anesthesia.

Oral Presentations

Oral presentations of diverse, high-quality and handselected peer-reviewed scientific research related to obstetric anesthesia will be presented, followed by a moderated question-and-answer session.

Gertie Marx Research Competition

Named in memory of obstetric anesthesia pioneer Gertie Marx, this research competition highlights the best quality research performed by our trainees (medical students, residents and fellows). Five presenters will compete in this judged competition, moderated by Dr. Brian Bateman.

Fred Hehre Lecture

This session offers reflections from a renowned member of the obstetric anesthesia community, which bring insights into scope of practice changes over time and focuses on what matters most to the art and science of obstetric anesthesia practice. This year's Fred Hehre lecturer will be obstetric anesthesia legend Dr. Vernon Ross.

Gerard W. Ostheimer Lecture

Always a highlight and one of the most highly anticipated sessions of the meeting, the Gerard W. Ostheimer lecture is a review of important, relevant, and practice-changing literature related to obstetric anesthesia, obstetrics, perinatology, and allied medical disciplines that was published in the preceding calendar year (2023). This digestible synthesis of the literature analyzes the clinical impact of published works and latest evidence-based advances in the field of obstetric anesthesia. This year's Ostheimer lecturer will be Dr. Pervez Sultan.

SOAP Distinguished Service Award Presentation & Awards Ceremony

Join us as we honor Dr. Brenda Bucklin, 2023 recipient of SOAP's highest honor, the 2023 Distinguished Service Award. Dr. Bucklin will be introduced by Dr. Joy Hawkins. This session will also include Dr. Klaus Kjaer, SOAP President, announcing recipients of the Gertie Marx and Best Paper Competitions, Teacher of the Year Awards, Research in Education, Frederick P. Zuspan Award, Patient Safety Award, and the Diversity and Inclusivity Award. Don't miss it!

Keynote – "Teaming"

The keynote presentation is by Dr. Amy Edmondson, best-selling author of "Teaming: How organizations learn, innovate and compete in the knowledge economy," A professor at Harvard Business School, she'll talk about the importance of psychologic safety and how our abilty to "team" supports our collective success in our dynamic and clinically challenging workplace.

President's Panel: Optimizing Anesthesia Teams: Stories from the Front Line

The session will be moderated by Dr. Klaus Kjaer and including panelists Alex Butwick, MD, Rayna Clay, MD, Beth Clayton, DNP, Amy Edmondson, PhD and Cheryl Parker, DNP, CRNA.

OAA/SOAP Panel: Strategies to implement national and institutional change in response to CEMACH and MBRACE findings

The session will be moderated by Dr. Roniesha McClendon and feature panelists Dr. Chris Elton (OAA) and Dr. Veronica Gillispie-Bell. Panelists will review the state of maternal health surveillance and results in the US, drivers of maternal mortality, solutions for change to improve outcomes and solutions to achieve health equity.

MFM Session: Obstetric Team Care in the post-Dobbs Era

The session will be moderated by Dr. Roniesha McClendon and feature Dr. Veronica Gillispie-Bell, Medical Director, Louisiana Perinatal Quality Collaborative and Pregnancy Associated Mortality Review. In this presentation, attendees will learn the drivers of maternal morbidity and mortality in the US, as well as the pathway to improvement. Changes in the healthcare landscape are proving to be an additional barrier to care. At the end of the presentation, attendees will be able to identify how they can individually contribute to improving maternal outcomes, while navigating through the changing landscape, all through a lens of equity.

ASRA/SOAP Panel - A Tailored Approach to Management of the Thrombocytopenic Patient

This joint panel moderated by Roulhac "D'Arby" Toledano will feature Dr. Melissa Byrne representing ASRA, and Dr. Melissa Bauer and Dr. Lisa Leffert, representing SOAP, as they provide thoughtful discussion surrounding thrombocytopenia. This session will discuss SOAP and ASRA consensus statements and guidelines and how to apply them in patient scenarios to aid in clinical decision-making.

ASA Update

SOAP is honored to host Dr. Michael Champeau, President, American Society of Anesthesiologists, for an update on the work of the ASA. SOAP President Dr. Klaus Kjaer will provide the introduction.

Clinical Track

Sol Shnider Clinic Track – Session #1

The Sol Shnider clinical track session #1 will cover clinically relevant reviews and updates for important topics such as "Personalized v. Protocolization" by Dr. Hans Sviggum and Dr. Scott Segal, "Opioid Rx" by Dr. Britany Raymond, and "Drug & Equipment Shortages" by Dr. Daniel Katz. This session will be moderated by Dr. Tiffany Angelo.

Sol Shnider Clinic Track – Session #2

The Sol Shnider clinical track session #2 will cover clinically relevant reviews and updates for important topics including "Intraoperative Breakthrough Pain Case" by Dr. Heather Nixon, "PDPH Acute and chronic effect" by Dr. Jess Ansari, and "Resources on your Unit – Customizing What Staff you Need for Your Patient Population" by Dr. Rayna Clay. This session will be moderated by Dr. Emily Dinges.

Sol Snider Clinical Track – Session #3

The Sol Shnider clinical track session #3 will cover clinically relevant reviews and updates for important topics including "Dural Puncture Epidural v. Other Neuraxial" by Dr. Anthony Chau, "POCUS in the Emergency – How Can We Guide Care" by Dr. Clemens Ortner, and "Barriers to Optimal Staffing" by Dr. Mark Zakowski. The session will be moderated by Dr. Greg Palleschi.

SOAP Research Network Symposium

The second iteration of the SOAP Research Network Symposium provides the opportunity to present research proposals to SOAP's network of research experts, who will provide constructive feedback on rigor, relevance, methodology, ethics, feasibility, and fundability of research ideas and discuss opportunities for potential project collaborators. This is an excellent opportunity to receive constructive feedback with the goal of everyone in the SOAP research community supporting everyone's excellent research!



SOAP 2023 Program Schedule

WEDNESDAY, MAY 3

8:00am – 5:00pm Focused Assessed Transthoratcic Echocardiography (FATE) Course Bayside ABC (4th floor) Faculty:

- 1. Jennifer Banayan, MD Northwestern University
- 2. Kaitlyn Brennan, MD Vanderbilt University
- 3. Ana Ramirez Chapman, MD UT Houston
- 4. Jean Marie Carabuena, MD Brigham and Women's Hospital
- 5. Caroline Thomas, MD University of Chicago
- 6. Ian Gaston, MD Northwestern University
- 7. Emily Stockert, MD Stanford University
- 8. Hokuto Nishioka, MD University of Illinois Chicago
- 9. Clemens Ortner, MD Stanford University
- 10. Ivan Velikovic, MD SUNY Downstate Health Science University
- 11. Waseem Athar, MD University of Arkansas Medical School
- 12. Ana Sjaus, MD Dalhousie University, Halifax
- 13. Elizabeth Ozery, MD Kaiser Permanente Oakland Medical Center
- 14. Naola Austin, MD Stanford University

1:00pm – 5:00pm Peri-Operative Point-of-Care (POCUS) Ultrasound Oak Alley (4th floor)

Faculty:

- 1. Cristian Arzola, MD University of Toronto
- 2. Jackie Galvan, MD UTSW Medical Center
- 3. Brinda Kamdar, MND MGH, Harvard
- 4. Jose Carvalho, MD Mount Sinai Hospital, University of Toronto
- 5. Fabricio Zasso, MD Mount Sinai Hospital, University of Toronto
- 6. Naveed Siddiqui, MD Mount Sinai Hospital, University of Toronto
- 7. Yusuke Mazada, MD Saitama Medical Center, Saitama Medical University, Japan
- 8. Javier Cubillos, MD Western University, London, Ontario
- 9. Naida Cole, MD University of Chicago
- 10. Leziga Obiyo, MD University of Chicago
- 11. Sangeeta Kumaraswami, MD Westchester Medical Center
- 5:00pm Educational Programming Adjourns for the Day

6:00pm -8:00pm Welcome Reception - Sheraton Hotel

THURSDAY, MAY 4

Continental Breakfast in Expo Hall 7:00am – 9:00am 7:00am - 7:45am Special Interest Group Roundtable Discussions 7:50 am - 8:00 am **Opening Remarks** Klaus Kjaer, MD, MBA 8:00am - 9:00am **KEYNOTE LECTURE: Teaming** Amy Edmondson, PhD 9:00am - 10:00am President's Panel: Optimizing Anesthesia Teams: Stories from the Front Line Klaus Kjaer, MD Moderator: Alex Butwick, MD Speakers: Rayna Clay, MD Beth Clayton, CRNA, DNP Cheryl Parker, CRNA, DNP Amy Edmondson, PhD 10:00am – 10:30am BREAK IN THE EXPO HALL 10:30am – 11:15am OAA/SOAP Panel: Strategies to implement national and institutional change in response to CEMACH and MBRACE findings Moderator: Roniesha McClendon, MD Speakers: Chris Elton, MD; President, OAA Veronica Gillispie-Bell, MD, MAS; Medical Director, Louisiana Perinatal Quality Collaborative and Pregnancy Associated Mortality Review 11:15am - 12:15pm LUNCH ON YOUR OWN 11:15am – 12:15pm Sponsor Lunch (NO CME) – pre-registration required PACIRA - Grand Couteau (5th floor) 12:30pm – 1:30pm **Best Paper Competition** Moderator: Ashraf Habib, MD Judges: Katie Arendt, MD Michaela Farber, MD Ron George, MD Phil Hess, MD Grace Lim, MD Feyce Peralta, MD 1. Uterine Tone Scores and Clinical Phenotype Correlate Closely with Oxytocin-Induced Increases in Uterine Smooth Muscle Calcium – Jessica Ansari, MD 2. Development And Validation of an Index Score for Predicting the Risk Of Postpartum Depression - Jean Guglielminotti, MD, PhD 3. Structural Racism and Use of Labor Neuraxial Analgesia Among Non-Hispanic Black People – Jean Guglielminotti, MD, PhD 4. Dural Puncture Epidural is Superior to Standard Epidural for Epidural Extension Anesthesia in Elective Cesarean Delivery: A Double-Blind Randomized Controlled Study - Nadir Sharawi, MB, BS

- 5. The Pharmacokinetics and Pharmacodynamics Of Oxytocin at Cesarean Delivery -David Monks, MBChB, FRCA, MSc
- 6. A Single-Cell Immune Profiling Approach to Identify Predictive Biomarkers Of Clinical Recovery Following Cesarean Delivery – James O'Carroll, MBBS, FRCA
- 1:30pm 2:15pm Optimizing Reproductive Health Moderator: David Gambling, MD
 - Reproductive Implications of Care By the Anesthesiologist Andrea Traynor, MD
 - Care for Second Trimester Terminations Peter Mancini, MD
 - Complications from Limited Reproductive Health Access Cristina Wood, MD
- 2:15pm 2:45pmBREAK IN THE EXPO HALL2:45pmEXPO HALL CLOSES FOR THE DAY

2:45pm – 3:45pm MFM Session: Obstetric Team Care in the post-Dobbs Era Moderator: Speakers: Roniesha McLendon, MD Veronica Gillispie-Bell, MD, MAS; Medical Director, Louisiana Perinatal Quality Collaborative and Pregnancy Associated Mortality Review

3:45pm – 5:45pm Case Reports - Abstract Breakouts (4th floor)

Breakout 1: Placental Accreta & PPH (Bayside A)

- 1. Undiagnosed Focal Accreta: Postpartum Hemorrhage Surprises Brian Waldman, MD
- 2. Perioperative management of Jehovah's Witness Patient with Placenta Accreta During Caesarean Delivery with Hysterectomy – Andrew Hong, MD
- 3. Expecting the Unexpected: An Anesthesiologist's Role in Unexpected Placenta Accreta Bianca Rich, MD
- 4. Anesthesia for Cesarean Hysterectomy complicated by Placenta Increta after Radical Trachelectomy Akram Hossain, MD
- 5. Obstetric Anesthesia Considerations in a Trauma Patient Shabnaz Rob, DO
- 6. Undiagnosed Placenta Accreta Spectrum Complicating a Second Trimester D&E for Intrauterine Fetal Demise Jessica Galey, MD
- 7. A Case of Interventional Radiology Embolization of Broad Ligament Hemorrhage in a Patient Undergoing Cesarean Delivery Jilyan Decker, MD
- 8. Factor XI Deficiency Postpartum Hemorrhage After Necessary Precautions Dallin Gould, DO
- 9. Management of a Jehovah's Witness parturient at high risk for postpartum hemorrhage Emmarie Myers, MD
- 10. Misoprostol administration resulting in ICU admission Danielle Esnard, MD
- 11. A Parturient with Factor VII Deficiency in Pregnancy: A Case Report Sana Rukh, MD, MPH

Breakout 2: Cardiac #1 (Bayside B)

- 1. Anesthetic Management During Cesarean Delivery of a Parturient with Left Ventricular Noncompaction Cardiomyopathy Emmarie Myers, MD
- 2. Anesthetic Management of Previously Undiagnosed Partial Anomalous Pulmonary Venous Return in Pregnancy – Phillip Callihan MD, PhD
- 3. Neuraxial Anesthesia for Dilation and Curettage in a Patient with Fontan

Circulation – Robin Pham, DO

- 4. Anesthetic Management for the Parturient with Wolff-Parkinson-White Syndrome – Courtney Hood, MD
- 5. Repeat Cesarean Delivery in a Patient with an an Acute and Evolving Non-ST Elevation Myocardial Infarction (NSTEMI) David Gutman, MD, MBA, FASA
- 6. Labor Analgesia in Patient with Fontan Circulation Ben Schmitt, DO
- 7. Sepsis and a Failing Heart Nitya Reddy, MD
- 8. Management of an Urgent Cesarean Section in a Patient with Unknown Severe Pulmonary Hypertension, Obesity, Heart Failure with Reduced Ejection Fraction and Prior Classical Cesarean Section – Tyler Guidugli, DO
- 9. Transcatheter Aortic Valve Replacement for Critical Aortic Stenosis in a Parturient Alex Tobias MD
- 10. Getting to the Heart of the Matter: A Case of Peripartum Cardiomyopathy Leading to Heart Transplantation Domenic Pedulla, MD
- 11. Point-of-Care Ultrasound Expedites Coordination of Care in An Obstetric Patient with Compressing Mediastinal Mass Undergoing Vaginal Delivery Linjia Jia, MD
- 12. Successful Cesarean Section in a Patient with a HeartMate3 Left Ventricular Assist Device – Katelyn Scharf, MD

Breakout 3: Complex Cesarean, Pain & Opioids (Bayside C)

- 1. Spinal Dexmedetomidine as an Adjuvant for Complex Cesarean Deliveries -Reporting On Two Cases - Karim Shuaib, MD
- 2. Ultrasound Guided Sacroiliac Joint Injection for Pregnant Women with Sacroiliac Joint Pain Kimpreet Kaur, DO
- 3. Remifentanil Infusion As A Bridging Technique for Placement of Neuraxial in A Parturient with Chronic Pain David Hundley
- 4. Management of Opioid Withdrawal In Peripartum- A Case Report Shibinath Velutha-Mannil
- 5. Sickle Cell Disease Complicated by Difficult Pain Management And Additional Hgb Mutations - Dillon Sooknanan, MD
- 6. Patient with polysubstance abuse at postdates gestation, presenting with severe pain Phillip Callihan, MD, PhD
- 7. Complex Cesarean Sections and Patient Comfort Celsie Channell, CAA
- 8. Perioperative Management and Urgent Cesarean Delivery of a Complicated Patient with Severe Sickle Cell Disease and Acute Fatty Liver - Yoga Dasari, D.O.
- 9. Internal Hernia Leading to Catastrophic Midgut Infarction in a Parturient Amy Yan, MD
- 10. Management of Interscapular Pain Associated with Labor Epidural Analgesia Alexander Samworth, MD
- 11. Trial of Labor After Cesarean Section Resulting in Rupture of the Uterus, Bladder, and Vagina Sujata Datta, MD
- 12. Provider Beware: Reactive Airway Mellany Stanislaus, MD
- 13. Bladder Distension For Baby Barrier: Successful Ultrasound-Guided Pubic Symphysis Joint Injection During Pregnancy - Emily Bero, MD
- 14. Uterine Rupture: How Can We Improve Maternal Safety? Stacy Moroz, BS

Breakout 4: Coagulation & AFE (Edgewood A&B)

- 1. The Management for Thrombocytopenic Purpura in Pregnancy Allen Wang MD
- 2. Labor epidural placement in a patient with von Willebrand disease type 2B: would you do it again? Anjana Kumar, MD
- 3. Thromboelastography Guided Neuraxial Placement in Parturients with HELLP: A Case Report Jean He, MD

- 4. "The Road to Hell is Paved with Good Intentions"- A First Case Report of Anaphylaxis to Tranexamic Acid in an Obstetric Patient - Dominika Dabrowska, MD, FRCA
- 5. Ultrasound-Assisted Thrombolysis for Pulmonary Embolism after Cesarean Section William Perez, MD
- A Case Report of a Super-Super Obese patient with suspected Pulmonary Embolism requiring neuraxial anesthesia for high-risk C-section - Wilfredo Borroto, MD
- 7. Management of Parturient with Fontan Physiology Neha Agrawal, MD
- 8. Flatline ROTEM: Machine Error or Amniotic Fluid Embolism? Christian Tilley, MD
- 9. An Uncommon Initial Presentation of Amniotic Fluid Embolism Daniel Webster, MD
- 10. Amniotic Fluid Embolism: An Atypical Presentation Jace Battrell, MD, MSMP
- 11. Delivery After Amniotic Fluid Embolism: Should We Prepare for Recurrence? -Shannon Haley MD, PhD
- 12. Amniotic Fluid Embolism and PEA Arrest in a Patient with Placenta Accreta Spectrum Kaitlyn Gagat, MD

Breakout 5: Fetal Surgery, Neonatal Outcomes & Ethics (Gallier A&B)

- 1. A double diagnosis: aortic dissection and pregnancy Grace DeSena, BA
- 2. Peri-delivery management of a patient with acute psychosis lacking decisionmaking capacity - Catherine Bergeron MD
- 3. To Tie or Not to Tie? Ethical Considerations for Sterilization Procedure for Pregnant Patient with Schizophrenia - Kathleen Daly-Jensen
- 4. Patient Advocacy: Considerations for Quality of Life and Ethics Regarding Reproductive Rights and Neonatal Palliative Care for Fetuses with Congenital Anomalies - Elia Rieder MD
- 5. Preparedness for Plan D, When Plans A-C Fail; Planning and Ethical Considerations for a Parturient in Psychosis During Labor - Lauren Newhouse, MD
- 6. EXIT to Airway Anesthetic for a Fetal Neck Teratoma Jennifer Tripi, MD
- 7. Multidisciplinary Management of Severe Hemolytic Disease of the Fetus and Newborn Requiring Multiple Intrauterine Transfusions Patricia Fuentes n/a
- 8. An Unexpected Weekend EXIT Lana Glantz, MD
- 9. A Case Report of Maternal Death and Disparities in Obstetric Health Care -Michael Luba, BS
- 10. Spinal Anesthesia for Cesarean Delivery in Pregnant Teenager Borislava Pujic
- 11. Are Anesthesiologists the Right Persons to Perform Neonatal Resuscitation? Manuel Vallejo, MD

Breakout 6: Post Dural Puncture Headache (PDPH) (Southdown)

- 1. Epidural Blood Patch in a Parturient with Subdural Hematoma and Midline Shift -Andrew Sprowell, MD
- 2. Epidural labor analgesia after prior epidural blood patch with fibrin sealant Laurie Chalifoux MD, FASA
- 3. Treatment of Post-Dural Puncture Headache with Atropine/Neostigmine Combination – Mary Roberts, MD
- 4. A Case of Pneumocephalus with Atypical Symptoms Following Labor Epidural -Thomas Dunne, MD
- 5. Intraparenchymal Hemorrhage in the Postpartum Patient Walter Taylor, MD
- 6. Post Epidural Blood Patch Complications: What to anticipate? Vache Naljian, MD
- 7. Cerebral venous sinus thrombosis following epidural blood patches for postdural puncture headache - Wilhelmina Tan

8.	Clinical Course of Pneumocephalus Complicated by Postdural Puncture
	Headache After Labor Epidural Anesthesia - Henry Tran, MS3

- 9. Nebulized Dexmedetomidine in the Treatment of Obstetric Post-Dural Puncture Headache: A Case Report - Jeffrey Thomas, DO
- 10. Treatment of Postdural Puncture Headache with Neostigmine and Atropine after Unintentional Dural Puncture with a Tuohy Needle - Erica Coffin, MD
- 11. The L5-S1 interspace in Difficult Spinal Anatomy Lessons Learned from Inadvertent Dural Puncture Management in a Patient with Cerebral Palsy and Severe Scoliosis - Neha Agrawal, MD

Breakout 7: Preeclampsia (Oak Alley)

- 1. Peripartum Cardiomyopathy and Operating Room Placement of Sheaths For Extra-Corporeal Membrane Oxygenation Prior to Cesarean Delivery in A Morbidly Obese Parturient - Terry James Biel MD, MBA
- 2. Complete Heart Block Mimicking Seizures in Parturient with Severe Features of Preeclampsia - Hebah Ismail, MD
- 3. Arterial Ischemic Stroke in a Parturient with History of Migraine Headaches Nicole Dayton, MD
- 4. Atypical Case of Delayed Onset Postpartum Eclampsia Guillermo Loyola, OMS-III
- 5. Pregnancy-associated Aortic Dissection and Anesthetic Complications in Marfan Syndrome - Grace DeSena, BA
- 6. Late onset of Postpartum Posterior Reversible Encephalopathy Syndrome Following Obstetric Hemorrhage - Mirjana Kendrisic
- 7. Difficult Airway in Preeclamptic Patient Erica Coffin, MD
- 8. Emergency Cesarean for a Patient with Atypical Hemolysis, Elevated Liver Enzymes, and Low Platelet Syndrome Complicated by Ruptured Subcapsular Hematoma - Phillip Callihan, MD, PhD
- 9. Case Report: Urgent Repeat Cesarean Delivery Due to Preeclampsia with Severe Features In Jehovah's Witness with Decompensated Cirrhosis - Ling-Qun Hu, MD, FASA
- 10. Unexpected Prolonged Neuromuscular Blockade in an Eclamptic Patient Requiring Emergent Cesarean Delivery - Kathryn Clark, MB, BCh, BAO
- 11. Anesthetic Management for Cesarean Delivery for Patient with Surgically Corrected Spina Bifida Cystica with Neurologic Deficits And Pre-Eclampsia -Madeline Bireley, MD
- 12. Perioperative Management of Caesarean Delivery for Patient with Alcoholic Cirrhosis and Esophageal Varices Madeline Bireley, MD
- 5:45pm Educational Programming Adjourns for the Day
- 7:00pm DINNER ON YOUR OWN Explore New Orleans

FRIDAY, MAY 5

- 7:00am 9:00amContinental Breakfast in Expo Hall7:00am 7:45amSpecial Interest Group Roundtable Discussions in Expo Hall
- 8:00am 10:00am Abstract Breakouts (4th floor)

Breakout 1: Uteronics, PPH & PAS (Bayside A)

- 1. Oxytocin vs carbetocin at cesarean delivery in parturients with class III obesity: Double-blind, randomized control, non-inferiority trial. – William Turner, MSc, MD
- 2. Relevant Factors Associated with Post-Partum Hemorrhage in a Rural Medical Center – Manuel Vallejo, MD
- 3. Anaesthetic Management of Placenta Accreta Spectrum in a UK tertiary centre: A cohort study of 34 cases. – Camilla Gordon, BSc, BM BCh, FRCA
- 4. Development and Validation of a Prognostic Model for Postpartum Haemorrhage – Brendan McCaffrey, MBChB
- 5. Placenta Accreta Spectrum with conservative management: Leaving Placenta In Situ (LPIS) Jennifer Hoayek, MD
- 6. Antithrombotic Management and Bleeding Complications Among Pregnant Patients with Atrial Fibrillation and Atrial Flutter: A Retrospective Cohort Study Using the Premier Database - Liliane Ernst, MD
- 7. Association of the 0-10 Uterine Tone Score with Uterotonic Administration in Cesarean Delivery Daniel Tobes, DO
- 8. Institutional Comparison of Demographic Variables in Patients Receiving Neuraxial versus General Anesthesia for Cesarean Section – Yannan Huang, BA
- 9. Understanding Local Contributors to Maternal Hemorrhage in Cesarean Delivery - Beth Clayton, DNP, CRNA, FAANA, FAAN
- 10. Quantifying the Accuracy of Clinician Risk Assessment for Postpartum Hemorrhage Ashley Lewis, MD
- 11. Effect of Tranexamic Acid on Blood Loss during Cesarean Hysterectomy for Placenta Accreta Spectrum Disorder – Alex Darwish, MD

Breakout 2: Neuraxial Anesthesia for Cesarean Delivery (Bayside B)

- 1. Pain during cesarean delivery: a patient-related outcome study assessing the incidence and risk factors for pain and intravenous medication during cesarean delivery Jose Sanchez, BS
- 2. Dexmedetomidine for maternal shivering during cesarean delivery: Impact on core maternal temperature Sagar Patel, MD
- 3. Comparison Between Traditional Seated Position Versus Seated Position with Dorsal Table Tilt on Time to Successful Spinal Placement in Elective Cesarean Deliveries: A Prospective Trial – Thomas Gruffi, MD
- 4. Time to first recognition of postpartum abnormal sensorimotor deficits following neuraxial anesthesia or analgesia a retrospective cohort study Thomas Yang, BMBS, FANZCA
- Comparison of motor block regression times following spinal and epidural anesthesia for cesarean delivery – a retrospective cohort study – Kathryn Clark, MB, BCh, BAO
- 6. Conversion of labor analgesia for intrapartum cesarean delivery: dural puncture epidural vs combined spinal epidural vs epidural Kathryn Clark, MB, BCh, BAO
- 7. Does Epidural Technique for Cesarean Sections Impact Patient Satisfaction? Teshi Kaushik, MD

- 8. Surgical Sensation During Caesarean Section: A Qualitative Analysis Taylor Mouliakis
- 9. Effect of intrathecal hyperbaric bupivacaine dose on the duration of urinary catheterization for patients who underwent cesarean delivery: a retrospective study Anjali James, BS
- Agreement between laterality of the epidural electrical stimulation test and color flow doppler used to confirm epidural catheter placement during labor analgesia: a prospective observational study – Juan Morales, MD
- Characteristics of the Epidural Electrical Stimulation Test and Pressure Waveform to confirm epidural catheter placement in pregnant people with BMI ≥50 kg/m2 – Jose Carvalho, MD
- 12. Differential sensory block during labor epidural analgesia: a prospective observational study to investigate the relationship of lower and upper sensory block levels to cold, pinprick and light touch Jose C.A. Carvalho, MD, PhD

Breakout 3: Cardiac & HTN (Bayside C)

- 1. Digitization of a labor and delivery unit hypertension treatment protocol is associated with faster time to treatment and reduced hypertensive episode duration Jennifer McAlister, PharmD
- Predicting Morbidity and Need for Anesthesia Interventions in Parturients with Acquired and Congenital Heart Disease: Use of the Obstetric Comorbidity Index – Noor Raheel, MBChB, MPH
- 3. Reliability of Icd-10 Codes in Identifying Post-Cesarean Delivery Surgical Site Infections Unyime Ituk, MBBS, FCARCSI
- 4. Management of the Obstetric Patient with Class III Obesity Alexander Samworth, MD
- 5. Improving Cesarean Hemorrhage Through the Use of a Protocolized Checklist; a Quality Improvement Initiative – Brittany Cureton
- 6. Perspectives on the Creation and Implementation of a Maternal Cardiac Care Team and Pathway at a Tertiary Care Medical Center – Michael Hart, MD
- 7. Optimising Labour Analgesia: Introducing a Two-Tier Programmed Intermittent Epidural Bolus Approach – Richard Snooks, BSc, BM, MSc, MRCEM, FRCA
- 8. Adverse Neonatal Outcomes and Definitions of Hypotension after Elective Cesarean Delivery under Spinal Anesthesia in Morbid Obesity with or without Hypertensive Disorders of Pregnancy – Jack Wang
- 9. CompuFlo Device Assisted Epidural Complications Sai Kamma, MS3
- 10. Cardiac Diseases in Pregnancy: So Many Types, So Little Time -- A Case Series - Ana Lisa Ramirez-Chapman, MD
- 11. Complex Care Coordination for Cardio-Obstetric Patients at a Tertiary Care Campus with Independent Obstetric and Cardiothoracic Surgical Hospitals – Catherine Bergeron, MD

Breakout 4: Teams, Communication & Education (Edgewood A&B)

- 1. Influence of Work Shift Type on Cesarean Delivery Decision-To-Incision-Times Hans Sviggum, MD
- 2. Effect of a multidisciplinary clinic on staffing and outcomes for cesarean hysterectomy for placenta accreta spectrum Madison Noall
- 3. Multidisciplinary Transfusion Education Decreases Avoidable Peripartum Blood Transfusion: Retrospective Observational Study – Maria Borrelli, DO
- 4. Then and Now: Assessing the Evolution of Our High-Risk Obstetric Anesthesia Clinic Stephen Ellwood, MD

5. A Simple Mobile Application to Improve Labor and Delivery Floor Communication – David Preiss, MD, PhD

6. Novel Usage of Simulation for Protocol Development: Impacted Fetal Head – Phillip Callihan, MD, PhD

7. Pre-Huddle Checklist: A Multidisciplinary Quality Improvement Project to Improve Communication and Efficiency – James Conwell, DO8. Determining minute-byminute obstetric anesthesia activity and utilization: Proof

of concept at a single large academic center Terry – James Biel, MD, MBA 9. Interventions to reduce opioid use in the postpartum period: a qualitative study

of nurses' perspectives on benefits and barriers – Tazim Merchant, BA 10. Evaluating obstetrical anesthesia grant proposal generated by artificial

intelligence (chatGPT) – Fernanda Oliveira, MD11. Factors Associated With Breastfeeding Success by Race: A Retrospective Study

- Lauren Sartor, MD

12. Female authorship over time as represented by the Gerard W. Ostheimer Lecture Series – Yostina Soliman, BA

Breakout 5: Vasopressors, Hypotension, Neonatal Outcomes (Gallier A&B)

1. Prophylactic Phenylephrine Infusion and Respiratory Morbidity in Neonates After Elective Cesarean Delivery: An Impact Study – Kiran Shah, MD

2. The Incidence of Prolonged Bradycardia Following Phenylephrine infusion for Cesarean Section: A Retrospective Analysis – Seth Landa, MD

3. Minimizing Hypotension Following Spinal Anesthesia For Cesarean Section Using a Gradual Repositioning Technique – Natasha Sinai Hede, MD

4. A Retrospective Comparison of Neonatal Acid-Base Status Before and After Discontinuing Routine Left Uterine Displacement for Elective Cesarean Delivery – Keyanna Jackson, BA

 5. Association between inpatient labetalol use during hospitalization for delivery and neonatal blood glucose and heart rate – Shakthi Jayanthy Venkatachalam, MBBS
 6. Inpatient Peripartum Labetalol is Associated with an Increased Risk of Fetal Hypoglycemia 1-hour Post-Delivery and Uterine Atony – Amnon Berger MD, PhD
 7. Infant Apgar Scores After Labor Using Opioid Free Epidural Analgesia Compared to Opioid Epidural Analgesia – Ankith Reddy, BA

8. Ropivacaine and fentanyl concentrations in umbilical cord blood and neonatal outcome after epidural analgesia administration using programmed intermittent bolus: a prospective observational study – Arisa Ijuin, MD

9. The assessment of inpatient postpartum sleep following vaginal and cesarean delivery using actigraphy – Alla Yarmosh, MD, MCR

10. Development of A Chinese Version of Obstetric Quality of Recovery-10 – Na Zhao, MD

11. Spinal Hydromorphone versus Morphine for Post-Cesarean Delivery Analgesia: A Randomized Non-Inferiority Trial - Ilana Sebbag, MD

Breakout 6: Postpartum Recovery and Depression (Southdown)

1. Identifying Patient-Centered Psychological and Social Support Needs After Traumtic Birth: A Qualitative Study – Grace Lim, MD, MS

2. An Environmental Scan of Regional Variances in Post-Cesarean PACU Care – Sherry Liou MD, MBA

3. A systematic review of patient-reported outcome measures in maternal postpartum post-traumatic stress disorder – James O'Carroll, MBBS, FRCA
4. Development and multicenter validation of the Stanford Obstetric Recovery Checklist (STORK) – Anarghya (Anya) Murthy

5. Relationship between sleep disturbances within 24 hours after cesarean delivery and postpartum depression: a retrospective cohort study – Kaede Watanabe, MD

6. Inflammatory biomarkers in the plasma and cerebrospinal fluid of patients with persistent pain and postpartum depression after elective cesarean delivery: an exploratory study – Mary Yurashevich, MD, MPH

7. Association of Anesthetic Technique for Cesarean Delivery with the Incidence of Depression or Postpartum Depression Diagnosed at the Postpartum Visit: A Retrospective Single Center Study – Elaine Avshman, BS

8. Psychological outcomes associated with severe placenta accreta spectrum disorder with cesarean hysterectomy: a retrospective survey study – Madison Noall

9. Quality of Recovery in Parturients with Obesity: A Prospective Observational Cohort Study – Khader Zimmo, MD

10. Psychological wellness and its relationship with Cesarean delivery quality of recovery and peritraumatic events: a prospective observational study – Luc Saulnier BA (Hons.), MA

11. Preliminary findings from a post cesarean delivery pain core outcome set development study – Alixandra Baycroft, MD

12. Longitudinal study evaluating postpartum recovery after scheduled cesarean delivery – Emily Sharpe, MD

Breakout 7: Racial & Ethnic Disparities/ Ethics (Oak Alley)

1. Trends of Racial/Ethnic Differences in Protocolized Postpartum Hemorrhage Checklist Use in Cesarean Deliveries – Brittany Cureton

2. Racial and Ethnic Disparities in Epidural Usage and Cesarean Delivery Rates – Wade Coomer, BS

3. Racial Disparities in Maternal and Neonatal Outcomes in the COVID-19 Positive Parturient – Rachel Weeks, MS2

4. Patient Perspectives on Emergency Research Informed Consent for Patients with Opioid Use Disorder Requiring Emergency Cesarean Delivery – Valeria Altamirano

5. Effect of an educational video on racial disparities in neuraxial labor analgesia: an impact study – Angelica Hatfield, MD

6. Effect of the COVID pandemic on racial disparities in anesthetic outcomes for cesarean deliveries: a retrospective single-center study – Jack Zeitz, BS

7. Obstetric anesthesiologists' perceived facilitators and barriers to providing informed consent for patients with limited English proficiency – Won Lee, MD, ScM

8. Socioeconomic deprivation, ethnicity and postpartum outcomes following cesarean delivery: A prospective, multicenter cohort study – James O'Carroll, MBBS, FRCA

9. Implicit bias, structural racism, and obstetric anesthesia outcomes: a scoping review of the literature (2000-2023) Fiamma Van Biema, MA, Phil

10. Mind the Gap: A Novel Method for Evaluating Global Academic Agency in Obstetric Anesthesiology - Anjan Saha MD, PhD

11. Racial and ethnic concordance between the patient and anesthesia team and patients' satisfaction with pain management during cesarean delivery - Jose Sanchez, BS

10:00am – 10:25am BREAK IN THE EXPO HALL

10:00am – 10:25am Mentoring Academy Meeting (Grand Chenier)

- 10:25 am 10:30 am Opening Remarks Ashraf Habib, MD and Amy Lee, MD
- 10:30am 11:50am Gertie Marx Research Competition Moderator: Brian Bateman, MD Judges: Brendan Carvalho, MD
 - Ruth Landau, MD Jill Mhyre, MD Arvind Palanisamy, MD Paloma Toledo, MD Cynthia Wong, MD
 - 1. The ED90 of Hyperbaric Bupivacaine for Cesarean Delivery in Super Obese Patients: An Up-Down Sequential Allocation Dose-Response Study – Liliane Ernst, MD
 - Comparison of an automated, electronic-medical-record-based postpartum hemorrhage prediction model to currently published risk stratification tools – Amber Wesoloski
 - Higher Fibrinogen Concentrate Doses Required in Pregnant Patients: A Novel In Vivo Pharmacokinetic Study in Parturients with Hypofibrinogenemia – Adnan Almaaitah, MD
 - 4. Personalized Risk Prediction of Preeclampsia Using Polygenic Risk Scores -Sagar Patel, MD
 - OTIP An Innovative Obstetric Triage Implementation Package to Reduce Delay and to Improve the Quality of Care at Referral Hospitals in Ghana – Elizabeth Colburn, B.A.
- 11:50 am 1:00 pm LUNCH ON YOUR OWN
- 11:50 am 1:00 pm SPONSORED LUNCH (NO-CME) pre-registration required Modera *Grand Couteau (5th floor)*
- 1:00pm 1:15pm BREAK

CONCURRENT SESSIONS

1:15 pm – 2:00 pm Oral Presentations #1 - *Main stage* Moderator: David Monks, MD

- 1. Transient receptor potential vanilloid-4 channel antagonists as a promising novel tocolytic agent: a translational study Daiana Fornes, PhD
- 2. Magnetic resonance imaging findings and clinical aspects of eclampsia : a prospective study. Mohamed Adnane Berdai
- 3. The 2014 Medicaid expansion and eclampsia Jean Guglielminotti, MD, PhD
- Validation of early uterine tone assessment as a predictor of major postpartum hemorrhage in 1004 cesarean deliveries: a prospective observational study – Jessica Ansari, MD
- 5. Maintenance infusion of oxytocin following elective cesarean deliveries: a dosefinding study – William Turner, MSc, MD
- 6. Transient receptor potential vanilloid-4 (TRPV4) receptor agonists induce contraction in human uterine smooth muscle cells: a translational approach to assessing a novel uterotonic agent– Leziga Obiyo, MD, MPH

- 1:15 pm 2:00 pm Member Forum : Reproductive Access (NO CME) Grand Chenier (5th floor)
- 2:00pm 3:00pm Fred Hehre Lecture Intro: Medge Owen, MD Speaker: Vernon Ross, MD
- 3:00pm 3:30pm BREAK IN THE EXPO HALL
- 3:30pm EXPO HALL CLOSES FOR THE DAY

CONCURRENT SESSIONS

3:30pm – 5:30pm Sol Shnider Track #1

Moderator: Tiffany Angelo, MD

- Personalized v. Protocolization Hans Sviggum, MD & Scott Segal, MD
- Opioid Rx Britany Raymond, MD
- Drug & Equipment Shortages Dan Katz, MD
- 3:30pm 5:30pm Journal Editor's Panel – From Reviews to Publications *Grand Chenier (5th floor)* Moderator: Ashraf Habib, MD
 - How to Provide a Good Review Cynthia Wong, MD
 - How to Write the Statistical Analysis Section of your Manuscript -Brian Bateman, MD
 - How to Utilize Social Media to Disseminate Research Ruth Landau, MD
- 5:30pm Educational Programming Adjourns for the Day
- 5:30pm 6:30pm Sponsored Happy Hour – Cerus *Grand Couteau (5th floor)*
- 7:00pm 9:00pm FELLOWS & RESIDENT'S RECEPTION Rodrigue Gallery (1st floor)
SATURDAY, MAY 6

- 7:00am 9:00am Continental Breakfast in Expo Hall
- 7:00am 10:00am Research Network Symposium Moderator: Ashraf Habib, MD *Grand Chenier (5th floor)* Panelists: Alex Butwick, MD
- 7:50 am 8:00 am Opening Remarks Tom Klumpner, MD and Brandon Togioka, MD

8:00am – 10:00am Sol Shnider Clinical Track #2 Moderator: Emily Dinges, MD

- Intraoperative Breakthrough Pain Case Based Heather Nixon, MD
- PDPH Acute and chronic effects Jess Ansari, MD
- Resources on your Unit Customizing What Staff you Need for Your Patient Population Rayna Clay, MD
- 10:00am 10:15am BREAK IN EXPO HALL
- 10:15am 11:30am Best Case Reports
 - Moderator: Jennifer Dominguez, MD Panelists: Bill Camann, MD Joy Hawkins, MD
 - Barbara Scavone, MD
 - 1. A Case of New Onset Myasthenia Gravis After Cesarean Delivery Michael Balot, D.O.
 - 2. Acquired Hemophilia A: A Rare Cause of Postpartum Hemorrhage Abdo Barakat, MD, MS
 - 3. Acute Massive Hemorrhage in Placenta Accreta Spectrum with Tornado Vessel on Imaging: A Case Report and Interdisciplinary Review Pamela Huang MD
 - 4. Dexamethasone for PONV during cesarean section Possible interference with diagnosis of congenital adrenal hyperplasia Leila Katabi, MD, MA
 - Management of a parturient with severe thrombocytopenia: use of ROTEM to guide placement of combined spinal epidural (CSE) for labor analgesia – Karim Shuaib, MD
 - 6. Management of a Pregnant Patient with Hereditary Angioedema in the Peripartum Period Micah de Valle, RN
 - 7. Peripartum Anesthetic Management of a Patient with Afibrinogenemia Yash Bisen, BA
 - 8. Right ventricular assist device (RVAD) insertion for severe pulmonary arterial hypertension during caesarean delivery: A Case Report Mariana Montes, MD, MPH
 - 9. Severe Pulmonary Hypertension In Pregnancy: A Case Report Eleanor Kenny, MD
- 11:30am 12:30pm LUNCH ON YOUR OWN
- 11:30am 12:30pm SPONSORED LUNCH (NO-CME) pre-registration required RIVANNA Grand Couteau (5th floor)
- 12:30pm 1:00pm ASA Update Intro: Klaus Kjaer, MD, MBA Speaker: MIchael Champeau, MD, FASA; ASA President

1:00pm -2:00pm	Gerard W. Ostheimer Lecture Intro: Michaela Farber, MD Speaker: Pervez Sultan, MD
2:00pm – 2:10pm	BREAK
2:10pm – 2:15pm	ISC Speaker Database Launch – Caitlin Sutton, MD
2:15 pm – 2:25 pm	Distinguished Service Award Introduction: Joy Hawkins, MD Recipient: Brenda Bucklin, MD
2:25 pm – 3:00 pm	 SOAP Awards Best Paper Competition Best Case Report Gertie Marx Research Competition Patient Safety Award Frederick P. Zuspan Award Teacher of the Year Diversity & Inclusivity Award Centers of Excellence 2022 Designees
3:00pm – 3:30pm	BREAK IN EXPO HALL
3:30pm	EXPO HALL CLOSES/EXPO MOVES OUT
3:15pm – 4:15pm	SOAP State Representatives Meeting (Grand Couteau)
3:30pm – 6:30pm	Abstract Sessions (4 th floor)
	 Breakout 1: Hematology (Bayside A) Anesthesia management of severe recurrent epistaxis in pregnancy -Ani Chilingirian, MD Perioperative management of a parturient with Bombay phenotype and placenta previa - Emmarie Myers, MD Sickle Cell Crisis and Aortic Stenosis - Julie-Ann Thompson Utilization of ISTH BAT Score in a Parturient with Bleeding of Unknown Cause - Lauren Blake, MD Divergent Analgesia Outcomes After Shared Decision-making in a Patient with Complex Bleeding Diathesis - Kiran Shah, MD Stroke and Postpartum Preeclampsia in a Patient with Hyperhemolysis Syndrome - Jasmine Kim, MD Perioperative Management of Dural Venous Sinus Thrombosis During Twin Pregnancy: A Case Report - Neil Mackie, MBChB, FRCA Life Threatening Cromer Antigen in Pregnancy Causing Consideration of Intra- Onenting MIO

- Individualized management of a parturient with Factor VII deficiency Margaret Smith MD
- 10. APML and Pregnancy: A Clinical Dilemma -Rushi Gottimukkala, MD

- 11. Hemolytic transfusion reaction in a patient with anti-Vel antibodies during a cesarean hysterectomy: A case report -Nada Ismaiel, MD, MSc, FRCPC
- 12. Anesthetic Management of the Parturient with Chronic Myeloid Leukemia and Associated Splenomegaly Christopher Lee, MD
- 13. Acquired Thrombotic Thrombocytopenic Purpura in Pregnancy: A Case Report -Lindsay Tremper, MD
- 14. A Parturient with Glanzmann's thrombasthenia : A Case Report Sana Rukh, MD, MPH
- 15. Asymptomatic Hypofibrinogenemia In A Primigravid Tilman Chambers, MD
- 16. Approach to Labor Analgesia in a Coagulopathic Parturient with Presumed Vitamin K Deficiency from Cholestasis of Pregnancy - Alexander Meshel, MD
- 17. A Case Report of Management of Homozygous Antithrombin III Deficiency for Cesarean Delivery Brittany Burton, MD, MHS, MAS
- 18. An Obstetric Symptomatic Carrier of Hemophilia A: A Multidisciplinary Approach - Nguyen Nguyen, DO
- 19. Multidisciplinary Management for Parturient with Von Willebrand Disease Type II (vWD II) - Nguyen Nguyen, DO

Breakout 2: Neuraxial Labor Analgesia and Neurologic Disease (Bayside B)

- 1. A Complication of Neuraxial: The Case of a Retained Epidural Catheter Mariana Montes, MD, MPH
- 2. Combined spinal epidural anesthesia for cesarean delivery in the setting of T12 -L1 conus intramedullary cystic lesion - Phillip Callihan, MD, PhD
- 3. Anesthetic Management in a Parturient Recovering from Guillain-Barre Syndrome. Should we do Neuraxial? Julia Tollin, MD
- 4. THAT HURTS! Anesthetic Management of a High-Risk Pregnant Patient with New-onset Allodynia A Case Report Emily Kim
- 5. Epidural Catheter Malfunction: A Case Series Mariana Montes, MD, MPH
- 6. The Parturient with a Large Sacral Dimple: is Neuraxial Safe? Jennifer Tripi, MD
- 7. Recurrent Horner's Syndrome in a Patient Presenting for Delivery -Chandramouli Rathnam, MD, MS
- 8. Use of Chloroprocaine Epidural for Women with Lidocaine Allergy -Alexandra Feldner, MD
- 9. Crack Dancing' In Labor And Delivery Mariam Ibrahim, MD
- 10. Successful use of epidural analgesia in a parturient with a history of transverse myelitis associated with multiple sclerosis Neil Mackie, MBChB, FRCA
- 11. Successful neuraxial anesthesia for a parturient who has a history of spinal schwannoma removal Yuta Kashiwagi, MD
- 12. Management of a Ruptured Arteriovenous Malformation Requiring Ventriculostomy and Craniotomy During Pregnancy- Brian Paoletti, MD
- 13. Psychogenic Non-Epileptic Seizures in the Differential Diagnosis of Peripartum Seizure - Jacob Nieb, MD
- 14. Multiple Sclerosis in Pregnancy, Anesthetic Considerations: A Case Report -Ioannis Angelidis, MD
- 15. Respiratory Insufficiency in a Parturient with Myasthenia Gravis Utilizing Neuraxial Anesthesia Ashley Lewis, M.D.
- 16. Accidental breakage of epidural catheter during labour analgesia : what next? A case report Gisha Mathew, MD
- 17. Unexpected High Epidural Anesthesia in a Patient With Epidural Placed in Head-Down, Knee Chest Prone Position - Bhakti Chourasia, MD
- 18. Anesthetic Management of an Urgent Cesarean Delivery in a Patient with a Recent History of Cauda Equina Syndrome: A Case Report Jacob Nieb, MD

Breakout 3: Cardiac (Bayside C)

- 1. Femoral Vessel Access for Potential ECMO Sheath Cannulation in Three Patients with Cardiopulmonary Disease Connor Funsch, MD
- 2. Anesthetic Management of Spontaneous Coronary Artery Dissection in an Anticoagulated Parturient - Andrew Hallmark, MD
- 3. The Conundrum of Pulmonary Hypertension: Safe Delivery of Anesthesia when Pregnancy is Contraindicated Andrew Hallmark, MD
- 4. Repeat Cesarean Delivery Number 12: A World Record! Amy Bingham, MD
- Peripartum anesthetic management of a patient with dilated cardiomyopathy secondary to pathogenic RNA-binding motif protein 20 variant -Courtney Hood, MD
- 6. How low can you (and your ejection fraction) go? Management of advanced heart failure in pregnancy Colette Ciresi, MD
- Suspected venous air embolism as the cause of cardiovascular collapse during cesarean section under general anesthesia: a case report -Thomas Yang, BMBS, FANZCA
- 8. Anesthesia for Cesarean Delivery in a Patient with Congenitally Corrected Transposition of the Great Arteries A. Taylor Thomas, MD, MPH
- 9. Echocardiographic strain analysis during vaginal delivery and third stage of labor: A case series Margaret Smith, MD
- 10. Aortic Root Aneurysm in a Parturient with Loeys-Dietz Syndrome: A Case Report - Mariana Montes, MD, MPH
- 11. Anesthetic Considerations for Management of a Parturient Undergoing Cesarean Delivery After Mechanical Mitral Valve Replacement -Mary Kay Kujak, MD
- 12. Anesthesia Management of caesarean section in patient with Pericardial effusion Manjusha Kuraganti, MD
- 13. Perioperative and Obstetric Management of a Parturient with Peripartum Cardiomyopathy for Emergent Cesarian Section - Courtney Singleton, MD, PhD
- 14. Aortic Aneurysm & Dissection Peripartum Ben Schmitt, DO
- 15. A Case of Tricuspid Stenosis Presenting for Cesarean Delivery Tyler King, MD
- 16. Management of Pericardial Effusion in a Parturient Presenting with Hypertensive Crisis and Respiratory Failure - Anjana Sekaran, MD
- 17. Peripartum management of patient with remote orthotopic heart transplant and severe diastolic dysfunction Daniel Conti, MD

Breakout 4: Neurologic diseases (Edgewood A&B)

- 1. Cesarean delivery in a patient with acute cerebral venous sinus thrombosis, cerebral infarcts and a recent COVID 19 infection Liuda Nolan, MD
- 2. Axonal Polyneuropathy in a Patient with Hyperemesis Gravidarum Alnesha Banks, MD
- 3. Management of a Parturient with Cerebral Palsy and a Ventriculoperitoneal Shunt with Seizure Immediately following Spinal Anesthesia for Cesarean Delivery - Brittni Lanoux, MD
- 4. Amyotrophic lateral sclerosis (ALS) and Anesthesia in an Obstetric Patient -Case Report - Grant Chambers, MD, MPH
- 5. Intracranial Hemorrhage in a Viable Parturient with Cesarean Section Delayed 33 Days - David Gutman, MD, MBA, FASA
- 6. A Case of an Awake Craniotomy in a Pregnant Patient Carmen Lopez, MD

- 7. Management of Moyamoya Disease in Pregnancy after Intracranial Bypass Grafting: A Case Report and Literature Review - Dennerd Ovando, MD
- Ventriculoperitoneal Shunt Malfunction in a Complex Parturient Allen Wang, MD
- 9. Ruptured Recurrent AVM and Intraventricular Hemorrhage in the Third Trimester: Perioperative Anesthetic Considerations for Cesarean Section -Taylor Leathers, MD
- 10. Interdisciplinary Management of a Parturient with Type II Spinal Muscular Atrophy - Mikayla Troughto,n MD
- 11. Positioning Super Morbidly Obese Patients for Cesarean Section Utilizing the Safe Patient Handling and Mobility Team and Devices - Katelyn Scharf, MD
- 12. Epidural Test Dose: Yet another Indication in Morbidly Obese Parturients -Julie Chedister, MD
- 13. Continuous Intra-thecal catheter use for repeat C section in previous difficult general anesthetic with a BMI greater than 100 John Mitchell, MD
- 14. Spontaneous rupture of an Invasive Nonresectable Buccal AVM during Pregnancy: Prenatal Management and Anesthetic Implications -Ashley Lewis, MD
- 15. Neuraxial technique placement in the parturient with history of multiple back surgeries: A Case Report Dan Drzymalski, MD
- 16. Diagnosis and Management of Nephrolithiasis in Active Labor using POCUS and Epidural Analgesia - Shalonda Cook, MD
- 17. Point-of-Care Ultrasound by Anesthesiology for Assistance with Care of a Hemodynamically Unstable Patient Requiring Emergent Exploratory Laparotomy - Claudia Rosso, MS3
- Apparent local anesthetic systemic toxicity after activation of a labor epidural catheter for cesarean delivery treated successfully with lipid emulsion -Angelica Hatfield, MD
- 19. Anesthetic management of obstetric patient with large parieto-occipital meningioma: a case report Rebecca Thompson, MD

Breakout 5: Unusual co-morbidities #1 (Gallier A&B)

- 1. Emergency cesarean delivery in a patient with acute fatty liver of pregnancy: A case report Na Zhao, MD
- 2. Anesthetic Management of a Parturient with Situs Ambiguus Emiley Tou, MD
- 3. Mediastinal Mass with Critical Right Ventricle Compression in Pregnancy -Zhaoyi Tang, MD
- 4. Cesarean section with epidural anesthesia in a morbidly obese parturient who survived long-term intubation and tracheostomy after severe COVID-19 infection- Yuta Kashiwagi, MD
- 5. Marfan Syndrome Parturient with Thoracic Aorta Dilatation and Lumbar Dural Ectasias Joe Salloum, MD
- Cesarean Delivery in a Parturient with Bilateral Pheochromocytoma Complicated by Left Ventricular Outflow Tract Obstruction: A Case Report -Teshi Kaushik, MD
- 7. Parturient with New Diagnosis of Takayasu Arteritis and Severe Coarctation of Aorta at 34weeks Gestation: A Case Report Teshi Kaushik, MD
- 8. Neuraxial vs general Anesthesia in a Parturient with Chronic Myeloid Leukaemia: A Challenging Decision - Maria Herincs, MBBS, PhD
- 9. Management of a Symptomatic Parturient with a Compressive Thyroid Mass -Emmarie Myers, MD

- First Reported Epidural Placement in Patient with Factor V Deficiency A Surprise During Preoperative Evaluation for Placenta Accreta Spectrum - Dan Hoang, DO
- 11. Tuberous sclerosis complex and candidacy for neuraxial anesthesia in parturients Ina Du MD, MPH
- 12. Anesthetic Management in Parturients Susceptible to Malignant Hyperthermia - Kiana Fahimipour, MD
- 13. Anesthetic Management of Acute Fatty Liver of Pregnancy: A Case Report -Matthew Thimm, MD
- 14. Anesthetic Management for Delivery in a Patient with Severe Pulmonary Hypertension - Patrice Vinsard
- 15. Neuraxial Anesthesia for Cesarean Delivery in a Patient with Tethered Cord, Syrinx, and Spina Bifida with a Neural Placode-Lipoma Interface - David Gutman, MD, MBA, FASA
- 16. Wernicke's Encephalopathy secondary to hyperemesis gravidarum during pregnancy Afshan Soomro MD
- 17. Long COVID-19 complications affects both antepartum and intrapartum care Logan Ernst, MD
- 18. Streptococcal Shock in a Parturient Keith Delaune, MD

Breakout 6: Unusual co-morbidities #2 (Southdown)

- 1. Parturient with Massive Cervical Fibroid Requiring Repeat Cesarean Section -Kathleen Daly-Jensen
- 2. Anesthetic Management of Bethlem Myopathy: A Multidisciplinary Approach Lauren Blake, MD
- 3. Anesthetic considerations for a parturient with subglottic stenosis and multiple sclerosis: a case report Justin Shang, DO
- 4. Delivery and Management of a Parturient with Spontaneous Dural Leak and Intracranial Hypotension Daniel Conti, MD
- 5. Anesthetic Management of a Parturient with a Hodgkin's Lymphoma and Anterior Mediastinal Mass - Kalissa Zhang, MD
- 6. Management of a Parturient with Aortic Stenosis and Worsening Aortic Coarctation Bill Hum, MS
- 7. Management of a Parturient with ESRD and Worsening Pericardial Effusion -Yusef Shibly, BS
- 8. Anesthetic Management of a Parturient with Post-COVID ILD, Large Pulmonary Bulla, and Acute-on-Chronic Respiratory Failure - Carolina Aravera, MD
- 9. Multidisciplinary Management of a Third Trimester Parturient with a Rapidly Expanding Renal Mass Undergoing Right Radical Nephrectomy -Jake Graffe, DO
- 10. Drug-induced hypotension leading to cardiac arrest during cesarean delivery -Weike Tao, MD
- 11. Anesthetic Considerations in a Parturient with Mast Cell Activation Syndrome -Daniel Arce, DO
- 12. Management of an asymptomatic patient with reactivated Q fever in pregnancy: a case report Sherry Liou, MD
- 13. Anesthetic Implications of Hereditary Angioedema in Pregnancy -Sherry Liou, MD, MBA
- 14. Combined Cesarean Delivery and Adrenalectomy for Pheochromocytoma Diagnosed During Pregnancy - Lynn Squires, MD
- 15. Neurofibromatosis and Anesthesia in an Obstetric Patient Case Report -Matthew Shelton, MD

- 16. A Case of Angiosarcoma in a Complex Parturient Allen Wang, MD
- 17. Anesthetic Considerations in a Parturient with Acute Psychosis -Eva Martinez, MD
- Complex Multi-Disciplinary Decision Making for a Parturient with Pulmonary Fibrosis and Cystic Bronchiectasis: Delivery Timing and Safety - Jarrell Holland, MD

Breakout 7: Unusual co-morbidities #3 (Oak Alley)

- 1. Anesthetic Considerations in a Parturient with Caudal Regression Syndrome -Zachary Ligus, MD
- 2. Anesthetic Considerations for Situs Inversus in the Peripartum Period -Preston Root, DO
- 3. Endometriosis of the Lungs Causing Recurrent Pneumothoraces in Pregnancy - Katelyn Scharf, MD
- 4. Preterm Delivery in a Patient with Chronic Hypercarbia Secondary to Severe Kyphoscoliosis Cortney Barbica, MD
- 5. Anesthetic Management of a Pregnant Patient with Severe Tracheal Stenosis Undergoing Microdirect Laryngoscopy with Incision, Dilation, and Steroid Injection - Jason Srnec, MD
- 6. Cesarean Section Under Spinal Anesthesia In Parturient With History Of Reversible Cerebral Vasoconstriction Syndrome (RCVS) - Sadaf Mirkarimi, MD
- 7. When There Seems to be No Anesthetic Options for Delivery A Case of Jarcho Levin Syndrome Yuki Shima
- 8. Peripartum Vascular Malformation Nicole Martin MD, MPH
- 9. Prolonged Spinal Anesthesia in a Patient with Lumbar Stenosis and Amphetamine Use Mackenzie Jacoby MD
- 10. Low Thoracic Combined Spinal-Epidural Anesthesia for Cesarean Delivery in a Patient with History of Spina Bifida and Tethered Cord - Vickie Hau, MD
- 11. Peripartum Management and Inter-Hospital Planning for a Pregnant Patient with Bleeding Arteriovenous Malformations and High-Output Heart Failure from Hereditary Hemorrhagic Telangiectasia - Catherine Bergeron, MD
- 12. Preoperative Management of Twin Gestation Pregnancy in a Parturient with Eisenmenger Syndrome Kyle Struzyk, MD
- 13. It All Comes Back to Anatomy Is the Optimal Level for Neuraxial Anesthesia Different in the Achondroplastic Parturient - Annastacia Woytash, DO
- 14. Not Just a Startle Response: Anesthetic Management of a Parturient with Hyperekplexia Lindsey Nguyen, MD
- 15. Airway Management in Parturient with Subglottic Stenosis Mallory Hawksworth, MD
- 16. Esophageal rupture associated with vomiting in pregnancy John Markley MD, PhD
- 6:30pm Educational Programming Adjourns for the Day
- 7:00pm DINNER ON YOUR OWN/DINE AROUND

SUNDAY, MAY 7

Coffee Service 7:00am - 9:00am 7:00am - 7:45am Special Interest Group Roundtable Discussions – General Session Foyer 8:00 am - 8:15am **Opening Remarks** Rebecca Minehart, MD, MSH, PEd and May Pian-Smith, MD 8:15am - 9:45am SOAP/ASRA Panel: "A tailored approach to management of the thrombocytopenic patient" Moderator: Roulhac "D'Arby" Toledano, MD SOAP guidelines surrounding thrombocytopenia - Melissa Bauer, DO (SOAP) Managing thrombocytopenia in patients with different etiology and levels. - Lisa Leffert, MD (SOAP) ASRA guidelines for performing nerve blocks in patients with low platelets – Melissa Byrne, MD (ASRA) 9:45 am - 10:00 am BREAK CONCURRENT SESSIONS 10:00am – 11:30am Sol Shnider Track #3 (General Session) Moderator: Greg Palleschi, MD Dural Puncture Epidural v. Other Neuraxial - Anthony Chau, MD POCUS in the Emergency - How Can We Guide Care -• Clemens Ortner, MD Barriers to Optimal Staffing – Mark Zakowski, MD ٠ 10:00am - 11:30am Oral Poster Presentations #2 (Grand Chenier 5th floor) Moderators: Brendan Carvalho, MD 1. Wide-area in vivo calcium imaging in mouse myometrium -David Combs, MD, PhD 2. Comparison of Using Bupivacaine or Liposomal Bupivacaine or Methylprednisolone and Dexamethasone in Transverse Abdominis Plane (TAP) Block for Postoperative Cesarean Delivery Analgesia -Suthawan Anakmeteeprugsa, MD 3. Second-Line Uterotonics in Postpartum Hemorrhage: A Multicenter, Double-Blind, Randomized Controlled Clinical Trial – Jimin Kim, MD, MSc 4. General Anesthesia for Cesarean Birth and its Association with Race: A Retrospective Cohort Study - Ilhan Eli, MD 5. Baseline parameters for Quantra® in healthy pregnant women undergoing elective cesarean delivery and comparison to standard laboratory values -Suthawan Anakmeteeprugsa, MD 6. Racial and Ethnic Disparities in Parturients Undergoing General Anesthesia for Cesarean Delivery - Caroline Thomas, MD 7. Atrial Fibrillation and Pregnancy: A Retrospective Cohort Study Using the Premier Database - Liliane Ernst, MD 11:30am - 11:40am BREAK 11:40 am -1:00 pm Case Reports and Research Abstracts (4th floor)

Breakout 1: Post-cesarean pain and opioids (Bayside A)

- 1. Treatment of Post Cesarean Delivery Lower Segment Incision Pain with Topical 5% Lidocaine Ointment: A Clinical Audit - Luc Saulnier, BA (Hons.), MA
- 2. Association of Heart Rate Variability With Preoperative Anxiety and Postoperative Pain After Scheduled Cesarean Delivery: A prospective Observational - Cyrus Bhiladvala, B.Sc
- 3. Quadratus Lumborum in Cesarean Section QUALICS Trial Quadratus Lumborum in Cesarean Section QUALICS Trial Cristian Arzola, MD
- 4. Effectiveness of Post-Cesarean Delivery Transversus Abdominis Plane Blocks on Postpartum Pain and Opioid Use Outcomes Among Mothers with Opioid Use Disorder - Paul Rodriguez, Jr.
- 5. Buprenorphine vs. Methadone for Postpartum Pain and Opioid Use Outcomes Among Women with Opioid Use Disorder After Cesarean Delivery -Catherine Bergeron, MD
- 6. Twenty-four-hour Postoperative Oral Morphine Equivalent Consumption Following Cesarean Delivery Stratified by Race: A Single-Center Retrospective Observational Study - Michael Campos, BS
- 7. Comparison of 100 mcg vs. 150 mcg Intrathecal Morphine Doses for Post Cesarean Delivery Analgesia with Regards to Efficacy and Opioid-related Side Effects: A Retrospective Cohort Study - Ilhan Eli, MD
- 8. Low Dose Intrathecal Morphine is Inferior for Post-Cesarean Analgesia Low Dose Intrathecal Morphine is Inferior for Post-Cesarean Analgesia - Andrew Sprowell, MD
- 9. Predictors of Postpartum Inpatient Opioid Requirement in Patients with Concern for Placenta Accreta Spectrum Predictors of Postpartum Inpatient Opioid Requirement in Patients with Concern for Placenta Accreta Spectrum -Natalie Pate, MD
- Postoperative Pain Following Open Intrauterine Repair of Fetal Myelomeningocele at a Single Institution: A Case Series Postoperative Pain Following Open Intrauterine Repair of Fetal Myelomeningocele at a Single Institution: A Case Series - Annastacia Woytash, DO
- 11. A Comparison of Postoperative Recovery Between Subjects Who Had Activation and Removal of Labor Epidural Catheter for Unscheduled Intrapartum Cesarean Delivery: A Prospective Survey-Based Study -Alyson Win, BS
- 12. When Does Laboring Pain Become Front of Mind: Timeline of Antenatal Care Concerns from Patients' Perspectives - Pamela Huang, MD

Breakout 2: General anesthesia (Bayside B)

- Impact of COVID-19 Pandemic on the Use of Video Laryngoscopy Versus Direct Laryngoscopy for Tracheal Intubation for Cesarean Delivery in a Tertiary Obstetric Centre: a Retrospective Analysis -Fabricio B. Zasso, MD, MHSc, MBA
- 2. High Cesarean Section Rates are not Always Related to High Post-Partum Hemorrhage Rates -Monica Siaulys
- 3. Preoperative Fasting Times and Patient Experience for Elective Cesarean Delivery: Round 2 of a Quality Improvement Project Using the Plan-Do-Study-Act (PDSA) Method - Angus Royal, MB, BS, FRCA
- 4. Incidence of General Anesthesia for Cesarean Delivery before and during the COVID-19 Pandemic at BC Women's Hospital: A Retrospective Clinical Audit Luc Saulnier, BA (Hons.), MA
- 5. Enhanced Induction and Recovery Using Total Intravenous General

Sunday, May 7 - Continued

Anesthesia for Patients Undergoing Transvaginal Cervical Cerclage - Tianyue Mi, PhD

- Concordance of Anticipated Difficult Airway with Difficult Neuraxial Placement in the Obstetric Population: A Prospective Observational Study -Diego Villela Franyutti, MD
- 7. Rethinking Reversal: Quantitative Twitch Monitoring and Postoperative Pulmonary Complications in Fetal Surgery Patients - Claire Naus, MD
- 8. Cesarean Section Under General Anesthesia: Incidence Rising Since Height of Covid Pandemic Taylor Leathers, MD

Breakout 3: Neuraxial labor analgesia & complications (Bayside C)

- 1. Severe Neck, Interscapular, Upper Back, and Shoulder Pain During Labor Analgesia: Recognition and Management - Rachel A. Achu-Lopes, MD
- 2. Pilot Study: Using Handheld Ultrasound for Epidural Placement in the Obese Laboring Patient -Jasveen Chadha, MBBS
- 3. A comparison of Number of Physician Administered Rescue Analgesia Boluses Between Patients Who Received Patient Controlled Epidural Analgesia and Programmed Intermittent Epidural Boluses - Dylan Grote, BS
- 4. Management and Outcomes of Obstetric Patients Who Decline Allogeneic Blood Transfusion Emmarie Myers, MD
- 5. Incidence and Management of Post Dural Puncture Headache (PDPH) at the University of Washington Medical Center Emily Dinges, MD
- Incidence of Post-Dural Puncture Headache after Combined Spinal or Dural Puncture Epidural. Does Size of the Spinal Needle Matter? -Michael Balot, DO
- 7. Management of Epidural-Associated Interscapular Pain- Christine Chen, MD
- 8. Identifying Barriers to Performing Sphenopalatine Ganglion Block and Developing an Institutional Block Kit Identifying Barriers To Performing Sphenopalatine Ganglion Block and Developing An Institutional Block Kit -Neil Mackie, MBChB, FRCA
- 9. Association of Second Stage Labor with Epidural Blood Patch Placement Following Dural Punctures - a retrospective cohort study -Thomas Yang, BMBS, FANZCA
- 10. Retrospective Analysis of the Potential Effects, Both Positive and Negative, of Replacing Fentanyl with Dexmedetomidine in a Labor Epidural on Peripartum and Postpartum Pain Management - Brenna Katz, MS3

Breakout 4: ECV, EXIT, NTG and N2O (Edgewood A&B)

- 1. Spinal Anesthesia for Cesarean Delivery Following Spinal Fusion and Fixation with Harrington Rods Case reports Borislava Pujic
- 2. Identifying Factors that Influence Epidural Satisfaction Emiley Tou, MD
- 3. Motivations and Demographic Differences among Laboring Patients in the Decision to Participate in Research Talia Scott, MD
- 4. Influence of Neuraxial Anesthesia on Outcomes of External Cephalic Version -Samantha Armstrong, BS
- 5. Improved Management of Medication Syringes for Parturient With Labor Epidural - Yuta Kashiwagi MD
- 6. Nitroglycerin as the Primary Uterine Relaxant for EXIT Procedures Jie Zhou, MD, MS, MBA
- 7. No Laughing Matter: Nitrous Oxide in Labor and Delivery and the Environment - Courtney Hood, MD

Sunday, May 7 - Continued

Breakout 5: Case Reports Cardiac & ECMO #1 (Southdown)

- 1. Cesarean Section in a Parturient with Severe Cardiomyopathy requiring Mechanical Support and utilization of Intraoperative Transesophageal Echocardiogram - David Gutman, MD, MBA, FASA
- 2. Shocking the System: Interdisciplinary Care and Anesthetic Management for a Cesarean Delivery in a Patient with Hypertrophic Cardiomyopathy and Recurrent Ventricular Arrhythmias - James Conwell, DO
- 3. Cardiovascular Collapse During Urgent Cesarean Delivery -Rebecca Myers, MD
- 4. Ischemic cardiomyopathy discovered during pregnancy Jessica Merrill, MD
- 5. A Primigravida with Senning Atrial Switch and Residual Severe Left Ventricular Outflow Tract Obstruction and Thrombocytopenia -Lisa Corbett, MD, CPE
- 6. Cesarean Deliver for an Achy Breaky Heart: Urgent cesarean section for a parturient with recurrent peripartum cardiomyopathy Samuel Pettigrew, MD
- 7. Multidisciplinary Management of a Pregnant Patient with Pulmonary Hypertension - Kristine Villegas, MD
- 8. Why is the VAD still there if the heart is better? Laparoscopic Tubal Ligation in a patient with Left Ventricular Assist Device (LVAD) placement and subsequent percutaneous exclusion - Ashley Lewis, MD
- 9. A Case of Asymptomatic Sustained Ventricular Tachycardia During Latent Labor - Laura Ibidunni
- 10. Non-Ischemic Dilated Cardiomyopathy in Cesarean Delivery Julie-Ann Thompson
- 11. Case of a successful awake Caesarean section using epidural anesthesia in a patient with Class 3 Obesity and moderate pulmonary hypertension Jordan Francke MD, MPH
- 12. Successful Delivery Post COVID-ECMO: Beating the Odds Madison Phillips, DO
- 13. Anesthetic Management and Extracorporeal Membrane Oxygenation for Pregnant Patient with Mediastinal Mass - Madison Phillips, DO
- 14. Uncorrected Atrial Septal Defect with Secondary Pulmonary Hypertension in the Parturient Milad Javaherian, MD

1:00pm

SOAP 2023 ANNUAL MEETING ADJOURNS

Speaker Disclosures

The following speakers and/or planning committee members have indicated that they have relationships with ineligible companies to disclose.

Name	Type of Relationship	Ineligible Company
Maliana Davian	Turanal	American Oplique of Obstatisians and
Melissa Bauer	Iravel	Gynecologists
Melissa Bauer	Grant / Contract	National Institutes of Health
Melissa Bauer	Other Professional	institute for Healthcare Innovation
Alexander Butwick	Other Professional	HemoSonics LLC
	Activities - Consultant	
Alexander Butwick	Other Professional Activities - Consultant	Octapharma USA, Inc.
Michael Champeau	Stock Option	ROM Technologies
Michael Champeau	Stock Option	Spiro Robotics
Michael Champeau	Stock	Viatris
Michael Champeau	Stock	Merck
Michael Champeau	Stock	Alcon Laboratories Inc
Michael Champeau	Stock	Novartis
Michael Champeau	Stock	Halyard Health, Inc.
Michael Champeau	Stock	Eli Lilly and Company
Michael Champeau	Stock	Pfizer
Michael Champeau	Stock	Organon & Company
Michael Champeau	Stock	F. Hoffmann-La Roche AG
Michael Champeau	Stock	Organon & Company
Michael Champeau	Stock Option	Spiro Robotics
Michael Champeau	Stock	Halyard Health, Inc.
Michael Champeau	Stock	Pfizer
Michael Champeau	Stock	Novartis
Michael Champeau	Stock	Merck
Michael Champeau	Stock	Eli Lilly and Company
Michael Champeau	Stock	F. Hoffmann-La Roche AG
Michael Champeau	Stock Option	ROM Technologies
Michael Champeau	Stock	Alcon
Michael Champeau	Stock	Viatris
Anton Chau	Other Professional Activities - Consultant	Merck

Anton Chau	Intellectual Property -	
	Other Intellectual	
	Property	
Jennifer Dominguez	Other Professional	Haisco-USA Pharmaceuticals, Inc.
	Activities - Other	
Michaela Farber	Grant / Contract	CRICO Risk Management Foundation
Michaela Farber	Grant / Contract	CRICO Risk Management Foundation
Michaela Farber	Fiduciary Officer	Society for Obstetric Anesthesia and Perinatology
Michaela Farber	Other Professional Activities - Consultant	Octapharma USA, Inc.
Michaela Farber	Other Professional Activities - Consultant	HemoSonics LLC
Michaela Farber	Grant / Contract	CRICO Risk Management Foundation
Michaela Farber	Other Professional Activities - Consultant	HemoSonics LLC
Michaela Farber	Fiduciary Officer	Society for Obstetric Anesthesia and Perinatology
Michaela Farber	Other Professional Activities - Consultant	Octapharma USA, Inc.
Jean Guglielminotti	Grant / Contract	National Institute on Minority Health and Health Disparities
Jean Guglielminotti	Grant / Contract	National Institute on Minority Health and Health Disparities
Jean Guglielminotti	Grant / Contract	National Institute of Mental Health
Robert Gaiser	Travel	American Board o fAnesthesiology
Robert Gaiser	Travel	American Board o fAnesthesiology
Veronica Gillispie	Intellectual Property - Other Intellectual Property	USMLE Step 2 study materials
Veronica Gillispie	Other Professional Activities - Consultant	Bloomlife,Inc
Veronica Gillispie	Other Professional Activities - Consultant	AbbVie Inc.
Ashraf Habib	Other Professional Activities - Consultant	Vertex Pharmaceuticals
Ashraf Habib	Grant / Contract	Heron Therapeutics, Inc.
Ashraf Habib	Grant / Contract	Haisco USA
Ashraf Habib	Other Professional	Trevena
Ashraf Habib	Grant / Contract	Pacira Pharmaceuticals Incorporated
Ashraf Hahih	Grant / Contract	Haisco LISA
Achrof Hohih	Grant / Contract	Paoira Pharmacouticala Incorporated
AShrat Habib	Other Professional Activities - Consultant	
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Brinda Kamdar	Other Professional	Aeton Law Partners
	Activities - Expert	
Brinda Komdor	VVItness Other Preference	Alder ashen Henvoy Wakaman LLD
Dinua Kanuar	Activities - Expert	
	Witness	
Brinda Kamdar	Intellectual Property -	Royalty for Regional Anesthesia Section
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Thomas Klumpner	Grant / Contract	Medical School, University of Michigan
Thomas Klumpner	Grant / Contract	Medical School, University of Michigan
Sandra Kopp	Fiduciary Officer	American Society of Regional Anesthesia and Pain Medicine
Ruth Landau	Other Professional Activities - Consultant	Pacira Pharmaceuticals Incorporated
Ruth Landau	Other Professional	American Society of Regional Anesthesia
	Activities - Other	and Pain Medicine
Ruth Landau	Employment	Columbia University
Ruth Landau	Other Professional	Pacira Pharmaceuticals Incorporated
Duth Londou	Activities - Consultant	
	Gift	LIMITED
James O'Carroll	Grant / Contract	Obstetric Anaesthetists' Association
James O'Carroll	Grant / Contract	Obstetric Anaesthetists' Association
Luis Pacheco	Other Professional Activities - Consultant	Coagulant therapeutics
Cesar Padilla	Intellectual Property -	Cesar Padilla MD; author of a Method of
	Other Intellectual	Treating Obstetric Conditions using the
	Property	Clinic Grant Back License of the method
Scott Segal	Intellectual Property -	Patent has been applied for but has not vet
eccil ecgai	Patent	been allowed
Scott Segal	Intellectual Property -	Patent has been applied for but has not yet
	Patent	been allowed
Brandon Togioka	Grant / Contract	Merck
Brandon Togioka	Grant / Contract	Georgia-Pacific
Brandon Togioka	Grant / Contract	B. Braun Medical
Brandon Togioka	Grant / Contract	B. Braun Medical
Brandon Togioka	Grant / Contract	Georgia-Pacific
Brandon Togioka	Grant / Contract	Merck
Cynthia Wong	Other Professional	Elsevier
	Activities - Other	

Cynthia Wong	Other Professional Activities - Other	Elsevier
Mark Zakowski	Other Business Ownership	Quantum Birthing LLC
Mark Zakowski	Other Business Ownership	Quantum Birthing LLC

All relevant financial relationships for this activity have been mitigated.

All other planners, faculty, and staff have reported no relevant financial relationships with ineligible companies to disclose.

Program Material Wednesday, May 3, 2023

Focused Assessed Transthoratcic Echocardiography (FATE) Course

Faculty: Waseem Athar, MD, Naola Austin, MD, Jennifer Banayan, MD, Kaitlyn Brennan, MD, Ana Ramirez Chapman, MD, Jean Marie Carabuena, MD, Ian Gaston, MD, Hokuto Nishioka, MD, Clemens Ortner, MD, Elizabeth Ozery, MD, Ana Sjaus, MD, Emily Stockert, MD, Caroline Thomas, MD, Ivan Velikovic, MD

Peri-Operative Point-of-Care (POCUS) Ultrasound

Faculty: Cristian Arzola, MD, Jackie Galvan, MD, Brinda Kamdar, MND, Jose Carvalho, MD, Fabricio Zasso, MD, Naveed Siddiqui, MD, Yusuke Mazada, MD, Javier Cubillos, MD, Naida Cole, MD, Leziga Obiyo, MD, Sangeeta Kumaraswami, MD

Program Material Thursday, May 4, 2023

Opening Remarks

Speaker: Heather Nixon, MD & Klaus Kjaer, MD, MBA

Opening Keynote " Teaming " Speaker: Amy Edmondson, PhD

President's Panel: Optimizing Anesthesia Teams: Stories from the Front Line

Moderator: Klaus Kjaer, MD Speakers: Alex Butwick, MD; Rayna Clay, MD; Beth Clayton, CRNA; Cheryl Parker, CRNA, Amy Edmondson, MD

OAA/SOAP Panel: Strategies to implement national and institutional change in response to CEMACH and MBRACE findings

Moderator: Roniesha McLendon, MD Speakers: Chris Elton, MD (President OAA); Veronica Gillispie-Bell, MD, MAS; Medical Director. Louisiana Perinatal Quality Collaborative and Pregnancy Associated Mortality Review

Best Paper Competition (main stage)

Moderator: Ashraf Habib, MD Judges: Katie Arendt, MD, Michaela Farber, MD, Ron George, MD, Phil Hess, MD, Grace Lim, MD, Feyce Peralta, MD

Optimizing Reproductive Health

Moderator: David Gambling, MD

- Reproductive Implications of Care By the Anesthesiologist Andrea Traynor, MD
- Care for Second Trimester Terminations Peter Mancini, MD
- Complications from Limited Reproductive Health Access Cristina Wood, MD

SMFM Session: Obstetric Team Care in the post-Dobbs Era

Moderator: Roniesha McLendon, MD Speaker: Veronica Gillespie-Bell, MD, MAS; Medical Director. Louisiana Perinatal Quality Collaborative and Pregnancy Associated Mortality Review

Case Reports #1 (breakout rooms)

Room 1 – Placental Accreta & PPH

- Room 2 Cardiac 1
- Room 3 Complex Cesarean, Pain & Opioids
- Room 4 Coagulation & AFE
- Room 5 Fetal Surgery, Neonatal Outcomes & Ethics
- Room 6 PDPH
- Room 7 Preeclampsia



INNOVATION TEAMS

Which teams do you expect to have greater innovation success?

- a) Teams with more diverse-expertise?
- b) Teams with more homogeneousexpertise?

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	WHEN FEAR WORKS	AND WHEN IT DOESN'T
	Standardized Work	Work Calls for Judgment, Ingenuity
	Modular	Interdependent
	Objective & Immediate	Subjective & Delayed
		Where does your work fall in this scheme?
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PROBLEMATIC VERSUS PRODUCTIVE SILENCE

Problematic	
Withholding voice related to a potentially serious business risk	Content that is off topic
Withholding voice related to human safety/dignity risks	Content pertaining to an unimportant or tangential issue
Withholding voice pointing to an opportunity for improvement or innovation	Content that you believe could produce serious harm by being shared at that moment
An unanswered question restricts your ability to contribute or perform optimally	You believe the context is Inappropriate for speaking up and you can identify an alternative, better opportunity to contribute your thoughts
You deny colleagues the opportunity to help you solve a problem or address an issue by not mentioning it	You don't believe anyone currently present can address your issue and you recognize another way to get the help you need
Self-doubt drives your silence	Careful reflection drives your silence
Your primary focus is concern with how you will look if you speak up	Your primary focus is on ensuring the quality of the work or furthering the organization's mission



















RE-FRAMING THE WORK: INNOVATION REQUIRES FAILURE

> I have not failed. I've just found 10,000 ways that won't work." Thomas A. Edison

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RE-FRAMING THE WORK: MOST THINGS WILL GO WELL ... PROBLEMS ARE WHERE THE TEAM CAN ADD VALUE

And Mr. Cho kind of looked at me. I could see he was puzzled.

He said, 'Jim-san. We all know you are a good manager, otherwise we would not have hired you. But please talk to us about your problems so we can work on them together. ' "

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WHAT YOU CAN DO - ASK YOURSELF:

What have I said today to reinforce the message

- ... that anyone's voice could make the difference in solving a problem or preventing a failure?
- ... that things *will* go wrong! that fast recovery and learning are what matter most?

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- fear organ
- Where we know how to do it right, but a single slip or other causal factor results in a failure (large or small)
- Multiple factors combine in a new way to produce a failure, usually in a reasonably familiar context

Intelligent Failures

 Undesired results of thoughtful forays into novel territory



Inviting Participation Building confidence that voice is welcome; raising the "cost" of silence

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Responding Productively Orientation toward continuous learning	
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RESPOND PRODUCTIVELY

"Once an RN dropped a vein graft on the floor. She spoke up, and [the surgeon] didn't say a word. He just made another incision. Maybe a millisecond was lost.

No yelling or screaming. He didn't need to. She knew she'd made a mistake."

Edmondson, A.C. (2003). Speaking up in the operating room How team leaders promote learning in interdisciplinary action teams. *Journal of Management Studies*, 40 (6): 1419-1452











THE BASIC HUMAN CHALLENGE It's hard to learn, if you already know

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SHARE ESSENTIAL PERSPECTIVES

The Situation: What are they up against?

Your intentions: What are you trying to accomplish?
 Your resources: What skills, information, experiences do you bring?
 Your situation: What are you up against?

Intentions: What are they trying to accomplish?
Resources: What skills, information, experiences do they bring?

C Amy C. Edmondson. All Rights Res

• "Seek first to understand"

• Then seek to be understood







CONTRASTING CHALLENGES

	Sudden Crisis	Sustained Crisis
Definition	Serious, unexpected, often dangerous emergency requiring immediate action	Ongoing period of intense difficulty, danger, or uncertainty
Primary goal	Limit immediate harm	Enable sustained resilience
Stakes	Obvious	Somewhat more subtle
Timeframe	Time-limited, short	Ongoing, long
Psychological Challenge	Urgent fear; paralysis (Are we going to be ok?)	Disillusionment, denial (Why bother?)
Risk Tolerance	High – Willing to move fast, take substantial risks, tolerate costs/danger to to achieve primary goal	Medium – Willing to experiment, constrained by desire to preserve resources for the long haul
EXAMPLE	Covid-19 March 2020	Today

	From Sudden Crisis Leadership	To Sustained Crisis Leadership
Leadership priorities	Fast reactivity	Intentional proactivity
Leadership approach	Top down, command/control	Inspirational, inviting solution making from everyone
Leadership risks	Failing to respond fast enough due to indecision or lack of situation recognition	Failing to create psychological safety and systems for sustained learning, problem solving, and support.

Strategies to implement national and institutional change in response to CEMACH and MBRRACE findings

Dr Chris Elton Consultant Anaesthetist, Leicester Royal Infirmary, UK President Obstetric Anaesthetists Association

> SOAP 55th Annual Meeting New Orleans Thursday, May 12, 2022



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MBRRACE-What's in a name? • CEMD • Confidential enquiry into maternal death • CEMACH • Confidential enquiry into maternal and child health • CMACE • Centre for maternal and child enquiries • MBRRACE-UK • Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK



Declaration of Interests

• All pictures are in the public domain

• I am President of the OAA which is a UK charity

• I have received contribution for attending meetings from SOAP and the OAA in a reciprocal agreement with the SOAP president

Obstetric Anaesthetists' Association

• I have no conflicts of interest

@eltonchris















Ethnic group	Estimated number of maternities	Direct deaths* (n)	Indirect deaths* (n)	Total <i>Direct</i> and <i>Indirect</i> deaths (n)	Estimated rate per 100,000 maternities	95% CI for death rate	Relative risk	95% CI for RR
White	1.407.352	58	93	151	10.7	9.1-12.6	1.0	
Black African	41,615	13	17	30	72.1	48.6-102.9	6.7	4.5-9.9
Black Caribbean	50,463	7	6	13	25.8	13.7-44.1	2.4	1.4-4.2
Pakistani	81,052	7	3	10	12.3	5.9-22.7	1.2	0.6-2.2
Indian	45,157	2	5	7	15.5	6.2-31.9	1.4	0.7-3.1
Bangladeshi	35,626	3	5	8	22.5	9.7-44.2	2.1	1.0-4.3
Asian and Others	70,136	3	1	4	5.7	1.6-14.6	0.5	0.2-1.4
Non white	231,971	35	37	72	31.0	24.3-39.1	2.9	2.2-3.9
Total	1 639 323	93	130	223	13.6	11.9-15.5		




















• Bangladeshi, Pakistani, Black African and Black Caribbean women having vaginal birth had a 14-22% lower incidence of spinal/epidural procedure (CI 0.75-0.80; CI 0.84-0.88; CI 0.80-0.84; CI 0.78-0.85 respectively. All p<0.0001)

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- Community outreach and personalised care including interpreters
- · And....action from the profession

Anaesthesia 2023

Editorial

















Accessibility | Cookie Guidance





ESC GUIDELINES European Society doi:10.1093/european/european/european/society of Cardiology (ESC) Endersond by: the International Society of Candor Medicine (ICM)

Endorsed by: the International Society of Gender Medicine (IGM), the German Institute of Gender in Medicine (DGesGM), the European Society of Anaesthesiology (ESA), and the European Society of Gynecology (ESG)

	mWHO I	mWHO II	mWHO II-III	mWHO III	mWHO IV
Diagnosis (if other- wise well and uncomplicated)	Soull or mid – paintmary steroors, – patent dictus anteroors – mitral value probases Soccessibility regarde verifications cland or verifications cland or verifications cland or verifications pulmonary Arotal or versional ectopic beats, noised	Unopensted atrial or ventricular septal defect Repaired stetalogy of Falloc (uppraventricular arhythmia) Turner syndrome without aertic dilatation	Mid het ventrocker impair- ment (EV 4433) Hypertrophic cardionyopathy Native or States valve dis- cardionyopathy Native or States valve dis- lor fV (indi unnal tansius), and cardia tansi tansius), Parfen or adher HTAD valvedorme andro data ditazion Autot 445 mm in bloagid Repared coarcturion Azioteverincale rapital defect	Moderate left verstricular impairment (JT 30–453) Previdos apreparture (JT 30–453) Previdos aprepartares Medanical solar Statusci regita versicida unitaria al directoricular fanction Fastas citadation al character condition and the cardas condition uncomplicated Unregaring function hart disease	Pulmonary arterial hypertension Severe systemic ventricio- tar dynkrotos (FF-002 or NTH4 dcisal FF-002 or NTH4 dcisal FF-002 previous pergantum Can- diomopathy with any encelaal left ventricider impairment. Severe signopotatic actis stronois Systemic right ventricide with moderate or severty discrataid even- moder function
Risk	No detectable increased risk of maternal mortality and noimild increased risk in morbidity	Small increased risk of maternal mortality or moderate increase in morbidity	Intermediate increased risk of maternal mortality or moderate to severe increase in morbidity	Significantly increased risk of maternal mortality or severe morbidity	Extremely high risk of maternal mortality or severe morbidity
Maternal cardiac event rate	2.5-5%	5.7-10.5%	10-19%	19-27%	40-100%
Location of delivery	Local hospital	Local hospital	Referral hospital	Expert centre for pregnancy and candiac disease	Expert centre for preg- nancy and cardiac disease



CI	lassification: Official ublication approval reference: PAR709	NHS
Ns	Maternal medicine network service specification	
13	3 October 2021, Version 1	
1.	. Scope	
Th (M es	his model service specification covers the provision of maternal medi MNs). The definitions and dependencies set out below should be us stablish a service that is tailored to local expertise, needs and opport	icine networks sed as a guide to unities.]
1.	.2 Description	
M	IMNs include pre-pregnancy, antenatal and postnatal care for womer nedical problems that pre-date or arise in pregnancy or the puerperiur	n who have significant m.



Category A: Local expertise	Category B: Review, advice and guidance from maternal medicine centre	Category C: Care led by maternal medicine centre
	Haematological disease	
Sickle cell trait	Current immune thrombocytopenia and platelet count s75	Sickle cell disease
Historical immune thrombocytopenia and platelet count >75	Thrombocytosis	Beta thalassaemia major
Gestational thrombocytopenia	White cell disorders	Other complex thalassaemia: • iron overload • endocrine disease • putmonary hypertension*
Current VTE or previous single VTE	Recurrent VTE	Current extensive VTE without other access to Factor Xa. monitoring
Obstetric antiphospholipid syndrome	Thrombotic antiphospholipid syndrome	Antiphospholipid syndrome with extensive arterial events
Inherited thrombophilia (no VTE, not antithrombin deficiency)	Inherited thrombophilia with previous VTE	Antithrombin deficiency
History of treated haematological malignancy	Stable myeloproliferative/myelodysplastic disease	Active haematological malignancy
Alpha/beta thalassaemia trait	Mild, isolated clotting factor deficiency • Factor II, V, XI or XIII > 0.2iu/ml • Factor X > 0.3iu/ml	Cloting factor deficiency: • Factor II, V, XI or XIII s 0.2iu/ml • Factor X s 0.3iu/ml • Combined deficiencies
B12/folate deficiency	Mild platelet function disorder with platelet count >100	Moderate/severe platelet function disorder or with platelet count >100
	Carriers of haemophilia with known female fetus and normal factor VIII/IX	Carriers of haemophila with male or unknown gender of fetus
	Type I Von-Wilebrand disease, VWF activity normalised in pregnancy	Von-Wilebrand disease: Type 1 if VWF not normalised, Type II and Type III
		Transfusion dependent disease



Summary

- Collecting accurate data on maternal mortality is important
- Reliable data requires individual and institutional compliance
- A carrot and stick approach may be of benefit
- "Admiring the problem" alone is insufficient
- We need to tackle racism in all its forms to tackle inequality
- High risk pregnancies require care from regional centres



						Modified Model Mealth
Obstetric Anesthesia and	Level	Title	Maternal Health	Hospital Capabilities	Anesthesia Staffing	Organization Patients*
Heart Disease: Practical	Birth	Birth center	Low risk	Not applicable	None	None
Clinical Considerations	Level I	Basic care	Low to moderate risk	Limited obstetric ultrasound Blood bank	Anesthesia provider readily available at all times	Modified World Health Organization class I
Anestresiscoor 2021; 135:164-83	Level II	Speciality care	Moderate to high risk	Computed tomography scanning/magnetic resonance imaging Maternal echocardiogram Nonobstetric ultrasound	Anesthesiologist readily available at all times	Modified World Health Organization class I or II
IN 1983 1986	Level II	Subspeciality care	More complex mater- nal, obstetric and fetal conditions	Interventional radiology In-house capability of all blood components	Board-certified anesthesiologist physically present at all times	Modified World Health Organ zation class I or II, some II
	Level N	Regional peri- natal health center	Most complex maternal conditions	ICI care with Maternal Fetal Medicine commangement Cardiovascular surgery, ECMO, and transplant capabilities	Board-certified anesthesiologist with obstrietic anesthesis fielowahip experience in obsteriric anesthesia physically present at all times	Modifie World Health Organ zation class L II, III, or N



Addressing the Maternal Health Crisis

Veronica Gillispie-Bell, MD, MAS, FACOG Associate Professor, Obstetrics and Gynecology Medical Director of Quality, Women's Services

Medical Director, Louisiana Perinatal Quality Collaborative and Pregnancy Associated Mortality Review

Disclosures

- AbbVie, Inc speaker and consultant on heavy menstrual bleeding
- Bloomlife, Inc consultant for the development of a remote patient monitoring device

Objectives

- Describe the state of maternal mortality
- Discuss best practices leading to improvement in outcomes
- Identify gaps in care and future needs

Maternal morbidity and mortality is a public health crisis

Scope of the Problem in the US

- Maternal mortality in the US is higher than any other developed country
- Globally, maternal mortality rates are declining

U.S. Maternal Mortality Ratio Compared to Industrialized Countries with 300,000+ Births, 2017–2018



Scope of the Problem in the US

• Maternal mortality Trends in Pregnancy-Related Deaths has consistently increased in the US over the last 30 years



Scope of the Problem in the US

 Rates have climbed even higher since the pandemic



Scope of the Problem in the US

- Black women are 3 and times more likely to experience a pregnancyrelated death
- American Indian and Alaska Native women are 2 times more likely to experience a pregnancy-related death



Ref Centers for Disease Control and Preventian Division of Reproductive Health. National Center fo Chronic Disease and Preventian and Health Promotion. Pregnancy Mortality Surveillance Systems

Scope of the Problem in the US

• The racial disparity gap worsened during the pandemic for Black women



Scope of the Problem in the US

- The pregnancy-related F mortality ratio is highest in the "non-core" or rural population
- According to the <u>March of</u> <u>Dimes</u>, 35% of the US is considered a maternity care desert – no hospitals or birth centers, OBGYNs or midwives per 10,000 births



Ref Centers for Disease Control and Prevention Division of Reproductive Health. National Center for Chronic Disease and Prevention and Health Promotion. Pregnancy Mortality Surveillance Systems

Scope of the Problem in the US

 Cardiovascular conditions were the leading causes of pregnancy-related deaths between 2017-2019, followed by infection, cardiomyopathy, and hemorrhage



Ref Centers for Disease Control and Prevention Division of Reproductive Health. National Center for Chronic Disease and Prevention and Health Promotion. Pregnancy Mortality Surveillance Systems

Moving Beyond the Numbers

Maternal Mortality Review Committees (MMRCs)

 MMRCs are multidisciplinary committees that review pregnancy-associated deaths (death of an individual at the time of pregnancy up to 1-year of the end of pregnancy) and determine areas of prevention





Pregnancy Associated Mortality Review Committee

- Reviews all maternal deaths defined as the death of an individual while pregnant or within one year of pregnancy, regardless of cause
- Works to understand the drivers of maternal mortality, complications of pregnancy, understand disparities
- Determine interventions at the level of individuals, families, providers, birthing facilities, health systems, and communities
- Inform the implementation of initiatives

Process Overview





Snapshot of Pregnancy-Associated Cases



Leading Causes of Death



Timing of Deaths



Disparities in Pregnancy-Associated Deaths



 37% of all births in Louisiana from 2017-2019 were to non-Hispanic Black women. However, non-Hispanic Black mothers accounted for 57% of all pregnancyassociated deaths that occurred from 2017-2019

Disparities

 Women with a high school degree/GED or less accounted for 47% of the births in Louisiana between 2017-2019 but 68% of the pregnancy-associated deaths.

	Some College Credit 11%	HS Grad or GED Completed 41%	12th Grade or Less; No Diploma 27%
Advanced Degree	Associate or Bachelor Degree		

Recommendations for Prevention

Recommendations by Point of Intervention



Priority Areas for Prevention

- Improve care coordination before, during and after pregnancy, including support for continued healthcare during the fourth trimester
- Ensure pregnant people receive the appropriate level of care based on the complexity and severity (acuity) of their medical issues, and risk factors present
 Expand the obstictic healthcare user/faces through talehaalth and include specialists such as
- Expand the obstetric healthcare workforce through telehealth and include specialists such as cardiologists, psychiatric and addiction specialists, and behavioral mental health specialists
- Address racial and cultural bias across the network of care that serves pregnant and postpartum people
- Improve and expand identification of and unbiased treatment for substance use and mental health during pregnancy
- Addressing social determinants of health to improve maternal mortality and decrease disparities
- Increase awareness of Louisiana's Maternal Mortality Review Committee and support the need for data sharing
- Contribute to the public health evidence base to increase capacity and better understand and address pregnancy-associated mortality

Using Data for Action

Maternal Mortality

Maternal Morbidity

Acute MI Acute renal failure ARDS AFE Blood transfusion Cardiac arrest/ventricular fibrillation or flutter Conversion of cardiac rhythm DIC Eclampsia



Goals of Prevention

Heart failure/arrest Ventilation Hysterectomy Puerperal cerebrovascular disorders Pulmonary edema/heart failure Sepsis Severe anesthesia complications Shock SCD Temporary tracheostomy





Louisiana Perinatal Quality Collaborative

• What is the LaPQC?

 LaPQC is a network of perinatal care providers, public health professionals, and advocates who work to improve outcomes for birthing persons, families, and newborns in Louisiana. The LaPQC serves a vital role in supporting birthing facilities across the state in implementing evidence-based best practices that promote safe, equitable, and dignified birth.

LaPQC is a partnership

- What we provide?
 - Alliance with state and national improvement efforts and requirements
 - Quality improvement coaching
 - Access to faculty experts
 - Training and tools

- What teams provide?
 - Doing the work
 - Data for measurement

- Improving quality through patient safety bundles
- Alliance for Innovation on Maternal Health
 - Promoting safe care for every U.S. birth via engagement with state-based multidisciplinary implementation teams.
 - Engaging multidisciplinary partners at the national level
 - Developing and providing tools for implementation of evidence-based patient safety bundles.
 - Utilizing data-driven quality improvement strategies.
 - Aligning existing efforts and disseminating evidence-based resources.







AIM Bundle Components



Obstetric Hemorrhage



Quality Improvement Science

- It takes 17 years for translational research to go into practice at the bedside WITHOUT improvement science. WITH improvement science, it takes 3 years
- Evidence based medicine tells us the "what and why" and Improvement science tell us the "how"



Driver Diagram





A change package is a concise and practical document that includes ideas and inspiration for teams seeking to apply QI methods to increasing the effectiveness and efficiency of their care processes and outcomes

What does partnership look like?

- Monthly topic calls
- Monthly coaching calls
- Charter Chats
- Listening Sessions

focus of Your Wo	
une 31, 2023 IPDS Alm	By June 31, 2023, the *** team will:
Patient Partnership and Equity Goal	1
status	What do you want to accomplish in the next 30 days?
_	
status	What do you want to accomplish in the next 60 days?
status	What do you want to accomplish in the next #0 days?

Reducing Maternal Morbidity Initiative

Hemorrhage

SMM overall: Decreased by 35%

- SMM among non-Hispanic Black persons: Decreased by 49%
- SMM among non-Hispanic white: Decreased by 16%
- Hypertension
 - SMM overall: Decreased by 12%*
 - SMM among non-Hispanic Black: Increased by 8%
 - SMM among non-Hispanic white: Decreased by 31%

*prior to COVID-19, the reduction was 22%

Reducing Maternal Morbidity Initiative





LaPQC Programs/Initiatives

Summary

- Maternal morbidity and mortality is a public health crisis
- Maternal mortality review committees are critical in identifying solutions
- To improve outcomes, we need multiple stakeholders
- State Perinatal Quality Collaboratives are key to improving clinical quality of care and addressing equity in birthing facilities
- A multidisciplinary team approach is needed in birthing facilities to address the leading causes of maternal morbidity and mortality

Questions & Discussion

Thank you!

Veronica Gillispie-Bell, MD, MAS, FACOG Veronica.gillispie@la.gov vgillispie@ochsner.org "The AIM program is supported by a cooperative agreement with the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant number UC4MC28042, Alliance for Innovation on Maternal Health. This information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government



References

- 2.
- Jaurie Zephyrin, M.D., and Eugene Dederce, P.D., "Measuring Maternal Martality," To the Point (blog), Commonwealth Fund, Feb. 6, 2020. <u>https://doi.org/10.26099/c14w-rgs2</u>. Retrieved April 24, 2023.
 Trends in Preparancy-Related Douths. Centers for Disease Control and Prevention Division of Reproductive Health. National Center for Chronic Disease and Prevention Tubility are fully and the second з.
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Abstract #: THURS-BP-01

Uterine tone scores and clinical phenotype correlate closely with oxytocininduced increases in uterine smooth muscle calcium

Presenting Author: Jessica R. Ansari, MD

Presenting Author's Institution: Stanford University School of Medicine - Pacifica, California

Co-Authors: Daiana Fornes, PhD - Stanford University Leziga T. Obiyo, MD, MPH - University of Chicago Virginia Winn, MD, PhD - Stanford University Lihua Ying, PhD - Stanford University

Introduction: Uterine atony causes most postpartum hemorrhage (**PPH**), the leading global cause of maternal morbidity and mortality. Efforts to discover novel therapies to treat atonic PPH are limited by incomplete understanding of the molecular and cellular mechanisms underlying both physiologic and pathophysiologic uterine contractility. It remains unknown whether a clinical diagnosis of uterine atony correlates with oxytocin-induced changes in uterine smooth muscle cell (**SMC**) cytosolic calcium [**Ca**²⁺]i. Thus, we tested the hypothesis that the clinical phenotype of uterine tone correlates directly with oxytocin-induced increases in uterine SMC [Ca²⁺]i.

Methods: Uterine biopsies were obtained from patients undergoing term, non-laboring, primary cesarean delivery from the midline of the superior edge of the hysterotomy. **Clinical phenotyping:** Uterine tone was assessed by the operating obstetrician using a validated 0-10 scale¹ (0 = profound atony and 10 = perfect tone) at 2- and 7-min after fetal delivery. Patients were also grouped as either "control" or "uterine atony". Control patients required no second line uterotonic and had quantitative blood loss (**QBL**)< 1000mL. Uterine atony patients received second line uterotonics and had QBL of >1000mL.

In vitro studies: Uterine SMC were isolated and grown in primary culture. Dynamic calcium imaging was performed using the calcium-sensitive dye fura-2. With fura-2, $[Ca^{2+}]i$ is directly proportionate to the ratio of light emitted at 340 nanometer (nm) (Ca²⁺-bound) to 380nm (free fura-2). For each patient, fura-2 ratios in > 30 uterine SMC were averaged each second. After obtaining a stable baseline, 1 micromolar oxytocin was added and continuous response recorded. Assays were performed blinded to clinical phenotype.

Results: The study included 12 patients: 8 controls and 4 with uterine atony. Median uterine tone scores were greater in controls compared to uterine atony patients at 2-min (6 compared to 4, p=0.05) and 7-min (7.5 compared to 5, p=0.002). In uterine SMC, maximal oxytocin-induced increase in $[Ca^{2+}]i$ correlated directly with 7-minute uterine tone score (Pearson's r=0.708, p=0.010). At baseline, there was no difference in $[Ca^{2+}]i$ between control and uterine atony groups. Oxytocin increased $[Ca^{2+}]i$ in controls by 1.83-fold (p< 0.0001 vs. baseline). In uterine atony patients, oxytocin caused an attenuated peak, 1.26-fold, (p=0.031 vs. baseline, p< 0.0001 vs. control), **Figure 1**.

Conclusion: These results demonstrate high fidelity between clinically-relevant uterine contractility and oxytocin-induced increase in uterine SMC [Ca2+]i. The attenuated response to oxytocin in uterine SMC from patients with uterine atony points to a cellspecific etiology and provides rationale for therapeutic strategies designed to increase uterine SMC [Ca²⁺]i. These findings will guide our studies of novel uterotonic therapies to address the major public health problem of PPH.

Ansari Figure for oxytocin microfluorimetry 1.30.pdf

Abstract #: THURS-BP-02 Development and validation of an index score for predicting the risk of postpartum depression

Presenting Author: Jean R. Guglielminotti, MD, PhD

Presenting Author's Institution: Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons - New York, New York

Background: Postpartum depression (PPD) is the most common postpartum mental health disorder and a leading cause of preventable maternal mortality in the United States.^{1,2} Screening for PPD during the perinatal period may help facilitate early detection of high-risk women and interventions.³ However, performance of complex machine learning algorithms in predicting PPD has been dissatisfactory with poor to fair accuracy and reliability.⁴ This study aims to develop an index score for predicting the risk of PPD in the general postpartum population based on routinely collected administrative data of hospitalizations for childbirth.

Methods: Hospital discharge records for women who had their first childbirth in New York State hospitals between January 2009 and December 2017 were linked on the individual level to postpartum inpatient, outpatient and emergency department visit records for up to 1 year. PPD was identified using algorithms based on ICD-9-CM and ICD-10-CM codes. A multivariable logistic regression model to assess risk factors for PPD and a point-based index score for predicting PPD were developed based on data from a 60% randomly split sample (training set) and validated on a 40% randomly split sample (validation set). The model included variables related to patient history of psychiatric or substance use disorders within 1 year before childbirth (e.g., depression), sociodemographic characteristics (e.g., age), delivery mode, obstetric complications (e.g., severe maternal morbidity, stillbirth), and hospital characteristics. Discrimination of the prediction model and the index score was assessed in the training and validation sets using the C-index.

Results: Of the 1,414,365 women included, 14,020 had newly onset PPD (1.0%). In the final prediction model, the risk factor with the highest odds ratio (OR) of PPD was a positive history of depression within 1 year before childbirth, either in isolation (adjusted OR 13.1; 95% CI: 12.2, 14.1) or in association with a history of another psychiatric or substance use disorder (adjusted OR 24.3; 95% CI: 22.8, 26.0) (**Table**). The C-index of the prediction model was 0.80 (95% CI: 0.79, 0.81) in the training set and 0.80 (95% CI: 0.79, 0.81) in the validation set. The index score ranged from 0 to 64 and the incidence of PPD increased progressively with the index score, from 0.4% for index score ≤ 10 , 1.2% for index score between 11 and 19, and 6.4% for index score ≥ 20 .

Conclusions: The index score based on routinely collected administrative data appears to be accurate and reliable for predicting PPD. If confirmed, the index score could be readily incorporated into electronic health records as an automated clinical tool for assisting early PPD detection and intervention. <u>03bis FIGURE PPD.pdf</u>

Abstract #: THURS-BP-03

Structural racism and use of labor neuraxial analgesia among non-Hispanic Black people.

Presenting Author: Jean R. Guglielminotti, MD, PhD **Presenting Author's Institution:** Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons - New York, New York **Co-Authors:** Ruth Landau, MD - Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons Guohua Li, MD, DrPH - Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons

Background: Labor neuraxial analgesia (LNA) is the safest and most effective technique to alleviate labor pain but is underutilized among non-Hispanic Black people.¹ Structural racism is recognized as a significant contributing factor for racial and ethnic disparities in healthcare access and utilization.² Structural racism can be measured using multidimensional racism indexes (MDRI) encompassing different aspects of racism. ^{3, 4} Research assessing the impact of structural racism on LNA use is lacking. To address this gap, we examined the association of MDRI with LNA use.

Methods: Data came from the US Natality file 2017, the Area Health Resource File, and the Vera Institute of Justice. Non-Hispanic Black or White people with a vaginal or intrapartum cesarean delivery were included. The outcome was LNA. The exposure was structural racism measured at the hospital county level using MDRI including the following 3 Black-to-White inequity ratios: 1) low education level (less than high-school), 2) unemployment, and 3) jail incarceration. MDRI was calculated as the mean of the 3 ratios and was categorized into 3 terciles, with the 3rd tercile corresponding to the highest level of structural racism. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) of LNA rate associated with the MDRI were estimated independently for Black and White people using multilevel models with adjustment for 14 patient and hospital county characteristics. Odds of LNA associated with the MDRI were compared between Black and White people using an interaction term between race and MDRI.

Results: A total of 1,740,716 birth certificates in 1381 hospital counties were analyzed; 75% of certificates were for births in a hospital in the residence county, 20% for intrapartum cesarean deliveries, and 23% for Black people. The LNA rates were 77.2% for Black people giving birth in counties in the 1st tercile of the MDRI, 74.7% in the 2nd tercile, and 72.4% in the 3rd tercile (**Table**). The LNA rates were 80.4% for White people giving birth in counties in the 1st tercile of the MDRI, 78.2% in the 2nd tercile, and 78.2% in the 3rd tercile. Compared to people giving birth in counties in the 1st terciles of the MDRI were respectively 24% (aOR 0.76; 95% CI: 0.68, 0.86) and 23% (aOR 0.77; 95% CI: 0.68, 0.87) less likely to receive LNA for Blacks, and 17% (aOR 0.83; 95% CI: 0.76, 0.92) and 18% (aOR 0.82; 95% CI: 0.74, 0.90) less likely to receive LNA for Whites. A statistically significant difference was observed between Black and White people (interaction term P-value < 0.001).

Conclusions: Structural racism is associated with significantly reduced LNA use, especially for Black people. Interventions to address structural racism could benefit both Black and White birthing people. <u>01bis FIGURE RACISM AND LNA.pdf</u>

Abstract #: THURS-BP-04

Dural Puncture Epidural is Superior to Standard Epidural for Epidural Extension Anesthesia in Elective Cesarean Delivery: A Double-Blind Randomized Controlled Study

Presenting Author: Nadir Sharawi, MB BS **Presenting Author's Institution:** UAMS **Co-Authors:** Waseem Athar, MD - UAMS Caroline Martinello, MD - UAMS Kyle Stoner, MD - UAMS Matthew T. Williams, MD - UAMS

Background

Dural-puncture epidural (DPE) and standard epidural are common modes of neuraxial labor analgesia. We investigated the effects of these techniques on the speed of conversion of neuraxial analgesia to anesthesia for elective cesarean delivery (CD).

Methods

This single center randomized, double-blind study tested the hypothesis that the DPE technique would provide faster onset of surgical anesthesia for CD and improve the overall guality of neuraxial blockade when compared to standard epidural. ASA 2 and 3 patients with a singleton pregnancy scheduled for elective CD were randomized to receive DPE or standard epidural in the delivery room 1 hour before surgery using previously described methodology.¹ A T10 sensory block was achieved using up to 20 ml of 0.0625% bupivacaine with 2 mcg/ml fentanyl through the epidural catheter and maintained using a continuous infusion of the same solution until the time of scheduled surgery. Epidural extension anesthesia was initiated in the operating room using 20 ml of 3% chloroprocaine. The primary outcome was the time taken from chloroprocaine administration to loss of sharp sensation at the T6 level. The secondary outcome was the quality of neuraxial anesthesia as defined by a composite of: (1) failure to achieve a T10 bilateral block preoperatively in delivery room, (2) failure to achieve a surgical block within 15 minutes of chloroprocaine anesthesia, (3) the requirement for intraoperative analgesia, (4) repeat neuraxial procedure, and (5) conversion to general anesthesia. We estimated that 120 mother-infant dyads would need to be recruited to detect a difference of two minutes between the groups with a 90% power at an α level of 0.05 assuming a common standard deviation of 3 minutes.

Results

140 participants were enrolled into the study, 70 in each group. 4 women in the standard epidural group were excluded. No patients were excluded from the DPE group. The primary outcome of median (IQR) time to surgical anesthesia was 655 seconds (437, 926) in the standard epidural group and 422 seconds (290, 546) in the DPE group. The median difference in the onset time of sensory block between the two groups was 233 seconds. Fig. 1 shows the survival curve for the onset time to surgical anesthesia between DPE and standard epidural techniques (hazard ratio 1.84; 95% CI 1.29 to 2.64; P< 0.001). Quality of anesthesia (secondary composite outcome) was

better in the DPE compared to epidural group (15.7% vs. 36.3%, respectively; (odds ratio 0.33; 95% CI 0.14 to 0.74; P=0.007). Patient satisfaction, maternal side effects, and adverse events were similar between groups.

Discussion

Under the conditions of this study, the DPE technique provided a faster onset and improved anesthesia block quality when used for epidural extension when compared to the standard epidural technique. Future studies are needed to compare DPE and standard epidural techniques for intrapartum CD. Sharawi DPE Figure.pdf

Abstract #: THURS-BP-05 The pharmacokinetics and pharmacodynamics of oxytocin at cesarean delivery

Presenting Author: David T. Monks, MBChB FRCA MSc
Presenting Author's Institution: Washington University in Saint Louis - Saint Louis, Missouri
Co-Authors: Leonid Kagan, PHD - Rutgers University
Preet M. Mohinder Singh, MD - Washington University in. St. Louis

Introduction: Oxytocin is widely used to prevent bleeding after cesarean delivery. Initial treatment failure rates are high and inadequate dosing may contribute. Excessive doses, however, are associated with serious adverse effects.^{1,2} Evidence from dose-finding studies suggests that higher oxytocin doses are required to be effective in women of higher body mass but data to guide more precise dosing in individual patients is lacking.³ One previous study attempted to measure serum oxytocin levels at cesarean delivery but none of the regimens investigated included a bolus, they only collected samples at three timepoints and were unable to derive pharmacokinetic parameters or correlate serum oxytocin concentrations with its effects.⁴ Our objectives were to obtain pharmacokinetic data to allow the adjustment of oxytocin doses according to body weight and to determine the relationship between plasma oxytocin concentration and uterotonic and hemodynamic effects.

Methods: We measured dorsalis pedis arterial oxytocin concentration, uterine tone, and hemodynamic parameters in twenty-five women (BMI 22.9 - 53.1) frequently in the first 40 minutes after exogenous oxytocin administration at elective cesarean delivery. Oxytocin administration was administered according to a protocol that was amended, during the trial, to adopt features of the international expert consensus guideline.⁵

Results: We were able to construct a one compartment pharmacokinetic model of exogenous oxytocin deposition with a volume of distribution and clearance (mean [coefficient of variation]) as 156.1 L [18%] and 83 ml.s⁻¹ [32%], respectively. We found no correlation between serum oxytocin concentration and uterotonic or hemodynamic parameters.

Discussion: We observed large between-subject variation in serum oxytocin concentrations and in some cases, these were many orders of magnitude larger than previously observed during endogenous release. Weight was not found to influence the pharmacokinetic modelling although the study may have been underpowered. Figure 2 Oxytocin arterial concentration_uterine tone_cumulative oxytocin dose vs Time.pdf

Abstract #: THURS-BP-06

A single-cell immune profiling approach to identify predictive biomarkers of clinical recovery following Cesarean Delivery

Presenting Author: James O'Carroll, MBBS, FRCA Presenting Author's Institution: Stanford University Co-Authors: Kazuo Ando, MD, PhD - Stanford University Brendan Carvalho, MBBCh, FRCA, MDCH - Stanford University School of Medicine, USA Dorien Feyaerts, n/a - Stanford University Brice Gaudilliere, n/a - Stanford University Joshua Gillard, n/a - Stanford University

Introduction

Cesarean delivery (CD) is the most commonly performed inpatient surgery worldwide. Poor recovery following CD can lead to impairment of maternal-infant bonding and prolonged hospital stay. Recent evidence suggests that immune responses following other surgery are key drivers of clinical and functional recovery[1]. Predictive biomarkers could aid accurate risk assessment of recovery after CD and facilitate tailoring interventions to those at highest risk for poor recovery. As a first step towards identification of predictive biomarkers of recovery after CD, the aim of this study was to comprehensively and functionally characterize the effect of CD on all major innate and adaptive cells of the maternal immune system using high-dimensional mass cytometry. Methods

Following IRB approval, eligible consenting patients undergoing scheduled CD were recruited. Whole blood samples were collected immediately before CD (Day 0) and at 24 +/-6 hours following delivery (Day 1) for analysis with single-cell mass cytometry. Patient demographic, medical, obstetric, anesthetic, and neonatal data were collected. Patient centric outcomes regarding recovery were also collected at Day 1 and Day 30 postpartum. (Fig. 1a) Wilcoxon-Mann Whitney test with a ranking for largest effect size (Effect size = % change from D0 to D1) with false discovery rate (FDR) adjustment was used to identify significant changes in the immune system between Day 0 and Day 1. In addition, Spearman correlation was used to correlate the change in immune signatures with outcome measures.

Results

A total of 30 patients were recruited, the median (IQR) age was 34 (32-39), BMI 27 (25-31), mean gestational age was 38 weeks 2 days (+/- 6) and median ObsQoR-10 score was 71.5 (62-87). Of the 1264 identified innate and adaptive immune features extracted from each blood sample, 433 showed a statistically significant difference between day 0 and 1 following CD. pSTAT3 responses in T cell subsets varied to the greatest extent in response to CD.(Fig. 1b) There was adecreased responsiveness of both innnate immune cells and T cell subsets to LPS and interferon alpha (IFNa) stimulation, identified by a decrease in pCREB, pS6 and pNFkB signal. Moreover, a CD-induced increase in pMAPKAPK2 and pSTAT6 signalling response of various T cell subsets to IFNa stimulation correlated with day 1 ObsQoR-10 score.

Conclusion

We have characterized the systemic immune signatures seen in response to CD. Individual components of this multivariate signature correlate with clinically-relevant recovery metrics. Further analyses, including multivariate predictive modelling can help identify predictive immunological biomarkers and understand mechanistic targets for immune modulation to improve recovery following CD.





Hypothesis: Uterine smooth muscle cells gathered from patients with uterine atony will have a decreased response to oxytocin as measured by intracellular calcium concentration



Results: Uterine smooth muscle cells gathered from patients with uterine atony show an attenuated response to oxytocin





Results: A clinical uterine tone score measurement (0-10) by the obstetrician correlates

Uterine tone scores and clinical phenotype correlate closely with oxytocin-induced increases in uterine smooth muscle calcium

ica Ansari, Dalana Fornes, Leziga Obiyo, Lihua Ying, Virginia Winn, David Cornfield







A SOAP 2023

Next st en for new tre restore intracellular calcium response in samples from patients with uterine atony

Manesthesia_mom 🛛 🕅 Stanford School of Me



Aim To develop an index score for predicting the risk of PPD based on administrative data of delivery hospitalizations

2

4









Results: Adjusted	odds ratios and points in th	e trai	ining	set
(limited to aOR>2)		aOR	Points]
````	Patient history			
	Tobacco use	3.3	12	1
	Partner violence	4.4	15	
	Anxiety	5.2	17	
	Opioid use	5.7	17	
	Suicidal ideation	6.4	19	
	Posttraumatic stress disorder	7.9	21	
	At least 2 of the above excluding depression	9.8	23	
	Depression	13.1	26	
	At least 2 of the above including depression	24.3	32	
	Demographic characteristic			
	Age ≤ 19 years	2.34	9	1
0	Obstetric complications			
A SOAP 2023	Stillbirth	2.83	10	1
MEETING	Hospital characteristics			
NEW ORLEANS 1 MAY 3.7	Rural teaching	2.33	8	



6

Results

in New York State

1,414,365 women with first childbirth living

14,020 women with new onset PPD: 0.99%

Median delay to diagnosis: 132 days

SOAP 2023

47.6%

29.8%

22.6%

MEETING

Identification of PPD cases

ED visit

Ambulatory visit

Hospital readmission









 Building stronger care systems and teams: Pursuing personalized maternal care #SOAPAM2023

#### Structural racism and use of labor neuraxial analgesia among non-Hispanic Black birthing people

Jean Guglielminotti, Ruth Landau, Guohua Li

COLUMBIA COLUMBIA DEPARTMENT OF ANESTHESIOLOGY

#### Racial & ethnic disparities in labor neuraxial ASOAP 2023 analgesia utilization MEETING

#### Labor neuraxial analgesia

- ✓ Safest and most effective technique to relieve labor pain
   ✓ Reduced odds of severe maternal morbidity
- (Guglielminotti J -JAMA Net Open 2022;5:e220137)
- UNDERUTILIZATION in minoritized racial and ethnic birthing people
  - Mechanisms accounting for these disparities  $\checkmark$  Patient's intent to use (education, health literacy, health insurance...)
  - ✓ Healthcare providers (implicit bias)
  - ✓ Site of delivery (dedicated OB anesthesia team...)

Unifying mechanism = Structural racism ?? Main determinant of racial & ethnic disparities in healthcare access and utilization

#### Structural racism

ASOAP 2023 Aurual MEETING NEW ORLEANS | MAY 37

 System where public policies, institutional practices, cultural representations & other norms work to perpetuate racial group inequities (*Yearby R-J Law Med Ethics 2020;48: 518-526*).

Indicator of structural racism	Geography	Example
Residential segregation	ZIP code County	Redlining
Inequity ratios Black-to-White Hispanic-to-White	County State	Low educational attainment Unemployment Incarceration
Aggre	gation into <b>multi</b>	dimensional

ZIP code, county or state racism index

 Research linking indicators of structural racism and racial & ethnic disparities in labor neuraxial analgesia utilization is lacking



Labor neuraxial analgesia utilization for vaginal deliveries USA, 2015-2019		
White	75.8%	
Black	70.6%	
Hispanic	65.0%	
Guglielminotti J		

#### **Hypothesis**



A multidimensional hospital county racism index is associated with lower labor neuraxial analgesia utilization among non-Hispanic Black birthing people

#### **Multidimensional Hospital County Racism Index**

#### The mean of 3 hospital county Black-to-White inequity ratios

- Lower education level (less than high school)
  - Unemployment rate
  - Jail incarceration rate
  - → A higher racism index value = More structural racism



**Methods** 



Birth certificate data (CDC) for vaginal and intrapartum cesarean deliveries (2017) Study sample

- Non-Hispanic Black and non-Hispanic White birthing people
- In-hospital birth

Data

Counties with > 100 White residents, > 100 Black residents, & > 100 in-hospital births • Exposure

Hospital county racism index (3 terciles: 1. Low, 2. Intermediate, 3. High)

Outcome Labor neuraxial analgesia utilization rate

Adjusted odds ratios of neuraxial analgesia associated with racism index

- Logistic regression models, independently for Black and White people .
- Comparison of Black and White people using an interaction term (Race x Racism Index) а. Adjustment for 14 patient and hospital county characteristics

#### **Results**



• 1,740,716 birth certificates with 22.8% for non-Hispanic Black 1381 hospital counties in 45 states and the District of Columbia



people	MEETING NEW ORLEANS   MAY 3-7
a	

Labor neuraxial analgesia utilization rate 79.0% Non-Hispanic White Non-Hispanic Black 74.8%






Interaction term
- Tercile 2: No difference between Black and White
- Tercile 3: 14.5% decrease for Black compared to White

Sensitivity analysis Similar results when limiting to people who gave birth in their residence county



SOAP 2023

MEETING





- Analysis limited to Black people (exclusion of other racial & ethnic minority groups )
- Observational study not necessarily causal association
- No information on patient's intent to use or healthcare provider's bias
- No hospital identifier in the data adjustment limited to hospital county characteristics

#### **Conclusions and perspectives**

- Structural racism is associated with significantly reduced use of labor neuraxial analgesia, especially for Black birthing people
- Interventions to address structural racism could benefit both Black and White birthing people

#### COLUMBIA MAILMAN SCHOOL OF PUBLIC HEALTH EPIDEMIOLOGY

COLUMBIA COLUMBIA UNIVERSITY DEPARTMENT OF ANESTHESIOLOGY

Guohua Li





The pharmacokinetics and pharmacodynamics of oxytocin at cesarean delivery

Dr David T Monks MBChB FRCA MSc Assistant Professor Washington University in St. Louis

### **Methods**

25 Women (BMI 22.9 - 53.1), elective CD under neuraxial

Oxytocin administered according to a protocol at delivery which was amended after first 19 participants

<u>Measurements:</u> dorsalis pedis arterial oxytocin concentration, uterine tone, and hemodynamic parameters

Original protocol (first	Updated protocol (last		
19 participants)	6 participants)		
Bolus 3 IU oxytocin;	Bolus 1 IU oxytocin;		
start oxytocin infusion	start oxytocin infusion		
at 15 IU.h ⁻¹	at 2.5-7.5 IU.h ⁻¹		
If inadequate tone	If inadequate tone		
(NRS < 7) at 3 min,	(NRS < 7) at 3 min,		
give a further dose of 3	give a further dose of 3		
IU over > 30 s.	IU over > 30 s.		
	Increase infusion to		
	7.5-15 IU.h ⁻¹		



# Oxytocin assay

Blood samples: 0, 1, 2, 3, 4, 5, 10 & 40 mins Collected into 5 mL BD vacutainers° containing 5 mg of  $K_2$  EDTA and 2500 KIU of aprotinin

Immediately placed on ice, centrifuged at 1600 x g for 15 min at 4°C, and the resultant plasma stored at -80°C before assays.

Plasma thawed, C-18 extracted, and assayed in duplicate using a commercially available oxytocin ELISA kit

# **Results**

Large variability in [oxytocin]_{art}

One compartment PK model

Volume of distribution and Clearance (mean [coefficient of variation]):

- Vd = 156.1 L [18%] and
- Cl = 83 ml.s⁻¹ [32%]

<u>No correlation</u> between serum oxytocin concentration and uterotonic or hemodynamic parameters.







1

## The pharmacokinetics and pharmacodynamics of oxytocin at cesarean delivery





A single-cell immune profiling approach to identify predictive biomarkers of clinical recovery following cesarean delivery

James O'Carroll, Kazuo Ando, Joshua Gillard, Dorien Feyaerts, Brendan Carvalho, Brice Gaudilliere and Pervez Sultan

#### Background

- Cesarean delivery (CD) is the most frequently performed inpatient operation worldwide.
- Poor recovery following CD can lead to impairment of maternal-infant bonding and prolonged hospital stay.
- Immune responses following other surgery are key drivers of clinical and functional recovery.
- Predictive biomarkers could aid accurate risk assessment of recovery after CD and facilitate tailoring interventions.
- First step towards identification of predictive biomarkers of recovery after CD.
- Funded in part a grant from the OAA and supported by NIHR



#### SOAP 2023 MEETING EETING @ lam cocarroll Aims & Eligibility Criteria Single-Cell Mass Cytometry Aims **Inclusion Criteria Exclusion Criteria** 3. Single-cell analysis of Intracellular signalling responses Unstimulated, LPS, INFalpha Characterize the effect of CD Patient refusal . ≥ 18 years old on all major innate and Unable to comprehend the 1. Comprehensive imm cell phenotyping ASA 2-4 adaptive cells of the questions asked in English Providing written consent maternal immune system Neonatal death ≥ 32/40 weeks gestation using high-dimensional mass Non-NHS patients Undergoing scheduled cesarean delivery cytometry. Assess for predictors of poor functional recovery 2. Analysis of cell frequencies Stanford MEDICINE Stanford MEDICINE







# Health

Moderator: David Gambling, M.B.B.S, DRCOG, FRCPC Panelists (REACH Task Force Members): Andrea J. Traynor, M.D. Peter Mancini, M.D. Cristina Wood, M.D., M.S.

Royal College of Obstetricians and Gynaecologists Royal College of General Practitioners Family Planning Association National Association of Family Planning Doctors
I hereby certify that DR. DAVID RICHARD GAMBLING
has special experience and competence in the techniques of contraception and family planning
Dated this 17th day of September 1979 No. 7161



Society for Obstatric Society for Obstatric Anesthesia and Perinatology ASOAP 2023 AELING Netroductors I May

Ross Douthat, NYT opinion piece entitled; **What do the Physical Costs of Pregnancy Mean for the Abortion Debate?** October 5, 2022

Reingold & Gostin. Roe v Wade's 50th Anniversary: New Legal Frontiers for Safeguarding Reproductive Freedoms. JAMA 1/30/2023.



Andrea J. Traynor, M.D. (she/her) Clinical Professor Obstetric Anesthesiology Fellowship Director Division of Obstetric Anesthesiology and Maternal Health Department of Anesthesiology, Perioperative, and Pain Medicine Stanford University School of Medicine



I have no financial disclosures

US abortion laws are changing

There are no federal protections

Each state is different

Laws might be even more different tomorrow



Are we doing the best we can for our patients?



Are there areas of our Anesthesiology practice that we can rethink?

### Prevention



Drugs that affect hormonal birth control

Scheduling of postpartum tubal ligations

Routine perioperative pregnancy testing

# Medications that interfere with hormonal ______ birth control







Pharmacokinetic models suggest approximately 34% decrease in progesterone

Sugammadex



# What is the provider knowledge base?

259 surveys - Anesthesiologists (resident and attending), sRNAs, CRNAs

99% - aware of the potential interaction between sugammadex and hormonal birth control pills

Less knowledge about other types of hormonal birth control

Dwan R, et. Al Anesth Analg 2021;133:958–66)



Most anesthesiolgists/CRNAsare aware that barrier method should be used for 7 days after sugammadex



61% of PACU RNs aware that a barrier method should be used for one month after Aprepitant

↑to 82% with education

David A, et. Al J Perianesth Nurs 2023;22:s1089-9472 Dwan R, et. Al Anesth Analg 2021;133:958–66)

#### How often are patients being counseled?



How Often Are Patients Being Counseled? Major academic hospitals, retrospective studies Randomly selected charts with sugammadex administration Patients taking hormonal birth control, number of patients with documented counseling n= 134; <u>one</u> patient¹ n= 48; <u>zero</u> patients² One patient - unintended pregnancy while on OCP (birth control failure cited)¹

7% failure rate for OCP in general population

¹Lazorwitz A, et Al. J Anesth 2020 34(2):294-97 ²Passi NN, et Al. BJA 2023 130(3):e412-e414







Methods of Birth Control



NCHS Data Brief No. 327, December 2018

## **Unfulfilled Requests**

Postpartum Tubal Ligation Request Completion Rate = 31-56%

# Why?

Richardson MG. Anesth Analg 2018;126:1225-31

709 Patients

324 (46%) did not receive procedure

121 (37%) - No consent

#### 21 (6.5%) - OR availability

Predominantly African American, Latino, unemployed, unmarried, insured by Medicaid

Zite N, et. Al. Contraception. 2006;73:404-407.

1460 Women Delivered

269 (69%) Received the Procedure

Those who did not were given similar methods of birth control

429 Requested PPTL

133 (31%) Did not



Pregnant within a year = 47%

Thurman AR, Janecek T. Obstet Gynecol. 2010 Nov;116(5):1071-7.

#### ACOG Committee Opinion #827: Access to Postpartum Sterilization Committee for Healthcare for Underserved Women

"Institutions should consider designating postpartum sterilizations as <u>nonelective procedures</u>.....Emphasis on the nonelective nature of the procedure might <u>increase the success</u> in scheduling with such a short notice" Complications of Tubal Ligation

Large Swiss study >5000 patients = zero deaths

Complications < 0.5%

 Intraabdominal injury, fever, hemorrhage (0.27%), thromboembolic events

Huber AW, Eur J Obstet Gynecol Reprod Biol. 2007;134:105–109.



Benefits



# We must prioritize getting PPTLs done

Think about your workflow

Make it known that you prioritize PPTLs

Block time ???

Flexibility with anesthetic plans





# Pregnancy Testing Prior to Surgery



#### High risk:

Should be based on risk of fetal harm during or subsequent to surgery



#### Surgeries on the uterine cavity or that significantly affect uterine blood flow D&C, hysteroscopy, hysterectomy, endometrial ablation, myomectomy

Procedures involving the heart or vascular system

#### Indeterminate risk:

Arterial procedures on the aorta, common iliac, internal iliac, uterine, and ovarian arteries Intra-abdominal laparoscopic procedures

# Pregnancy Testing Prior to Surgery



E.g. X-rays or ter

American Society of Anesthesiologists*





No currently used thetic agents been shown to any teratogenic its in humans of age when using dard clinical doses and duration.



May be offered to patients with a uterus of childbearing age and for whom the result would alter the patient's management

#### Should not be mandatory

Informed consent or assent of the risks, benefits, and alternatives related to preoperative pregnancy testing should ideally be obtained What happens with a positive result in your state?

Best practice - shared decision-making - ideally with educational materials



Are we doing the best we can for our patients given the changing laws?



Are we giving the patients as much control as possible over their reproductive health?

"The most damaging phrase in the human language is: 'It's always been done this way" --Grace Hopper







Kortsmit K, Mandel MG, Reeves JA, et al. Abortion Surveillance — United States, 2019. MMWR Surveill Summ 2021;70(No. SS-9):1-29.

# Examples of Co-morbidities

#### • ALS

- Glioblastoma
- · Metastatic breast cancer
- Congenital heart disease (Fontan)
- Pulmonary HTN
- Severe scleroderma with multiorgan failure
- ESRD (HD)
- Obstetric Complications
  - Placenta Accreta
  - Molar Pregnancy

- BMI > 50 (or 60+, 70+)
- Uncontrolled Diabetes
- Multiple sclerosis
- Active COVID
- Persistent, severe asthma
- Uncontrolled HTN
- Severe psychiatric Illness
- Polysubstance Abuse
- Current/recent URI
- Difficult Social Situations Homelessness, incarceration, domestic violence, decisional conflict, travel

Allen R, Singh R. Society of Family Planning clinical guidelines pain control in surgical abortion part 1 — local anesthesia and minimal sedation. *Contraception*, 2018; 6:471-477

5. Cervical ripening should not be employed solely for pain reduction.

6. Waiting 3 min to allow onset of action for infiltration of anesthesia to the cervix does not improve pain scores.

#### Level B: Recommendations are based primarily on limited or inconsistent scientific evidence. Level A: Recommendations are based primarily on good and consistent scientific evidence.

# Verbal support techniques (support person, distraction) and music help women cope with the procedure but do not necessarily reduce pain.

- Preoperative NSAIDs reduce postoperative pain.
   A 20-mL buffered 1% lidocaine PCB reduces procedure pain. 2. Intracervical and paracervical blocks have similar effects 3. Vacuum source (electric vs. manual) does not affect pain scores. Oral or sublingual lorazepam does not decrease procedural pain but does reduce anxiety.
   Oral opioids do not reduce procedural pain.
  - 4. Nitrous oxide in a 50/50 mixture does not appear to reduce pain.
  - Atraumatic tenacula are not associated with less pain than single-tooth tenacula.

# Level C: Recommendations are based primarily on consensus and expert opinion.

A combination of treatments — including NSAIDs, local anesthesia and such nonpharmacologic interventions as yerbal support — should be used to reduce pain and improve patient satisfaction during surgical abortion.

Paracervical Block



es Patients' Perce

Cansino C, Denny C, Carlisle AS, Stubblefield P. Society of Family Planning clinical recommendations: Pain control in surgical abortion **part 2 – Moderate sedation, deep sedation, and general anesthesia**. *Contraception*, 2021;104:583-592,

· Level A: Recommendations are based primarily on good and consistent scientific evidence.

# 07:00 Family Planning OR at YNHH

#### • 8-12 Patients scheduled

- 1 room in Ambulatory OR
- CRNA working under anesthesiologist
  Pre-op Nursing

  IV access
  NPO 8 hours
  Flagyl 500 mg IV
  Ketorlac 30 mg IV

- Patient Characteristics:
- Gestational Age > 20 weeks
- Young Age
- Patient Requested GA
- · Increased Bleeding Risk
- Morbid Obesity
- Chronic Pain/Opioid tolerance
- Active Drug Use
- Complicated medical history
- Complicated social situations

# Anesthetic Plan

- Anxiolysis
- Induction
- Airway
- Maintenance
- Recovery
- Pain Control

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# Anesthetic Plan

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• ETT vs LMA vs Deep Sedation

# Anesthetic Plan

- Anxiolysis
- Induction
- Airway
- Maintenance
- Recovery
- Pain Control

### ALL PREGNANT PATIENTS ARE FULL STOMACH

- Additional Concerns:
- pH
- LES function
- Gravid Uterus Mechanical Compressions

# Anesthetic Plan

- Anxiolysis
- Induction
- Airway
- Maintenance
- Recovery
- Pain Control

Dean G, Jacobs AR, Goldstein RC, Gevirtz CM, Paul ME. The safety of deep sedation without intubation for abortion in the outpatient setting. *J Clin Anesth.* 2011 Sep;23(6):437-42.

- Retrospective Review
- 62,125 surgical abortions during deep sedation
- 11,039 second-trimester
- Zero cases of perioperative pulmonary aspiration

# Anesthetic Plan

- Anxiolysis
- Induction
- Airway
- Maintenance
- Recovery
- Pain Control

Dean G, Jacobs AR, Goldstein RC, Gevirtz CM, Paul ME. The safety of deep sedation without intubation for abortion in the outpatient setting. *J Clin Anesth.* 2011 Sep;23(6):437-42.

PPNY Screened Patients (2001-2008)NPO 8 hours (solid) and 2 hours (clears)

# Anesthetic Plan

- Anxiolysis
- Induction
- Airway
- Maintenance
- Recovery
- Pain Control

Gokhale P, Lappen JR, Waters JH, Perriera LK. Intravenous Sedation Without Intubation and the Risk of Anesthesia Complications for Obese and Non-Obese Women Undergoing Surgical Abortion: A Retrospective Cohort Study. *Anesth Analg.* 2016 Jun;122(6):1957-62.

Mancuso AC, Lee K, Zhang R, Hoover EA, Stockdale C, Hardy-Fairbanks AJ. Deep sedation without intubation during second trimester surgical termination in an inpatient hospital setting. *Contraception*. 2017 Mar;95(3):288-291.

Aksel S, Lang L, Steinauer JE, Drey EA, Lederle L, Sokoloff A, Carlisle AS. Safety of Deep Sedation Without Intubation for Second-Trimester Dilation and Evacuation. *Obstet Gynecol.* 2018 Jul;132(1):171-178.

# Anesthetic Plan

- Anxiolysis
- Induction
- Airway
- Maintenance
- Recovery
- Pain Control

### Experience at YNHH

- Most cases with LMA
  - Intubation in cases of very high BMI, high aspiration risk, expected complications (e.g. known accreta), or if otherwise indicated clinically
- Do not intubate 20+ week patients because of GA alone



# Anesthetic Plan

- Anxiolysis
- Induction
- Airway
- Maintenance
- Recovery
- Pain Control

Components of General Anesthesia

- Unconsciousness
- Amnesia
- Blunting reflexes
- Muscle relaxation/Akinesis
   PCB
   Ketamine with select patients
- Analgesia
  - PCB (level A evidence)
  - Ketorolac (level A evidence)

# Anesthetic Plan

- Anxiolysis
- Induction
- Airway
- Maintenance
- Recovery
- Pain Control

#### **TIVA vs Inhalational**

Experience at Yale

- Pre-2018: Sevoflurane 1% + N2O 50%
- 2018-present: TIVA (propofol 150 mcg/kg/min)
- Propofol with ketamine (1 mg/mL) at infusion 70 mcg/kg/min will provide ketamine infusion ~0.4 mg/kg/hr
  - · Patients on opioid agonist/antagonist
  - High requirements (e.g. PSA)

# Anesthetic Plan

- Anxiolysis
- Induction
- Airway
- Maintenance
- Recovery
- Pain Control

#### TIVA vs Inhalational

Hall JE, Ng WS, Smith S. Blood loss during first trimester termination of pregnancy: comparison of two anal techniques. Br J Anaesth. 1997 Feb;78(2):172-4.

- · Prospective, randomized
- · 48 ASA I-II patients undergoing suction D&E at 9-12 weeks Isoflurane Group: EBL 40.4 mL
- TIVA (Propofol) Group: EBL 18.8 mL

Kumarasinghe N, Harpin R, Stewart AW. Blood loss during suction termination of pregnancy with two different anesthetic techniques. *Anaesth Intensive Care*. 1997 Feb;25(1):48-50.

- Prospective, randomized
- 100 ASA I-II patients undergoing suction D&E at 6-14 weeks
- Isoflurane Group: EBL 244 mL
- TIVA (Propofol) Group: 148 mL

Cansino C, Denny C, Carlisle AS, Stubblefield P. Society of Family Planning clinical recommendations: Pain control in surgical abortion part 2 – Moderate sedation, deep sedation, and general anesthesia. *Contraception*, 2021;104:583-592.

#### Level A: F ons are based primarily on good and co

#### Level B: Re ons are based primarily on m utific evidence:

- · Fentanyl and midazolam reduce pain (GRADE 1B)
- Patients receiving sedation or GA should be monitored by pulse both during and after surgery (GRADE 1C).
- The ASA classification system can be used as a guide to assess a patient' procedure-related risk (GRADE 2C).
- Supplemental oxygen should be used (GRADE 1C).
- Low-risk patients undergoing surgical abortion in the first and second trimester may safely receive moderate or deep sedation without routine endotracheal intubation (GRADE IC).
- Level C: Re ns are based p General anesthesia for dilation and evacuation is con with a propofol infusion and an opioid (GRADE 1C)
- Several factors may influence the decision of whether a appropriate candidate for out-of-hospital anesthesia, im preference (whether the surgeon or anesthesia provider nearest hospital that can accommodate postabortion co
- oper anesthesiolog

Post-sedation care requires patient monitoring until the patient baseline level of consciousness (GRADE 1C).

(March 2023)















99% of mental health deaths were preventable



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#### Patients from outside of Colorado presenting for abortion

• 37 y.o. G1P0 highly desired IVF pregnancy

- PPROM at 16 weeks
- Denied induction
- Difficulty finding transportation to airport: Aiding and abetting
- Presented in CO meeting sepsis criteria
- Abortion provided
- Prolonged 2-week ICU admission
- 21 y.o. G2P1 at 21 weeks
  - 20-week anatomy scan: Multiple fetal anomalies considered fatal
  - Decision to abort
  - Travelled to CO for abortion

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#### Patients from outside of Colorado presenting for abortion

• 29 y.o. G4P3 at 22 weeks

- History of peripartum cardiomyopathy (EF 15%)
- · Home state Medicaid also denied IUD and Nexplanon
- Pregnancy confirmed at 20 weeks
- Recommendation to abortion by obstetric service given EF was declining (EF 40%)
- Traveled to second state but denied based on gestational age
- Came to CO: EF 10-15%, NYHA Class IV
- Abortion provided
- CICU admission, partial recovery of cardiac function
- Listed for heart transplant







JAMA Psychiatry | Original Investigation Women's Mental Health and Well-being 5 Years After Receiving or Being Denied an Abortion A Prospective, Longitudinal Cohort Study

"Our findings add to the body of evidence rejecting the notion that abortion increases women's risk of experiencing adverse psychological outcomes. Women who had an abortion demonstrated more positive outcomes initially compared with women who were denied an abortion."

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JAMA Psychiatry | Original Investigation Association Between State-Level Access to Reproductive Care and Suicide Rates Among Women of Reproductive Age in the United States Mark Psychiatry 2017 Feb 1380 [127:14]. doi:10.1001/jamageduary.2017.454. PMID: 3677674; PMID: 94505551: • States with restrictions on access to reproductive care from 1974 to 2016 were associated with increased suicide rates among reproductive-

 Further research is needed to assess whether current factors affecting access to reproductive care services are related to suicide risk among female sex of reproductive age and to inform suicide prevention strategies

14

aged women.

Feb 2012

First-Time First-Trimester Induced Abortion and Risk of Readmission to a Psychiatric Hospital in Women With a History of Treated Mental Disorder

Trine Munk-Olsen, PhD; Thomas Munk Laursen, PhD; Carsten B. Pedersen, MEdSc; <u>et al</u> Author Affiliations | Article Information Arch Gen Psychiatry. 2012;69(2):159-165. doi:10.1001/archgenpsychiatry.2011.153

**Main Outcome Measure:** Readmission at a psychiatric hospital with any type of mental disorder occurred more frequently in those

experiencing childbirth compared to abortion.



























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#### Summary

- Leading Cause of Maternal Mortality: Mental Health
- Those patients receiving an abortion do not have increased mental health issues compared to those delivering an unwanted pregnancy
- Denial of abortions increases negative socioeconomic and mental health outcomes
- Perinatal mental health programs can provide life saving care
- OB Anesthesiologists play an important role





# Advocacy: How and Why You Should Get Involved

Veronica Gillispie-Bell, MD, MAS, FACOG Obstetrician and Gynecologists Medical Director, Louisiana Perinatal Quality Collaborative and Pregnancy Associated Mortality Review

# Disclosures

- Abbvie, Inc
- Speaker's Bureau, Consultant
- Bloomlife, IncConsultant

 Identify
 Identify
 Identify
 Identify
 Indentify
 Indentify

More and more legislative decisions are impacting the way we practice medicine

# Examples

Louisiana

Act 483 – requires physicians to provide a disclosure statement when prescribing Mifepristone

de a pro nt heo

"A healthcare practitioner... or a healthcare facility... shall respect a potient's right to privacy and refrain from making a written inquiry or asking questions concerning the ownership of a firearm or ammunition by the patient or a family member of the patient"

Florida



<u>The 21st Century</u> <u>Cures Act</u>

 Clinical notes must be shared with patients (e.g., consultation, discharge, H&P, imaging, lab and pathology reports, procedure and progress notes)

Dobbs v. Jackson Women's Health Organization

- On June 24, 2022, by a vote of 6-3, the Supreme Court overturned Roe v. Wade
- Abortion is not a Constitutional right and is a state's right

The Court agreed to hear a Mississippi case (Dobbs v. Jackson Women's Health Organization)



American College of Obstetrics and Gynecology Statement of Policy

Legislative Interference with Patient Care, Medical Decisions and the Patient-Physician Relationship

ACOG opposes legislation that weakens the patient-physician relationship. We urge physicians to advocate against undue legislative interference in patient care. A patient's right to be counseled and treated by their physician according to the best available medical evidence and the physician's professional medical judgment must be protected.

Published May 2013





# Advocating for your patients

- Inform the patient and promote informed consent
   Empower the patient and protect autonomy
   Protect the rights and interests of patients where they cannot protect their own
   Ensure patients have fair access to available resources
- Support the patient no matter what the potential
- Represent the views/desires of the patient and not



# Individual responsibility





Professional society



Hospital committees

Local, state, and federal policy

# Getting involved: Local, state, federal policy





# Increase Your Political Awareness



State Advocacy	Seasions	House	Senate	Committees	Legislators	
		HILLS YOU ARE TRACKING Add a bill to your textelog fact. In: The Set (Last Set Invo; or )				
<ul> <li>Get involved in the</li> </ul>		You are	natching 12 instruments			
legislative session!	Author UNDRY Provides relative to restricting solit	Cum Pendin tary confinement (OR INC	ent Statuts g House Administration of Criminal J REASE GF EX See Note)	usfice	Considered Considered 4/2	
• Sign up for <u>Legis.la.gov</u>	HILFERTY tablishes an income tax credit fell WILLARD TH. Describes relation to maternit	Pendin lowing the delivery of a stil Pendin	g House final passage Ibom child (EG -\$726,000 GF RV Se g House Insurance el deules (OR INCREASE GE EX Se	ve Note) e Note)	Sched. for 4/25	
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# Where do you stand?

"The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy."

# nd the Patient-Physicia cians and Gynecologis Relationship. Statement of Policy. American College of Obste Published May 2013. Amended and Reaffirmed August 2021. References Mitchell D. Creinin, M.D., "Mifepristone Antagonization With Progesterone to Prevent Medical Abortion," Obstetrics & Gynecology vol. 135, 158-165 (Jan.

- Sara K. Redd et al. "Medication Abortion "Reversal" Laws: How Unsound Scient Paved the Way for Dangerous Abortion Policy", *American Journal of Public 121*, https://doi.org/10.1016/j.jpp.202-212.https://doi.org/10.1016/j.jpp.202-

  - Hofford R. Seven Tips for Effecting Legislative Change. Fam Pract Manag. 2001:8(4):35

# Thank you!

## Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-01

## Undiagnosed Focal Accreta: Postpartum Hemorrhage Surprises

## Presenting Author: Brian Waldman, MD

**Presenting Author's Institution:** Department of Anesthesiology, University of Michigan Medical Center

### **Co-Authors:**

## Introduction:

Placenta accreta spectrum (PAS), defined as a range of disorders involving variable trophoblastic placental invasion into uterine myometrium, has emerged as a leading cause of postpartum hemorrhage (PPH) and maternal morbidity/mortality over the last 4 decades. Traditionally, PAS spans from focal accreta, where placental uterine adherence is small/localized and hysterectomy may not be required, to percreta, with placenta extending into nearby abdominal structures requiring hysterectomy and reconstruction. The rise in PAS incidence is attributed to the rise in risk factor prevalence, like history of cesarean delivery. Also, history of cesarian delivery with co-diagnosis of placenta previa increases risk of PAS substantially. These risk factors and others should prompt further PAS evaluation with ultrasound which has reached high diagnostic accuracy but cannot always be relied on for extent of placental invasion or identifying focal accreta.

## Case reports:

1. 30 year old woman G3P1011 at 36w2d with asthma and placenta previa, presented for primary cesarian delivery. Given the patient's elevated PPH risk, 2 large bore IVs were placed prior to skin incision, and delivery was performed under combined spinal epidural (CSE). Despite prior ultrasound negative for PAS, the obstetric team noted focally adherent placenta with ongoing bleeding after delivery, and arterial line was placed. Patient received 1 unit packed red blood cells (for hemoglobin 7.7), oxytocin, methylergonovine, misoprostol, and tranexamic acid (TXA) intra-operatively, and a Bakri balloon was placed prior to hysterotomy closure to control bleeding. Final calculated blood loss was 1768 mL.

2. 38 year old woman G3P1011 at 36w5d gestation with history of prior cesarian delivery complicated by placenta accreta, presented for repeat cesarian delivery. Given the patient's elevated PPH risk, 2 large bore IVs and arterial line were placed prior to skin incision, and delivery was performed under CSE. Again despite ultrasound negative for PAS, focally adherent placenta complicated by bleeding after delivery was

noted. Patient received oxytocin, methylergonovine, and carboprost intra-operatively, and a Bakri balloon was placed prior to hysterotomy closure to control bleeding. Final calculated blood loss was 489 mL.

## **Discussion:**

Both mothers experienced protracted bleeding secondary to undiagnosed focal accreta seen both clinically and on placental pathology. Fortunately, both also delivered healthy neonates, had their Bakri balloons and epidurals removed postoperative day 1, and were discharged after a 2 day hospital stay. Preparation for these patients' increased odds of PAS and PPH given risk factors was key in managing PPH. Recognizing risk factors even in the setting of a negative ultrasound can be essential in reducing maternal morbidity/mortality from PAS.

## Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-02

Perioperative management of Jehovah's Witness patient with placenta accreta during caesarean delivery with hysterectomy

Presenting Author: Andrew Hong, MD Presenting Author's Institution: Rutgers New Jersey Medical School Co-Authors: Rushi Dave, n/a - Rutgers New Jersey Medical School

Placenta accreta spectrum (PAS) is an abnormal growth of trophoblasts into the uterine myometrium, which innately carries a higher risk of significant hemorrhage due to the placenta not completely separating during delivery. Considering the major concern for severe and potentially life-threatening hemorrhage, management of these patients becomes exponentially more complex when patients do not accept blood transfusions. Jehovah Witness patients' refusal of transfusions creates unique challenges in the surgical setting, and each Jehovah Witness patient makes an individual decision to accept specific derivatives of plasma or cellular blood components. In this case, we present a 29-year-old Jehovah's Witness female at 34 weeks gestation with a history of four prior caesarean deliveries, who presented to our institution with placenta accreta for a planned caesarean delivery with supracervical hysterectomy and bilateral salpingectomy. Given the patient's religious beliefs as a Jehovah's Witness, it was essential to have a pre-operative discussion with her regarding which blood products she would or would not receive. This patient refused packed red blood cells, platelets, fresh frozen plasma, clotting factors, and immunoglobin, however she agreed to accept acute normovolemic hemodilution, intraoperative cell salvage, albumin, factor VII recombinant, and erythropoietin. The patient also underwent balloon placement in the bilateral internal iliac arteries prior to delivery. Estimated blood loss was 1789 mL, and the patient received 430 mL of hemodiluted blood and 250 mL of blood via cell salvage. The procedure resulted in the successful delivery of a male infant with Apgar scores of 5 and 9 at 1 and 5 minutes, respectively, while adhering to the patient's personal preference of care. Similar techniques may be considered in the management of a parturient with PAS, particularly in the Jehovah's Witness population.

## Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-03

# Expecting the Unexpected: An Anesthesiologist's Role in Unexpected Placenta Accreta

Presenting Author: Bianca E. Rich, MD

**Presenting Author's Institution:** University of Utah Health - Murray, Utah

**Co-Authors:** Brett Einerson, MD, MPH - University of Utah Health, Intermountain Health

Matt Givens, MD - University of Utah Health, Intermountain Health

## **INTRODUCTION:**

Placenta Accreta Spectrum (PAS) can cause significant maternal morbidity and mortality. The American College of Obstetricians and Gynecology (ACOG) recommends PAS management involve a standardized approach with a multidisciplinary care team accustomed to managing PAS¹. While antenatal diagnosis of PAS allows for this type of management, unexpected PAS can occur outside of referral centers. The Society for Maternal Fetal Medicine's Checklist for Unexpected Morbidly Adherent Placenta recommends transport to a facility with PAS experience if PAS is discovered and the patient can be stabilized². However, case descriptions of this transport are rare. We present a case of unexpected PAS with successful transport to a PAS referral center.

## CASE:

A 23-year-old G4P3003 at 39 weeks' gestation with 3 prior cesarean deliveries (CD) presented to a community hospital in active labor. She underwent repeat CD, but surgical course was complicated by unexpected PAS and 2.5 L blood loss after partial removal of the placenta. Bakri balloon placement was unsuccessful and transfer to a PAS referral center was requested. Per recommendation of the remote expert PAS team, the patient's abdomen was packed for transfer while receiving ongoing resuscitation from the anesthesia and air transport teams. The patient received 10 units pRBC, 2 units FFP, 1 unit platelets, and 6L crystalloid and had an additional 500 cc of blood loss during the transport. On arrival to the PAS referral center, heart rate was 160s with SBP of 130 on norepinephrine. Blood gas revealed lactic acidosis, Hgb 10.6, and base excess of -12. She was taken for emergent total abdominal hysterectomy under general anesthesia with an additional 1L of blood loss and received another 4L of crystalloid, 4 units pRBC, 7 units FFP, platelets and cryoprecipitate. The patient was transferred to the ICU for monitoring and was discharged on postoperative day 7.

## **DISCUSSION & CONCLUSIONS:**

PAS management by an experienced team is an important determinant of maternal mortality. Anesthesiologists play a critical role in management and rapid stabilization of patients with unexpected PAS at centers with less PAS experience. As such, Anesthesiologists should be familiar with ACOG and SMFM recommendations and feel empowered to encourage pausing procedural interventions and assist with patient

transfer to a higher level of care to optimize outcomes. Temporization efforts should follow balanced transfusion protocols, and deployment of expert transport teams with adequate blood products is essential during this vulnerable patient period.

## Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-04

# Anesthesia for Cesarean Hysterectomy complicated by Placenta Increta after Radical Trachelectomy

Presenting Author: Akram Hossain, MD Presenting Author's Institution: Maimonides Medical Center Co-Authors:

**Background**: While radical trachelectomies are performed less commonly than hysterectomies, they are a way to preserve fertility in early-stage cervical cancer patients. This procedure is being performed more often both worldwide and around the nation and as anesthesia providers we should be aware of how to manage patients who present a viable high-risk pregnancy after radical trachelectomy.

**Case Report**: A 43 years old Female with history of cervical cancer, stage 1b1, treated with paclitaxel and radical trachelectomy in 2015 in a foreign country, with laparoscopic abdominal cerclage placed in January 2022, with successful IVF pregnancy presents to our labor & delivery unit at 24 weeks and 6 days with vaginal bleeding. MRI showed placenta increta. Multidisciplinary team meetings were held and the plan was to continue with watchful monitoring and deliver at 32 weeks and perform Cesarean hysterectomy.

At 32 weeks, Anesthesia team placed T12-L1 epidural catheter pre-procedure. Patient was taken to Interventional Radiology and epidural was initiated with 2% Lidocaine with 5mcg/mL Epinephrine and at conclusion of procedure, she was transported to the operating room. In the operating room she was given 2mg of Midazolam for anxiolysis and the epidural was loaded with 15 mL of 2% Lidocaine with 5mcg/mL Epinephrine. Patient received 1 unit of Packed Red Blood Cells, 1 unit of Fresh Frozen Plasma, and 200 mL of blood collected from the cell saver along with 2 liters of fluids. She remained sedated during the procedure while maintaining her own airway with supplemental oxygen. She received a total of 45 mL of Lidocaine with Epinephrine, with 5 mL dosages every 30 minutes. She was transferred to the recovery room and later admitted to the post-partum floor. Epidural was kept in place, but due to patient refusal and wanting to ambulate, it was removed the next morning. Her postoperative course was uneventful and was discharged from the hospital on POD4.

**Discussion:** We were able to maintain adequate anesthesia for all procedures this patient underwent with an epidural that was continuously dosed. Having IR place occlusion balloons helped limit the blood loss from the procedure. Careful preoperative discussion and preparation is essential for positive outcome.

## Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-05

## **Obstetric Anesthesia Considerations in a Trauma Patient**

Presenting Author: Shabnaz Rob, DOPresenting Author's Institution: Maimonides Medical CenterCo-Authors: Kalpana Tyagaraj, MD - Maimonides Medical Center

## INTRODUCTION

Trauma is one of the leading non-obstetric cause for maternal and fetal mortality. When evaluating a pregnant patient after trauma, the care team must consider emergent maternal and fetal needs. In most scenarios, optimizing maternal hemodynamics improves fetal outcomes.

## CASE REPORT

33 years old female at 34 weeks gestational presented after being struck by a motor vehicle. Upon arrival to ED- she was awake and responsive, moving all 4 extremities and reporting left sided abdominal pain and ecchymosis over the left lateral abdomen. FAST showed no pericardial effusion, bilateral lung sliding, and no free fluid in abdomen. Fetal heart rate was 80 bpm. A decision was made for emergent cesarean delivery. Noncontrast Head and C-spine CTs were done and no acute pathology was found.

Patient arrived with multiple large bore IVs and ongoing resuscitation with crystalloids. Rapid sequence induction and intubation was performed. Massive Transfusion Protocol was initiated while the anesthesia team initiated one unit of O-ve PRBC. A live fetus was delivered. Right radial arterial line was inserted and ABG, CBC, and coagulation labs sent- Hgb 13.8 and lactate of 2.8. Trauma surgery explored the abdomen after uterine closure and noted multiple liver lacerations; with no active bleeding. Patient received 2U PRBC, 1U FFP, 3L of crystalloids, oxytocin and carboprost. Bilateral TAP blocks performed using 0.25% bupivacaine and liposomal bupivacaine. Patient was hemodynamically stable throughout. Decision was made to extubate the patient and was transferred to radiology for CT Chest and X-Ray which showed multiple rib fractures and right hemothorax and chest tube was placed. by surgical team. 12 hours post op Hgb was 7.6 and at 24 hours 6.7. Patient received 1 additional unit of PRBC in SICU. Patient remained hemodynamically stable. On postop day 5 for reduction of left segmental humeral shaft fracture was done.
#### **DISCUSSION:**

Physiological adaptations of pregnancy- hypercoagulable state, increased plasma volume and cardiac output may underestimate the extent of hemorrhage and influence the adequacy of resuscitation. A lower mortality rate as compared to non-pregnant women suggests pregnancy likely confers protection. Multidisciplinary approach and prompt intervention is essential for successful outcomes.

chart.pdf

## Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-06

# Undiagnosed Placenta Accreta Spectrum Complicating a Second Trimester D&E for Intrauterine Fetal Demise.

#### Presenting Author: Jessica Galey, MD

**Presenting Author's Institution:** University of Maryland School of Medicine - Baltimore, Maryland

**Co-Authors:** Katelyn T. Scharf, MD - University of Maryland School of Medicine Bhavani S. Kodali, MBBS, MD - University of Maryland School of Medicine Karl Seif, MD - University of Maryland School of Medicine Ozhan Turan, PhD, FACOG - University of Maryland School of Medicine Amy Zheng, MD - University of Maryland School of Medicine

Prior cesarean delivery (CD) and established placenta previa are the biggest risk factors for placenta accreta spectrum (PAS), which can cause significant maternal hemorrhage^{1,2}. We present a case of a patient with undetected PAS who required a dilation and evacuation (D&E), which was complicated by massive hemorrhage necessitating a hysterectomy.

A 36yo G4P2012 at 24w5d with preeclampsia and history of 2 prior CDs was transferred to our hospital where FDIU was diagnosed. Initial assessment revealed no placenta previa, hence mifepristone and misoprostol were given for labor induction. On placement of cervical ripening balloon, 500mL of brisk bright red blood was noted. The obstetricians decided to stop the induction and prepare for a D&E. She continued to lose another 1L of blood. Labs showed a drop in fibrinogen (216 from 349) and hemoglobin (7.8 from 11.8). She was transfused packed red blood cells (PRBCs) and proceeded to urgent D&E using her existing epidural for anesthesia. Tranexamic acid (TXA) was administered and upon removal of the placenta, the patient had seizure-like activity and became unresponsive. Brisk bleeding was noted from the cervix and vagina. She was intubated and focused echo was done to rule out amniotic fluid embolism while the obstetricians used multiple intrauterine hemorrhage devices that failed to minimize bleeding.

Vasopressors were administered, a central line was placed, and massive transfusion event was initiated. Given the brisk rate of bleeding, the team decided to proceed with hysterectomy instead of uterine artery embolization in interventional radiology. Upon entry, the lower uterine segment was noted to have increased vascularity with an adherent portion of the placenta, consistent with PAS. Blood loss was 11L and the anesthesia team resuscitated the patient using thromboelastogram (TEG) guidance with 23 units of PRBCs, 18 units of fresh frozen plasma, 5 units of platelets, 4 units of cryoprecipitate, and 3 grams of fibrinogen. Uterotonics including methylergonovine maleate, oxytocin, and carboprost were administered.

Her abdomen was left open and she was taken to the surgical intensive care unit (SICU) intubated. Her SICU course was uneventful and she underwent abdominal closure 48 hours later.

PAS can be a difficult to diagnose¹ potential complicating factor in patients undergoing second trimester D&Es leading to massive hemorrhage and is an important consideration as the incidence of PAS continues to increase³.

Scharf PAS abstract image.pdf

# Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-07

# A Case of Interventional Radiology Embolization of Broad Ligament Hemorrhage in a Patient Undergoing Cesarean Delivery

#### Presenting Author: Jilyan Decker, MD

**Presenting Author's Institution:** Temple University Lewis Katz School of Medicine Department of Anesthesiology - Philadelphia, Pennsylvania **Co-Authors:** 

#### Introduction:

Postpartum hemorrhage is a leading cause of maternal morbidity and mortality. Interventional radiology (IR) can help to prevent and treat postpartum hemorrhage. Although there have been publications addressing the utility of prophylactic procedures such as prophylactic balloon occlusion of the iliac arteries for patients with abnormal placentation [1], literature on when it is appropriate to take a post-delivery patient to IR is more scarce [2]. Here, we describe one such case.

#### Case:

The patient is a 26-year-old female, G6P3113, who presented at term with spontaneous rupture of membranes. Patient had a history of prior cesarean delivery for non-reassuring fetal heart tracing remote from delivery, followed by two successful vaginal births. She desired a repeat trial of labor after cesarean delivery. An epidural catheter was placed at the patient's request. Several hours later, an emergency cesarean delivery. Intraoperatively, it was noted that there was an extension of the hysterotomy into the right broad ligament. Surgical attempts at hemostasis were performed, but there was concern for continued oozing. By this point in the procedure, the patient had received 3L of crystalloid, 250mL of 5% albumin, and 1 unit of packed red blood cells. She was hemodynamically stable and not requiring any vasoactive agents. She had adequate analgesia from the epidural that remained in place.

Due to concern for ongoing bleeding, as well as her hemodynamic stability, the decision was made to transport the patient to IR for possible embolization. In the IR suite, the patient remained hemodynamically stable. Angiography revealed active hemorrhage from the right uterine artery. Coil embolization of the right uterine artery was performed, with cessation of bleeding noted. The patient remained hemodynamically stable and was transported to the recovery area.

#### **Discussion:**

The decision to proceed to the IR suite with a patient experiencing postpartum hemorrhage can be a difficult one to make. There are no clear guidelines on which to base this decision. The patient has to be experiencing enough bleeding to be clinically significant and difficult to control from a surgical approach, yet must be hemodynamically stable enough to be transferred to another area of the hospital and undergo the procedure. The risks of definitive treatment such as hysterectomy have to be weighed against risks of hemodynamic decompensation during transfer. This case highlights the importance of a team-based approach to decision making between the IR, anesthesiology, and obstetric teams. Cases such as these may help in the development of clinical guidelines to provide clinicians with a decision-making framework to determine patients that may benefit from IR treatment.

Figure 1.pdf

# Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-08

# Factor XI Deficiency Postpartum Hemorrhage After Necessary Precautions

Presenting Author: Dallin Gould, DO
Presenting Author's Institution: VCU Health
Co-Authors: Cedric Campbell, MD - VCU Health
Arun Karrupiah, MBBS, MD, D. ABA - VCU Health

Factor XI deficiency affects 1 in 1 million patients worldwide. Pregnant patients with Factor XI deficiency have an increased incidence of bleeding of about 19% when compared to 2% in general population(1). Despite a known increase in PPH it continues to be difficult to predict the extent of bleeding, because each patient's presentation is vastly different (1). Unlike other bleeding disorders, clinical symptoms can be absent in clinical history.

We present a patient with known factor XI deficiency, including her subsequent postpartum hemorrhage after taking what was thought to be necessary precautions. The patient presented to labor and delivery as a 39-year-old G1P0 38 weeks pregnant dated by Invitro fertilization. Factor XI deficiency was discovered as an incidental finding on IVF work up. The patient was found to be negative for any bleeding history, but factor XI activity was >28% before admission (normal >50% and does not change in pregnancy(2)). After a failed 3-day induction at an outside hospital she was transferred to our center. Hematology was consulted and recommended preparing 3 units of fresh frozen plasma, if neuraxial was planned to give 1g IV Tranexamic acid before placement and continue TXA 1G orally 4 times a day for 3 days after vaginal delivery and 5 days for C-section. An attempt was made for vaginal delivery, but after 20 hours it was decided a surgical assisted delivery was needed. TXA was given and single dose spinal was successfully performed for anesthesia. The C-section preceded uneventfully with blood loss of 760mL. After the patient was taken back to the floor the patient experienced further bleeding eventually requiring a dilatation and curettage with additional 2 liters of blood loss requiring multiple blood products. Labs drawn before returning back to the operating room demonstrated Factor XI activity of 23% and PLT of 140. Bakri balloon was placed. In total the patient received 12 units of fresh frozen plasma, 3 units of red blood cells, 2 units of platelets, 1 gram of TXA before and after C/S, 3 doses of 30 mg of Pitocin, and 2 doses of methergine. Factor XI activity following resuscitation was 43%.

Our patient may have experienced a catastrophic outcome if it was not for continued vigilance from staff. While factory XI concentrates are available they are not FDA approved to be used. At this time we rely on FFP to resuscitate our patients with factor XI deficiency. We must continue to treat these unique patients individual needs knowing the pathophysiology of coagulation and their short comings.

Factor XI deficency pathophysiology.pdf

## Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-09

# Management of a Jehovah's Witness parturient at high risk for postpartum hemorrhage

#### Presenting Author: Emmarie Myers, MD

**Presenting Author's Institution:** Johns Hopkins University School of Medicine - Elkridge, Maryland

Co-Authors: Zachary Janik, MD - Johns Hopkins University School of Medicine

The Jehovah's Witness parturient has a constitutional right to decline allogenic blood transfusion consistent with her religious beliefs1. Although personal thresholds may vary, traditionally Jehovah's Witnesses do not accept primary blood components, even in life-threatening circumstances. Some may accept blood component fractions, albumin, or intraoperative cell salvage (ICS). This presents unique challenges for the anesthesiologist during the peripartum period due to the potential for acute, large volume blood loss. We present a case of management of a Jehovah's Witness parturient at high risk for postpartum hemorrhage (PPH).

A 31-year-old G1P0 Jehovah's Witness with a history of a 5x6cm lower uterine fibroid was admitted at 38w4d for induction of labor in the setting of pre-eclampsia with severe features. The obstetrics team felt that vaginal delivery would be in the patient's best interest given the potentially morbid nature of cesarean delivery from her bleeding risk and large fibroid. The decision was made to proceed with cesarean delivery given no cervical change after 17 hours. The patient was at high risk for PPH in the setting of prolonged oxytocin use, therapeutic magnesium sulfate, and a potential need for classical uterine incision due to the fibroid location. The patient would accept ICS therapy but declined use of all fractionated blood products, clotting factors, and albumin. A multi-disciplinary plan was made including the use of ICS, prophylactic tranexamic acid immediately after delivery, and uterine incision with Debakey vascular clamps for hemostatic control. Uncomplicated combined-spinal epidural with hyperbaric bupivacaine, fentanyl and morphine sulfate was performed. The Obstetric and Fetal Therapy teams performed a midline vertical skin incision and ultrasound-guided classical hysterotomy utilizing vascular clamps along the hysterotomy edges. Tranexamic acid was given, and uterine atony was treated with oxytocin infusion, misoprostol and carboprost. Quantitative blood loss was 1L, and the patient received 800cc crystalloid. There was not sufficient cell salvage collected to return to the patient. Hemoglobin was 13.0 g/dL pre-operatively, 10.1 g/dL on post-operative day 1, and she was successfully discharged home on postpartum day 6.

Caring for the Jehovah's Witness parturient, particularly one with major risk factors for PPH, requires knowledge and utilization of other resources from both the anesthesiology and obstetric teams to prevent and manage blood loss. Multidisciplinary communication and advanced planning were key to a satisfactory outcome in this patient: her myriad of risk factors for a poor outcome were recognized early and

appropriate plans were put in place. Prior experience in fetal surgery cases lead to recommendation for additional surgical techniques to help control bleeding for this high-risk patient.

### Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-10

## Misoprostol administration resulting in ICU admission

**Presenting Author:** Danielle Esnard, MD **Presenting Author's Institution:** Ochsner Clinic Foundation **Co-Authors:** 

Introduction: Misoprostol is a prostaglandin E1 analog that has been widely used as a uterotonic agent for second line treatment of postpartum hemorrhage due to uterine atony, and as first line treatment in resource-poor countries due to its heat stability and ease of administration. Its use as a second line agent when oxytocin is readily available has been challenged due to its significant side effect profile and questionable efficacy. We present a case of hyperthermia, encephalopathy, and lactic acidosis in the setting of buccal misoprostol administration resulting in unplanned ICU admission.

Case report: Our patient is a 24 year old G1P0 at 40.1 weeks EGA who was admitted for induction of labor. Her labor was augmented with cervical foley balloon placement and intravenous oxytocin, and an epidural was placed. After 14 hours of labor an IUPC was placed due. The patient developed a fever of 101 F and was administered antibiotics and acetaminophen for suspected chorioamnionitis. Cesarean delivery was ultimately performed after 2 hours of maternal pushing due to arrest of descent as well as fetal tachycardia with recurrent late decelerations. After delivery of the fetus (Apgars 2/9), uterine atony and postpartum hemorrhage was noted, which was treated with continuous IV oxytocin infusion (30u/500mL), buccal misoprostol 800mcg, and tranexamic acid 1g. Approximately 15 minutes following the misoprostol administration the patient started to complain of nausea and feeling unwell which progressed to acute agitation. She also became tachycardic and rigorous, but was normothermic. Management included 100% supplemental O2 via face mask, placement of a second large bore IV and an arterial line, and anxiolysis with dexmedetomidine and midazolam. Upon arrival to the recovery room she became acutely hypoxic and facial edema was noted. There was concern for development of pulmonary edema as the patient was clenching her teeth tightly and obstructing her airway. She was placed on BiPap and given hydrocortisone, diphenhydramine, and famotidine. At that time her pH was 7.2, lactate 8, and CPK 400. The decision was made to admit her to ICU for encephalopathy, lactic acidosis, and airway watch. Upon arrival to the ICU, her temperature was 104 F. Overnight, her mental status and vitals normalized, and she was stepped down the following day. Blood cultures, tryptase, and complement levels

were negative.

Discussion: Misoprostol has been widely used as a secondary agent for treatment of uterine atony, however this practice has been called into question due to its significant side effect profile and questionable efficacy when oxytocin is available. This case highlights the risks involved in misoprostol administrated, including but not limited to anxiety, rigors, confusion, myalgias, bronchospasm, and in our case, unplanned ICU admission. Perhaps it is time to re-evaluate the use of this medication when oxytocin is readily available.

# Abstract #: THURS-CR- Room 1–Placental Accreta & PPH-11

A Parturient with Factor VII Deficiency in Pregnancy: A Case Report Presenting Author: Sana Rukh, MD MPH

**Presenting Author's Institution:** University of Arizona College of Medicine-Tucson **Co-Authors:** Shanua Bratton, BS - University of Arizona College of Medicine-Tucson Priyanka Hadvani, BS MS - University of Arizona College of Medicine-Tucson

# Introduction

Factor VII deficiency is a rare bleeding disorder, present in 1 in 500,000 people¹. Limited cases of factor VII deficiency management during the intra- and postpartum period have been reported; thus patient care requires a multidisciplinary collaboration between obstetric, anesthesia, and hematology teams. Herein, we report a case of factor VII deficiency in a pregnant female with a history of postpartum hemorrhage (PPH) requiring packed red blood cell (PRBC) transfusions and arterial embolization, and discuss therapies for management.

# **Case Presentation**

The patient is a 27-year-old G3P1011 with history of factor VII deficiency and PPH, who presented at 39w0d for repeat cesarean section (RCS). Past medical history includes a CS during her first pregnancy in which she required 1 unit (u) of PRBC transfusion postoperatively; 1 week later she had significant PPH requiring 20u PRBCs and placement of uterine artery coil. At this time, she was seen by a hematologist and diagnosed with factor VII deficiency (factor VII level at 40%). On presentation for this CS, labs showed a Hgb 11.9, factor VII 97%, PT 12.6.

After discussion with hematology, she was given 2u of fresh frozen plasma (FFP) prior to delivery. In case of PPH, she would get recombinant factor VIIa (rFVIIa) every 2 hours until hemostasis. The CS was performed under general endotracheal anesthesia, with delivery of a viable infant and estimated 800 ml blood loss. No bleeding complications were noted in the postoperative period. On discharge, the patient had Hgb 8.4, factor VII 46%, PT 13.6. Patient had stable levels of PT for 2 weeks following discharge.

# Discussion

As demonstrated in this case, management of factor VII deficiency during pregnancy is important as the uterus and placenta are rich in tissue factor, making hemostasis more dependent on factor VII and the extrinsic pathway¹. Fixed standards of care protocols are needed for peripartum management. Management options include FFP and rFVIIa. FFP can be used for its low cost, easy availability, and effect expected for 4-6 hours after administration. However, it can have limited effectiveness due to risk of circulatory

overload with overuse². rFVIIa remains the most widely accepted therapeutic option for this condition.¹ More studies are needed to assess thrombosis risk in FFP versus rFVIIa. Overall, this case presented a rare blood disorder that required careful consideration in peripartum care. Future research should address these gaps in standard management

Factor 7 deficiency image (SOAP 2023).pdf

# Anesthetic management during cesarean delivery of a parturient with left ventricular noncompaction cardiomyopathy

Presenting Author: Emmarie Myers, MD
Presenting Author's Institution: Johns Hopkins University School of Medicine - Elkridge, Maryland
Co-Authors: Phillip Callihan, MD, PhD - University of Virginia Health

Left ventricular noncompaction cardiomyopathy (LVNC) is a rare, often genetic, form of cardiomyopathy¹. There are limited data regarding LVNC in the pregnant patient; however, the potential for worsening left ventricular function, cardiac events and propensity for arrhythmias must be factored into anesthetic management. We present a case of a parturient with LVNC undergoing cesarean delivery with neuraxial anesthesia.

A 20yo G1P0 with history of LVNC, paroxysmal tachyarrhythmia, and Limb-Girdle muscular dystrophy was admitted at 28w5d for symptomatic tachyarrhythmia. Left ventricular ejection fraction (EF) was severely reduced at 20-25%, and right heart catheterization showed an elevated pulmonary capillary wedge pressure of 35mmHg and low cardiac index (2.02). Milrinone was started for inotropic support. Her course was complicated by recurrent episodes of tachyarrhythmia and congestive hepatopathy. Given worsening clinical picture and transverse lie, cesarean delivery was planned for 32w3d in the cardiac operating rooms. An arterial line was placed for hemodynamic monitoring, but a pulmonary arterial catheter (PAC) was deferred given concerns for triggering a tachyarrhythmia. The planned anesthetic was neuraxial, with total intravenous general anesthesia as back-up given risk of rhabdomyolysis and hyperkalemia with volatile anesthesia from her muscular dystrophy. Uncomplicated combined-spinal epidural was performed with intrathecal injection of morphine sulfate only for post-operative pain control. The epidural was slowly dosed with 2% lidocaine, and the cardiothoracic surgery team placed groin sheaths for emergent ECMO access once the epidural level was sufficient. The epidural was then dosed for cesarean delivery. Vasopressin was used to maintain hemodynamics and avoid worsening of pulmonary vasoconstriction, while epinephrine was avoided due to its arrhythmogenic potential, tocolytic effects, and concern for exacerbating the patient's high resting heart rate in the 120s. In anticipation of the autotransfusion after uterine involution, milrinone was increased and inhaled epoprostenol started prior to delivery. The patient remained hemodynamically stable and tolerated delivery well. Milrinone was titrated back to the

initial dose and continued postpartum along with epoprostenol. She was ultimately discharged on postpartum day 5, and follow-up TTE showed improvement in EF to 30-35%.

This case demonstrates successful use of neuraxial anesthesia for cesarean delivery in a patient with severely reduced EF from LVNC. Maintenance of hemodynamic stability with appropriately chosen vasopressors and inotropes may be required, and patients should be carefully monitored given the potential for decompensation from autotransfusion. The potential benefits from use of a PAC should be weighed against the risk of arrhythmias in patients with LVNC.



Anesthetic management of previously undiagnosed partial anomalous pulmonary venous return in pregnancy

Presenting Author: Phillip Callihan, MD, PhDPresenting Author's Institution: University of Virginia HealthCo-Authors: Christopher Stout, MD - University of Virginia Health

#### Introduction

Pulmonary hypertension in pregnancy significantly increases the risk of eclampsia syndromes, intrauterine fetal demise, preterm delivery, and major adverse cardiac events.¹ We present a case of previously undiagnosed partial anomalous pulmonary venous return (PAPVR) causing volume-induced hypertension in pregnancy. **Case** 

28yo G5P1031 at 30 weeks with history of reactive airway disease, type 2 diabetes, depression, substance use disorder, pulmonary embolism in prior pregnancy, chronic hypertension with superimposed pre-eclampsia without severe features, and pulmonic stenosis who presented with worsening shortness of breath, orthopnea, new paroxysmal nocturnal dyspnea and peripheral edema. She reported a diagnosis of pulmonic stenosis as early as age 4, however transthoracic echocardiography did not support pulmonic stenosis (velocity 2.2 m/s) and showed elevated pulmonary artery systolic pressure (PASP). Right heart catheterization demonstrated significant right heart dysfunction and a newly diagnosed left-to-right shunt (right atrium (RA) 19 mmHg, pulmonary capillary wedge pressure (PCWP) 22 mmHg, pulmonary artery pressure (PAP) 80/25(43) mmHg, evidence of left to right shunting per shunt run oxygen saturations: superior vena cava (SVC) 70.2%, RA sat 76.4%, right ventricle (RV) 83.9%, pulmonary artery (PA) 84%, wedge 97.4%. CT pulmonary angiogram revealed polysplenia and previously undiagnosed PAPVR with the right upper and lower pulmonary veins draining the entire right lung into the RA. Further, there was no evidence of pulmonic stenosis, ultimately suggesting that RV failure was driven by volume-induced rather than pressure-induced pulmonary hypertension. Due to concern for the ability of her cardiovascular system to tolerate the ongoing demands of increasing volume as her pregnancy progressed, cesarean delivery was performed at 32 weeks under epidural anesthesia. Intraoperative hemodynamic monitoring via arterial line and PA catheter showed: arterial blood pressure mean

>80mmHg throughout case, max PAP 97/46 (64) mmHg, central venous pressure (CVP) max 30 mmHg. Postoperatively she was treated with lasix and her hypertension was managed with labetalol.

# **Discussion**

Pulmonary hypertension has multiple causes, all of which present challenges, especially related to fluid status and hemodynamic management. We report safe and effective epidural anesthesia for cesarean delivery in a patient with pulmonary hypertension due to previously undiagnosed PAPVR in the setting of polysplenia syndrome.



# Neuraxial Anesthesia for Dilation and Curettage in a Patient with Fontan Circulation

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## **Background**

Congenital heart disease (CHD) is among the most common birth defects with an estimated incidence of 81 out of every 10,000 births. Fontan circulation is a result of palliation in patients with single ventricle physiology and is highly unique. Over the last 30 years, survival of patients with CHD into adulthood has improved to rates of 85% due to advances in surgical management.^{1,2} As survival rates improve, more patients are reaching reproductive age; therefore, the obstetric anesthesiologist must be aware of the principles of anesthetic management in the setting of this complex physiology.

#### **Case Presentation**

A 19-year-old female G2P0A1 presented with a first trimester demise requiring dilation and curettage. Medical history included complex CHD characterized by double inlet left ventricle, double outlet right ventricle, subaortic stenosis, and multiple ventricular septal defects status-post patch repair for aortic coarctation, as well as Norwood, Glenn, Fontan palliation, and mitral valve repair. The patient had chronic dyspnea on exertion with baseline saturations of 88-94%.

Obstetric anesthesiology and cardiology were consulted for preoperative evaluation. An echocardiogram showed systemic left ventricular ejection fraction of 51%, fenestrated lateral tunnel Fontan with right-to-left flow, and no significant valvular abnormalities. Given stable symptoms and echocardiogram, the anesthesiology team planned for neuraxial anesthesia.

An arterial line was placed, and a bolus of intravenous fluids was given with an in-line air filter prior to neuraxial placement. We performed a combined spinal epidural and gave an intrathecal dose of 0.8 ml of 0.75% bupivacaine and 20 mcg of fentanyl, which was inadequate for surgery. 15 ml of 2% lidocaine was then given epidurally to achieve an adequate surgical level to T10. The patient remained hemodynamically stable, and phenylephrine infusion was discontinued prior to surgery start. Spontaneous ventilation was maintained, and the case ended without any complications.

#### **Discussion**

Fontan circulation is characterized by passive venous return to the pulmonary circulation, rendering these patients dependent on adequate preload and low pulmonary

vascular resistance (PVR) to maintain forward flow of cardiopulmonary circulation.^{2,3} Increased PVR or decreased systemic vascular resistance (SVR) will lead to right-to-left shunting, thereby worsening hypoxia and hypercarbia. Primary tenants of obstetric anesthesia management in these patients include spontaneous respiration, avoidance of respiratory depressants to prevent PVR exacerbation, and vasopressors as needed to avoid decreases in SVR, which can be seen after a full-dose spinal anesthetic. These patients are high-risk, especially during pregnancy, and management requires multidisciplinary planning and communication.

### Anesthetic Management for the Parturient with Wolff-Parkinson-White Syndrome

**Presenting Author:** Courtney R. Hood, MD **Presenting Author's Institution:** University of North Carolina - San Antonio, Texas **Co-Authors:** Heidi Heyman, MD - University of North Carolina

Wolff-Parkinson-White (WPW) syndrome is characterized by an accessory pathway in the heart's conduction system that can lead to life-threatening arrhythmias, posing an exceptional risk to both mother and fetus during childbirth. [1] The literature is scarce for data pertaining to WPW syndrome in pregnancy and is limited to a few case reports and case series. [2-5] We present a 26-year-old G2P1 with a history of WPW syndrome and asymptomatic bicuspid aortic valve who presented at 18-weeks gestation for an anesthetic evaluation as part of delivery planning. Work-up included an ECG showing ventricular pre-excitation suggestive of right-sided anterior/anteriolateral pathway, and a Zio patch study showing predominately underlying NSR. The patient's transthoracic echocardiogram showed EF 55-60% and normal biventricular function. As part of her bicuspid aortic valve workup, an MRA was performed showing an ascending thoracic aortic diameter measuring 2.5 cm. She underwent an induction of labor at 39 weeks gestation. Labor management included continuous telemetry, close monitoring of electrolytes, and an early epidural to blunt the sympathetic response of labor. Avoided medications included ephedrine, terbutaline, and hydralazine. In consultation with Cardiology, procainamide was determined to be the medication of choice for this patient in the event of SVT. Procainamide was kept at bedside but not needed. Procainamide, calcium channel blockers, beta-blockers, and IV adenosine have all been safely used in pregnancy as single doses, but medication choice in WPW is nuanced and depends on if the SVT is regular or irregular. [6, 7] This case highlights the anesthetic considerations and challenges to consider for labor and delivery in patients with WPW syndrome.



# Repeat Cesarean Delivery in a Patient with an an Acute and Evolving Non-ST Elevation Myocardial Infarction (NSTEMI)

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#### Introduction

Management of Pregnancy-Associated Myocardial Infarction (PAMI) presents multiple challenges. PAMI affects up to 8 parturients per 100,000 deliveries. Risk factors include >35 years of age, diabetes, and pre-eclampsia. It may be diagnosed pre- or post-partum. Case fatality rates are higher compared to non-pregnant women of childbearing age (Tweet et al, 2020).

#### Case Report

A 35 yo G2P1 at 32w4d with a history of poorly controlled Type 1 diabetes, pyelonephritis, urosepsis, and recurrent NSTEMIs presented requiring urgent cesarean for worsening pre-eclampsia and breech presentation. She presented to the ED at 17 weeks gestation with heartburn, emesis, and left chest pain radiating to scapula. Labs were notable for blood glucose of 547 and a troponin of 5757. EKG was normal. She was admitted for diabetic ketoacidosis and diffuse coronary artery calcifications found on CT. Left heart catheterization revealed 3-vessel coronary disease involving the Left Anterior Descending, Left Circumflex, and Right Coronary Arteries. She was treated with Aspirin, Labetalol, and statins without stenting. The patient was discharged after treatment and followed by cardiology, endocrinology, and MFM. Outpatient cardiac rehabilitation was scheduled during course of pregnancy.

On the day of delivery, the patient presented with 5 days of nausea and vomiting, dyspnea, and tachycardia. Troponins were elevated. Given a history of cesarean and breech presentation, the decision was made to proceed with cesarean. A STAT echo was normal, and patient was taken to the operating room. Spinal anesthesia using 1.4mL 0.75% Bupivacaine, 15mcg Fentanyl, and 0.1mg Morphine was placed. A phenylephrine infusion was started at 80mcg/min, an arterial line was inserted, and an insulin infusion at 5.5 units/hr was started for elevated blood glucose. The patient went

to the ICU for observation and heparin infusion and was discharged home after an uncomplicated surgical and post-operative course.

After discharge she made multiple ED visits including an event of significant hypoglycemia causing unconscious at home while breast-feeding and possible seizures. She continued to follow with cardiology, cardiac rehabilitation, and endocrinology. There is ongoing discussion of scheduling coronary bypass.

### **Discussion**

This complicated case demonstrates the salience of multidisciplinary collaboration in allowing challenging patients to have safe deliveries. As emphasized by Maternal Mortality Review Committees, collaborative efforts must be continued post-partum to ensure future health and safety in subsequent pregnancies and while nurturing existing families.



### Labor Analgesia in Patient with Fontan Circulation

Presenting Author: Ben Schmitt, DOPresenting Author's Institution: Medical College of Wisconsin, WisconsinCo-Authors: Ayse Kula, MD - Medical College of Wisconsin

**Case**: 24F G1 with history of double inlet left ventricle with extracardiac Fontan palliation and aortic aneurysm, with pre-pregnancy VO2 max of 20 cc/kg/min, and baseline intermittent chest pains presented to the high risk obstetric anesthesia service. Pregnancy course was complicated by progressive dilation of aortic aneurysm to 4.3cm at 20 weeks gestation on MRI, with worsening chest pains. She presented at 33w6d gestation with contractions, worsening dyspnea, increased frequency of chest pains. Following 24hrs of antenatal steroids labor analgesia was requested prior to insertion of cervical ripening balloon.

After 1mg IV midazolam for anxiolysis, a dural puncture epidural (27g Whitacre) was performed. Epidural infusion of 0.0625% bupivacaine with fentanyl 2mcg/cc at 8cc/hour was started, taking extreme care to maintain blood pressure (BP), sinus rhythm, and heart rate control. After 1 hour, epidural rate was increased to 10cc/hour and the patient received PCEA bolus of 3cc Q10min, with BP monitoring every 5 minutes for the first 30 minutes after each pump change. After 20 hours the epidural solution was changed to 0.1% bupivacaine with fentanyl. Three hours later the patient had an unassisted vaginal delivery complicated by 822cc blood loss, which was treated with 10 units of intramuscular oxytocin and 800mg buccal misoprostol

**Discussion**: Patients with Fontan circulation rely on passive filling of pulmonary circulation with elevated central venous pressure (CVP). Persistently increased CVP can cause liver & kidney disease, protein losing enteropathy, and/or plastic bronchitis. The 45% plasma volume expansion of pregnancy increases the risk of arrythmia and heart failure, made worse at delivery when anticipated cardiac output increases to 60-80% above baseline. Additional gestational concerns include thrombosis, post-partum hemorrhage, heritability of congenital heart disease, and 50% chance of miscarriage. Methergine and carboprost should be avoided for postpartum hemorrhage as they can increase pulmonary vascular resistance (PVR) and impair blood flow.

Goals	Actions
Keep Pulmonary Vascular Resistance Low	Avoid Hypercarbia
	Avoid Hypoxia
	Avoid Acidosis
	Avoid Hypothermia
	Avoid high intrathoracic pressure
	Pulmonary vasodilators (sidenafil, bosentan, nitric oxide, ect.)
Maintain Sinus Rhythm	Adequate Analgesia
	Electrocardiogram Monitoring
	Pacemaker/ICD planning
Maintain Preload	Avoid Prolonged Fasting
	Left Uterine Displacement
	IV Fluids
Decrease Risk Embolism	Filters on IV tubings
	Sequential compression devices
	Anticoagulation/ anti-platlet agents when able
Adapted from J Cardiothorac Vasc Anesth. 2022 Jan;36(1):275-285	
ICD = Implantable Cardioverter Defibrillator	

## Sepsis and a Failing Heart

**Presenting Author:** Nitya Reddy, MD **Presenting Author's Institution:** University of Michigan **Co-Authors:** 

Puerperal sepsis is one of the leading causes of complications in pregnancy, with sepsis from Group A streptococcus (GAS) 20 times more likely in postpartum women than nonpregnant women. This infection can cause severe cardiomyopathy and rapidly lead to death if not diagnosed and managed effectively.

This is a 34-year-old woman G2P0010 with a past medical history of ulcerative colitis who previously underwent multiple abdominal surgeries. She underwent an uncomplicated scheduled primary cesarean section at 39 weeks gestation. On POD 2, she developed worsening abdominal pain, hypotension, and tachycardia. CT abdomen/pelvis was unremarkable. With worsening hemodynamics on POD 3, she was transferred to the surgical ICU (SICU). Bedside TTE revealed an LVEF of 45%. She was fluid resuscitated, started on multiple pressors, antibiotics, steroids, and was emergently taken for a laparotomy. Her bowel was found to be intact, but she continued to deteriorate. TEE estimated her LVEF was now 25% despite inotropic support. Given her hemodynamic status, femoral artery access was obtained to prepare for potential VA ECMO cannulation. The decision was made to proceed with a hysterectomy with the presumed diagnosis of GAS sepsis. The operation was successful, revealing an inflamed and necrotic uterus. She returned to the SICU where she was extubated the next day and weaned off inotropes with recovery of cardiac function.

This case highlights the rapid progression of GAS and its effect on cardiac function. A study by Boltz et al described suppression of cardiac function in patients with GAS bacteremia. This is likely due to the release of endotoxins contributing to cardiac myocyte dysfunction. In a study by Forni et al, 6 patients developed cardiomyopathy associated with GAS resulting in rapid onset hypotension, lactic acidosis, renal insufficiency, lung injury, and coagulopathy. The hemodynamics for all patients showed normal cardiac output that decreased over time and normal systemic vascular resistance (SVR), contrasting with a low SVR and increased cardiac output in typical septic shock. Our patient presented with rapidly worsening hypotension, tachycardia, and a severely reduced EF that was refractory to fluid resuscitation – consistent with GAS sepsis. She was fortunately able to recover due to swift diagnosis, early antibiotics, hemodynamic support, and source control of her infection without requiring VA ECMO or other invasive cardiac support.

#### Management of an Urgent Cesarean Section in a Patient with Unknown Severe Pulmonary Hypertension, Obesity, Heart Failure with Reduced Ejection Fraction and Prior Classical Cesarean Section.

Presenting Author: Tyler Guidugli, DO

**Presenting Author's Institution:** University of Kentucky - Lexington, Kentucky **Co-Authors:** Regina Fragneto, MD - University of Kentucky Tayler Hines, DO - University of Kentucky Jon Holzberger, MD - University of Kentucky Johannes Steyn, MD - University of Kentucky

**Introduction:** Pulmonary hypertension is a well-established risk factor for MACE in pregnancy. Morbidity and mortality in these patients remain very high, especially in the setting of HFrEF. It is critical that these patients are cared for by a multidisciplinary team of obstetricians, obstetric anesthesiologists, and cardiologists to improve outcomes.

**Case:** A 33-year-old G8P1 at 31 weeks and 6 days with a history of severe morbid obesity (BMI 82), COPD on home oxygen, pulmonary embolism, myocardial infarction, HFrEF and prior classical cesarean sections presented as an emergent transfer for vaginal bleeding and contractions. The patient had been experiencing new onset chest pain, dyspnea, headache and vision changes over the last several days; however, vaginal bleeding and contractions prompted her to seek evaluation.

An urgent cardiac work-up revealed LVEF of 30%, and right ventricular dilation. She continued to labor in the setting of previous classical uterine incisions and was taken to the main OR for urgent Cesarean delivery. General anesthesia was induced after placement of an arterial and post induction central line. A transesophageal echo probe revealed severe biventricular heart failure and severe tricuspid regurgitation, both of which were unknown preoperatively. Shortly after induction she became increasingly hypotensive requiring norepinephrine, vasopressin, epinephrine, and milrinone. Due to ongoing hemodynamic instability the patient was left intubated and taken to the ICU. Several hours after arrival she remained unstable despite maximal pharmacotherapy and was placed on peripheral VA ECMO.

Unfortunately, she continued to decline developing multisystem organ failure. An attempt was made to transition the patient to an RVAD, in order to help wean from ECMO, that was unsuccessful. She was ultimately transitioned to comfort care and passed surrounded by family.

**Discussion:** Pulmonary hypertension in concurrence with HFrEF has a significantly higher morbidity and mortality in pregnancy than pulmonary hypertension alone. Our patient had multiple comorbidities, including undiagnosed severe pulmonary

hypertension, as well as limited prenatal care. Since she was having contractions with a prior classical cesarean section there was little time to optimize the patient's comorbidities prior to surgery. We chose general anesthesia due to the patient being on chronic anticoagulation precluding neuraxial placement. The use of transesophageal echo greatly impacted our management by earlier identification of the severity of right heart failure and implementation of inotropic agents.

# Transcatheter Aortic Valve Replacement for Critical Aortic Stenosis in a Parturient

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#### Introduction:

Undiagnosed valvular heart disease may be unmasked by the physiologic stress of pregnancy. Aortic stenosis (AS) in pregnancy is rare, is commonly associated with bicuspid valves, and confers increased maternal and fetal morbidity and mortality. Transcatheter aortic valve replacement (TAVR) has been described in parturients but has been reserved for life-threatening scenarios.¹

#### Case:

A 35-year-old G2P0101 at 23w0d with no known medical history presented with acute decompensated heart failure (NYHA IV symptoms). Transthoracic echocardiography (TTE) was notable for critical AS (AVA 0.54 cm², mean gradient 94 mmHg), moderate aortic insufficiency (AI), and a left ventricular ejection fraction (LVEF) of 50-55%. She was admitted to the ICU and was followed by a multidisciplinary team including Obstetrics, Cardiology, Cardiothoracic Surgery, Cardiothoracic Anesthesiology, and Maternal Critical Care. Due to severity of symptoms, degree of stenosis, and anticipated deterioration of hemodynamics further in gestation, the consensus was to intervene urgently. She was not a candidate for percutaneous valvuloplasty due to AI, and was planned for TAVR, with surgical aortic valve replacement (SAVR) if TAVR was not technically feasible. SAVR was deferred as it would necessitate cardiopulmonary bypass which presented a high risk for IUFD at this estimated gestational age (EGA).

Following placement of a pre-induction arterial line, a combined volatile and intravenous general anesthetic was administered, and transesophageal echocardiography (TEE) was employed to monitor function and guide valve deployment. Her intraoperative course prior to valve deployment was notable for marked hemodynamic instability requiring a high dose norepinephrine infusion, as well as boluses of epinephrine and vasopressin. The severity of stenosis and calcification prohibited the traditional supravalvular catheter approach via the ascending aorta despite many attempts and led to a discussion about conversion to SAVR. Ultimately, a retrograde transseptal

approach to the aortic position was successful. Following satisfactory valve deployment, the patient returned to the ICU, was extubated on POD 1, and was discharged on POD 3 with near complete resolution of her symptoms.

#### **Discussion:**

Cardiovascular disease impacts 1-3% of pregnancies and is the most common cause of maternal mortality.² As more women with congenital heart disease reach childbearing age, their perinatal management will become increasingly common. Patients with mild or moderate AS tolerate pregnancy well, but the rate of maternal and fetal complications rises dramatically with increasing severity of AS.² Options for patients who fail medical management include pregnancy termination, transcatheter valvuloplasty, TAVR, and SAVR. This case highlights the need for individualized plans for patients based on the degree of their pathology, severity of symptoms, and EGA.

# Getting to the Heart of the Matter: A Case of Peripartum Cardiomyopathy Leading to Heart Transplantation

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Introduction: Peripartum cardiomyopathy (PPCM) is a type of non-ischemic cardiomyopathy with reduced ejection fraction affecting a parturient in late pregnancy or in the first five months postpartum. Diagnosis is often difficult, as many symptoms are similar to those seen in normal pregnancy. Management of PPCM is comparable to that of other forms of heart failure, but one must consider the effects of medications and interventions on the fetus. Severe cases may require advanced therapies with mechanical circulatory support, and some ultimately require heart transplantation.

Case: A 34-year-old female, G1P0, with history of anemia, leiomyoma, and cholecystectomy presented at 37 weeks and 5 days GA with chest pain, dyspnea, and nonproductive cough. She was noted to be tachycardic to 130 beats/min. Work up revealed an elevated BNP, negative troponin, and a CT chest negative for pulmonary embolism. Urgent transthoracic echocardiography (TTE) showed a severely reduced LVEF (17%) with moderately reduced RV function. The findings were consistent with PPCM. Cardiology, OB and cardiac anesthesia, and cardiothoracic surgery were immediately consulted. An arterial line was placed and dobutamine infusion was initiated for inotropic support, but the patient became unstable with hypotension and ensuing fetal distress. An emergent cesarean section was performed under general anesthesia, and a central line and Swan-Ganz catheter were placed. Vasopressor support was escalated with norepinephrine and phenylephrine infusions, inotropic support with epinephrine was initiated, and an intra-aortic balloon pump (IABP) was placed. Postoperatively, the patient had worsening biventricular function requiring peripheral veno-arterial ECMO and was transferred to an affiliated hospital for heart transplant evaluation. Her course was complicated by spinal cord infarction with paraplegia and a failed trial of ECMO decannulation before undergoing an orthotopic heart transplant on postpartum day 17. She was discharged to a rehabilitation center, and two months later, TTE showed improved LVEF (65%).

Discussion: Vaginal delivery is preferred in cases of PPCM, but both neuraxial and general anesthesia can be safely performed when cesarean delivery is required with

strict hemodynamic control and invasive cardiac monitoring. Acute increases in venous return immediately after delivery make this period a tenuous time with high risk of fluid overload. Acutely decompensated patients require treatment with vasodilators and inotropic support, but mechanical circulatory support with IABP, ECMO, or ventricular assist devices should be considered early in refractory cases. Approximately 10% of PPCM patients require heart transplantation, but studies suggest higher rates of graft failure and lower age-adjusted survival compared to non-PPCM patients.

# Point-of-Care Ultrasound Expedites Coordination of Care in An Obstetric Patient with Compressing Mediastinal Mass Undergoing Vaginal Delivery

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## Introduction

Symptoms of mediastinal masses include dyspnea due to tracheobronchial compression and heart failure in the case of cardiac or major vessel compression.¹ These symptoms can be exacerbated in obstetric physiology and hemodynamic impact may compromise fetal perfusion. Existing case reports describe cesarean delivery in patients with compressing mediastinal masses with the use of combined spinal epidural being the preferred anesthetic technique.²⁻³ We present a successful case of a patient with a compressing mediastinal mass undergoing non-elective induction of labor who benefited from point-of-care ultrasound (POCUS) exam by obstetric anesthesiologists that expedited coordination of care, and who underwent safe vaginal delivery.

#### **Case Summary**

A 28 year old woman at 39 weeks of gestation presented to obstetric emergency triage with acute sharp rib pain, dyspnea, and worsening cough, and was admitted for induction of labor for category II fetal heart rate tracing. Chest x-ray demonstrated a large anterior mediastinal mass. Immediate POCUS exam by obstetric anesthesiologists was concerning for cardiac compression. Cardiology was emergently consulted, and formal transthoracic echocardiogram showed partial compression of right atrium and ventricle and mildly reduced left ventricular function.

Multidisciplinary discussions involving anesthesiologists, obstetricians, cardiologists, and cardiac surgeons followed regarding hemodynamic compromise if large volume hemorrhage were to occur, including potential need for extracorporeal membrane oxygenation. An epidural catheter had been placed for labor analgesia without a spinal dose and decision was made to proceed with vaginal delivery in the operating room with resuscitative equipment, vasoactive medications, and blood products readily available. Patient underwent vacuum-assisted vaginal delivery without complications, with an estimated blood loss of less than 100 cc.

# Conclusions

We illustrate the utility of POCUS to provide expeditious information to assist with coordination of multidisciplinary care in critical obstetric cases. We also demonstrate

that vaginal delivery under neuraxial anesthesia is a safe and possibly preferred alternative to cesarean delivery in obstetric patients with mediastinal masses due to decreased risk of intrapartum hemorrhage.



Figure. Transthoracic echocardiogram images in parasternal long axis view during A) diastole and B) systole, demonstrating mediastinal mass (Mm) compression throughout the cardiac cycle.

# Successful Cesarean Section in a Patient with a HeartMate3 Left Ventricular Assist Device

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Left ventricular assist devices (LVADs) are implanted cardiac support pumps used to treat patients with end-stage heart failure¹. Women of reproductive age with LVADs are counseled that pregnancy is relatively contraindicated given the unclear maternal-fetal implications, however, successful vaginal and caesarean deliveries (CD) have been described in the literature¹.

We present a 29-year-old G3P2002 (2 prior vaginal deliveries) with a history of peripartum dilated non-ischemic cardiomyopathy status-post HeartMate3 LVAD placement 1.5 years prior, previous embolic stroke, and hypertension who presented with an 8-week pregnancy. She declined pregnancy termination.

Her anticoagulation was switched from warfarin to enoxaparin during the first trimester and she was started on digoxin for right ventricular support. She was regularly seen by both maternal fetal medicine and cardiology for transthoracic echocardiogram (TTE) guided LVAD speed adjustments and anti-Xa monitoring. Her LVAD did not require speed adjustments until 3 weeks prior to delivery when it was increased from 5200 revolutions per minute (RPM) to 5300 RPM and was increased to 5400 RPM 1-week prior to delivery for LV dilation.

A multidisciplinary team decided on a controlled mode of delivery via planned primary CD at 36w3d. She was 5 days earlier, received betamethasone for fetal lung maturation, and was transitioned to a heparin drip, which was stopped 10 hours prior to CD.

Her CD took place in the cardiothoracic operating room with cardiac surgery available in the event of decompensation. Arterial line, central venous catheter, and Swan-Ganz catheter were placed. TTE images were obtained prior to neuraxial anesthesia placement. A combined-spinal epidural (CSE) was performed with intrathecal narcotics and slow titration of epidural local anesthetics to avoid a precipitous drop in systemic vascular resistance. During the procedure, she was co-loaded with albumin and no

vasopressors were required. Percutaneous wires were placed in the right femoral artery and vein to facilitate rapid veno-arterial extracorporeal membrane oxygenation cannulation if necessary.

Blood loss was minimal (475 mL) with minimal hemodynamic shifts and no vasopressors were required. Apgar scores were 6, 8, and 9 at 1,5, and 10-minutes. For hemorrhage prevention, the patient was administered prophylactic buccal misoprostol and 10 units of oxytocin diluted in 10 mL of saline over 10 minutes. After delivery, her MAP decreased to 60 mmHg, which was attributed to decreased preload given decreased central venous pressure and improved with administration of crystalloid and albumin. LVAD speed was decreased from 5400 RPM to 5200 RPM to avoid a suction event. She recovered in the cardiac surgery intensive care unit where she did well and was discharged home on postoperative day 3.

# Abstract #: THURS-CR- Room 3– Complex Cesarean, Pain & Opioids- 01

Spinal dexmedetomidine as an adjuvant for complex cesarean deliveries - reporting on two cases

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#### Introduction

Spinal  $\alpha_2$ -agonists are used to prolong the duration of spinal anesthesia, reduce intraoperative visceral pain and shivering, and enhance postoperative analgesia. Clonidine has been extensively studied and offers many benefits,¹ although in our experience it causes prolonged hypotension which may delay discharge from PACU. Dexmedetomidine is less used in North America, although a meta-analysis reporting on 8 studies (580 cesarean cases) was recently published.² During a national shortage of clonidine in 2019, we decided to use preservative-free (PF) dexmedetomidine in cases where clonidine would have been used, and report here on two complex cases.

#### <u>Case 1</u>

A 36yo G8P3 at 33 wks with anxiety was admitted for emergent cesarean delivery in the setting of bleeding placenta previa and known large fibroid. The decision to perform a spinal anesthetic with the addition of dexmedetomidine was made. The spinal solution included hyperbaric bupivacaine 12mg, PF morphine 150mcg, fentanyl 15mcg, and PF dexmedetomidine 5mcg (in 0.5ml dilution). As per our usual practice, a phenylephrine infusion was started at 50mcg/min and titrated to maintain baseline BP.

Hemodynamic parameters remained stable throughout the case with a phenylephrine infusion not exceeding 50mcg/min and stopped by the end of surgery. Surgical duration was 86min with total QBL 800ml. No maternal bradycardia was noted, with the lowest recorded heart rate of 81bpm. The patient was comfortable throughout the case with a sedation score of 1. She met criteria for PACU discharge within 2h of admission (our standard), with full recovery of motor block 270min after spinal dose. No intra- or postoperative nausea, vomiting or shivering were observed. Post-cesarean analgesia with acetaminophen and ibuprofen was optimal (no oxycodone taken).

#### Case 2

A 55yo G1P0 with a bleeding placenta previa was brought emergently to the OR for cesarean delivery. A spinal anesthetic with hyperbaric bupivacaine 12mg, PF morphine 150mcg, fentanyl 15mcg, and PF dexmedetomidine 4mcg (in 0.4ml dilution) was performed. An unexpected placenta accreta resulted in a cesarean-hysterectomy (surgical duration 190min, QBL 2500ml) with 4U RBCs and 2U FFP transfused. No

additional IV adjuvants were given and patient was comfortable throughout. Phenylephrine infusion was stopped by end of case. Patient remained stable in high-risk unit with full motor block recovery 4h after spinal. Post-op C-hyst analgesia was achieved with acetaminophen and ibuprofen only (no opioids).

## **Conclusion**

These two cases demonstrate the use of spinal dexmedetomidine in emergent circumstances showing the stable hemodynamic profile and remarkable post-cesarean analgesia. Further studies comparing the hemodynamic profile, duration of the block, effect on shivering, PACU stay, post-cesarean pain and opioid-sparing between spinal clonidine vs dexmedetomidine are needed.

## Abstract #: THURS-CR- Room 3– Complex Cesarean, Pain & Opioids- 02

Ultrasound Guided Sacroiliac Joint Injection for Pregnant Women with Sacroiliac Joint Pain

**Presenting Author:** Kimpreet Kaur, DO **Presenting Author's Institution:** SAUSHEC - San Antonio, Texas **Co-Authors:** Sean Fletcher, MD - SAUSHEC

A 34-year-old G6P4A1 female with a past medical history of anxiety, post-traumatic stress disorder, asthma, obesity, and chronic low back presented for sacroiliac joint pain at 10 weeks of pregnancy. Routinely a corticosteroid injection is offered as a therapeutic intervention and is most commonly performed under fluoroscopy. During pregnancy, fluoroscopy is contraindicated as ionizing radiation can be teratogenic to the fetus and most providers would recommend other conservative measures. After consultation with her obstetrics team, this bilateral sacroiliac joint injection was done successfully under ultrasound guidance, thus eliminating the concern of ionizing radiation. This is a less common technique that can be safely performed on pregnant patients. Some of the challenges include patient positioning, needle visualization under ultrasound, and unfamiliarity with the procedure.

At least 20% of women who are pregnant will experience sacroiliac joint pain during pregnancy and studies have shown pain can become progressively worse as the pregnancy advances from the first to the third trimester (1). It is postulated that there is an increase in the hormone relaxin which causes an increase in the laxity of ligaments, including the sacroiliac joint ligament. In pregnant patients, few options are available for pain control that will not have untoward adverse effects on the fetus; including NSAIDs which can cause premature closure of the ductus arteriosus and opioids which can cause dependence and respiratory depression. Pregnant patients represent an underserved patient population that may benefit from this technique. This case illustrates a common procedure performed for sacroiliac joint pain in pregnant patients that does not expose the mother or fetus to undue radiation.
# Remifentanil Infusion As A Bridging Technique for Placement of Neuraxial in A Parturient with Chronic Pain

## Presenting Author: David A. Hundley

## **Presenting Author's Institution:**

**Co-Authors:** Rebecca Thompson, MD - McGovern Medical School/University of Texas Health Science Center at Houston Danielle White, MD - McGovern Medical School/University of Texas Health Science Center at Houston

## Introduction

Neuraxial anesthesia is the gold standard anesthetic option for cesarean delivery (CD). However, remiferitanil can be a useful pharmacologic agent as an adjunct in certain parturients with complex pathologies. We report the case of a chronic pain patient for which we utilized remiferitanil to place the neuraxial for CD (1).

# Case Presentation

This is the case of a 31 year old G9P2062 at 34 weeks 5 days gestation with a history of polytrauma and pelvic fractures secondary to a motor vehicle collision 2 years prior to presentation, status post multiple orthopedic procedures. Our patient presented as a transfer for intractable hip and back pain that severely limited movement. The obstetrics team scheduled the patient for primary CD in the setting of increased pelvic pain and immobility secondary to the growing uterus.

Upon arrival to the operating room (OR), the patient was not able to move to the OR bed due to severe pain with leg movement. A remifentanil infusion was started at a rate of 0.05 mcg/kg/min to provide analgesia for bed transfer. Patient noted improvement in her baseline pain with infusion, yet she still could not tolerate transfer to the OR table. Supplemental oxygen was initiated and incremental doses of 10 to 30 micrograms of remifentanil were bolused, resulting in sufficient analgesia for transfer. However, she was unable to sit upright and the remifentanil infusion was increased to 0.1 mcg/kg/min to allow for lateral positioning to place a combined spinal epidural. Patient was prepped and given local anesthesia at L3-L4 at midline. A 17g Tuohy needle was used, loss of resistance was found, and a 25g Pencan spinal needle was used to administer 11.25mg bupivacaine 0.75% with dextrose 8.25%, 15mcg fentanyl, and 0.15mg duramorph. The epidural catheter was threaded and left in place. Our patient noted instant pain relief in her lower extremities and was placed in left uterine displacement position for CD.

Patient tolerated the CD well and the epidural catheter was left in place for post-op pain control for 48 hours. Acute pain medicine service was consulted for assistance with medication management. She was diagnosed with sciatica and started on multimodal pain control. At time of discharge, patient was ambulating and pain was well controlled with oral medications.

## **Conclusion**

Remifentanil is a short acting mu opioid receptor agonist that is rapidly metabolized by plasma and tissue esterases. Although remifentanil crosses the placenta, it is quickly eliminated in the fetus due to its rapid metabolism. Remifentanil has been used as an alternative labor analgesic as a result of these properties (1), and can be adapted in unique circumstances, such as chronic pain, to assist in positioning for neuraxial anesthesia.

## Management of Opioid Withdrawal In Peripartum- A Case Report

Presenting Author: Shibinath Velutha-Mannil, Fellow

Presenting Author's Institution: Baptist Memorial Hospital, Memphis

**Co-Authors:** Divya muraleedharan, Clinical Research Coordinator - Shelby Research LLC, Memphis

The opioid crisis has affected pregnant women worldwide with increasing rates of opioid use disorder (OUD) and neonatal opioid withdrawal syndrome (NOWS). A thorough understanding of the pathophysiology and pharmacology of opioid addiction is essential for anesthesiologists to manage patients with OUD on the labor floor effectively.

We report a case of 29 y.o., G2P2002 at 41w4d with previous history of cesarean delivery who presented to triage with altered mental state, dilated pupil, unable to answer questions appropriately due to slurring of speech, and decreased response to external stimuli. The patient was evaluated in triage by Anesthesia and MFM team. Vitals at admission were T 98.4°F, HR:101, RR 20, BP:135/70, SpO2: 99 %. ABG reported a PCO2 of 50mmHg. A formal USG was obtained, which dated the patient at 37w2d with regular uterine contractions. Her past medical history was significant for chronic heroin use, asthma, depression with suicidal ideation, and allergic to tramadol. A urine Toxicology screen was performed, positive for Amphetamines, Benzodiazepines, and Cannabinoids and negative for opioids. The MFM team ultimately recommended cesarean delivery. The patient's routine labs reported hematocrit in the normal range and ruled out coagulopathy. Anti-aspiration prophylaxis was administered. The patient received a subarachnoid block at L3L4 level in sitting position; after aspiration of clear CSF 1.5ml, 0.75% bupivacaine with 100 mcg (In patients on opioid agonist therapy its prudent to administer one and half times of usual dose) of preservative-free morphine was administered via a 25G Gertie Max needle. Hypotension was(MAP ~50) managed with phenylephrine infusion. The patient was irritable in the intraoperative period, and her pulse rate was constantly above 100/min. She reported chills and fatigue during the surgery. She delivered a female baby with an APGAR score of 8/8/8. The newborn was later transferred for continuous oxygen support and clinical signs of NOWS. In the immediate postpartum patient was diagnosed with opioid withdrawal. Her clinical Opioid Withdrawal Score was (COWS)~36, and she was started on IV Buprenorphine microdosing and PO clonidine 100 mcg 12th hourly. The patient received an initial 100 mcg of Buprenorphine as an IV push and an incremental increase in the dose up to 500 mcg. The patient reported good analgesia with Buprenorphine without needing to take any opioids. On PPD 3 patient was switched to oral Buprenorphine (Subutex) with an overall improvement in cravings and withdrawal from illicit opioids.

A multi-disciplinary team of Obstetric Anesthesiologists, High-risk obstetricians, and Addiction Medicine is necessary for a successful outcome in parturients with OUD.

IV Buprenorphine Microdosing.pdf

# Sickle Cell Disease Complicated by Difficult Pain Management And Additional Hgb Mutations

#### Presenting Author: Dillon Sooknanan, MD

#### Presenting Author's Institution: UCSF

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It is well known that while the sickle cell population can carry a pregnancy to term, they are at higher risk of morbidity and mortality risk (up to 11-fold increased risk of maternal death¹) due to metabolic demands, hypercoagulable state, endothelial dysfunction, severe anemia, and increased vaso-occlusive episodes. Acute chest syndrome is one of the most common causes of death and is often preceded by acute pain episodes¹. They also have an increased risk of C-section (up to 43% in the nulliparas group²). This highlights the importance of pain control, making repeated neuraxial attempts and trial of spinal with intrathecal morphine instead of progression GA for this patient population worthwhile.

We describe a case of a 19 year-old G1P0 with a history of sickle cell disease, frequent IUTs, asthma, and persistently low SpO2 readings who was admitted for induction of labor at 37 weeks in the setting of fetal anemia. This patient received an early epidural within 24 hours of induction due to her history of acute chest syndrome and frequent pain flairs due to her sickle cell disease. However, she required multiple replacements (total 4 epidural placements over 3 days) for failed/dislodged catheters. On induction day 4, the patient was determined to have a failed induction and received a spinal anesthetic for a cesarean section. Ultimately sedation was needed to tolerate c-section & post-op pain control was still of primary concern.

Complicating this patient care was a gamma globulin mutation in the Hgb G2 gene required for fetal Hgb, leading to a higher risk of methemoglobinemia. This patient's SpO2 frequently read in the 80's despite PaO2 levels being within normal limits for pregnancy (104mmHg). Many anesthetics are known risk factors for methemoglobinemia, but this patient had exposure to lidocaine pre-admission for multiple IUTs and tolerated epidural/spinal related anesthetics with lab findings rising to a max of 1.6% methemoglobin level (< 1.5% normal). While patients can also have low saturations from SCD alone, the findings mentioned raised concern for erroneous pulse oximetry in the SCD population³ or due to known additional hemoglobinopathy.

Patient with polysubstance abuse at postdates gestation, presenting with severe pain

**Presenting Author:** Phillip Callihan, MD, PhD **Presenting Author's Institution:** University of Virginia Health **Co-Authors:** Virginia Berry, MD - University of Virginia Health

# Introduction

Parturients suffering from polysubstance abuse can present with complex pain symptoms, and limited histories that can cloud the diagnosis of labor, substance withdrawal, or serious diseases of pregnancy such as preeclampsia.¹ Such complicated clinical scenarios present the obstetric anesthesiologist with challenging considerations regarding the optimal timing and choice of neuraxial and systemic analgesia.

# <u>Case</u>

A 25yo G2P0 at 41+3 weeks presented to the obstetrics unit agitated and writhing in bed, with acute abdominal discomfort and bilateral lower extremity edema and pain. Her history included genital herpes simplex virus, anxiety and depression, and limited prenatal care. She reported daily heroin use during pregnancy, most recently the night before admission, as well as less frequent methamphetamine, cocaine, and alcohol use.

The obstetrics team decided to begin postdates induction of labor, ordered buprenorphine prn, and asked the anesthesiology team to consider placing a lumbar epidural for the leg and abdominal pain. Following buprenorphine administration, the patient's psychomotor agitation worsened, with confirmed emesis, lacrimation, rhinorrhea, anxiety, and restlessness. She also became unable to answer questions and appeared encephalopathic. Urine drug screen returned positive for opioids and amphetamines.

Addiction medicine was consulted and concluded that in addition to opioid withdrawal suggested by a Clinical Opiate Withdrawal Scale (COWS) score of 22, the patient's lethargy and confusion also pointed to amphetamine withdrawal. Labor induction was deferred, buprenorphine was discontinued, and substituted with full agonist fentanyl and hydromorphone therapy. Symptomatic withdrawal treatment included clonidine, lorazepam, gabapentin, and promethazine.

Over the next 36 hours, the patient became calmer, less somnolent and more lucid. She was able to consent to induction of labor and epidural analgesia. She ultimately developed severe range blood pressures, and cesarean delivery was called

due to failure to progress. To provide denser and more reliable anesthesia, the labor epidural was removed, and a cesarean was completed under spinal anesthesia with bupivacaine, fentanyl, and preservative-free morphine.

# **Conclusion**

Induction of labor and aggressive initiation of buprenorphine in a parturient experiencing acute opioid withdrawal can exacerbate withdrawal symptoms, antagonize full opioid agonists, and cause hemodynamic instability. A prudent approach to these patients entails, when possible, stabilizing their withdrawal symptoms prior to initiating the stress of labor. Multidisciplinary management, particularly in consultation with a clinical addiction specialist, is optimal for these cases.²

**Complex Cesarean Sections and Patient Comfort** 

Presenting Author: Celsie Channell, CAA Presenting Author's Institution: MetroHealth, Ohio Co-Authors: Kelly Lebak, MD - MetroHealth

### Intro:

Patients with multiple c/s are at a higher risk for adhesions, infection, blood loss, bowel injury, hysterectomy, OR time, and delayed delivery time.1 These complex cases require adequate venous access, invasive monitors, and CSE vs general. A recent article suggests the use of ultrasound for the presence of the "sliding sign" as a predictor for intra-abdominal adhesions with good sensitivity, high specificity, and good negative predictive value.² Currently, there is no accepted method for pre-op assessment of adhesions.

# Case:

Our patient is a 36 y/o G6P3 at 38w4d who presented to L&D with headache concerning for pre-e. Her history includes c/s x3 and T2DM. After discussion with OB, the decision was made to proceed with section and tubal ligation under CSE. CSE was attempted at two levels without CSF flow, thus an epidural catheter was threaded and dosed with lidocaine. Immediately after achieving surgical anesthesia, the FHR dropped to the 80's without recovery and OB proceeded with crash section. After delivery, persistent uterine atony was noted with significant blood loss. Uterotonics and 2U of PRBCs were given with tone improvement. During dissection, bowel injury occurred secondary to bowel to uterine adhesions. General surgery was consulted intraoperatively for bowel resection. The patient experienced significant pain during bowel resection, so the decision was made to convert to general. After bowel repair, the OB team encountered poor uterine tone again and the decision was made for hysterectomy. Afterwards, the patient was extubated and taken to PACU in stable condition. EBL was 4.8L, she received 4U PRBCs and 2U FFP.

# **Discussion:**

It is difficult to predict the complexity of a section. We try to utilize neuraxial when appropriate, but this can ultimately be traumatizing for the patient in these unexpected complex cases where intraop pain causes conversion to general. During the case debrief, it was discussed that earlier conversion to general when the bowel injury occurred would have spared the patient from experiencing intraop pain. Another takeaway was anesthesia should have taken a more active role in the c-hys discussion as the patient agreed to a tubal ligation. Blood loss could have been minimized if the team moved to c-hys sooner. For these complex sections, we recommend the OB and anesthesia team discuss these cases and consider the patient's comfort and goals for the case.

# Perioperative Management and Urgent Cesarean Delivery of a Complicated Patient with Severe Sickle Cell Disease and Acute Fatty Liver.

### Presenting Author: Yoga Dasari, DO

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**Introduction:** Sickle cell disease (SCD) presents with anemia and painful ischemic vaso-occlusive crises. Abnormal erythrocytes sickle in an O₂ depleted environment resulting in impaired microcirculation and bone marrow ischemia. Pregnancy complicated by SCD is associated with increased risk of preeclampsia, eclampsia, gestational diabetes, chronic fetal hypoxia, IUGR, and spontaneous abortion (1). We present the peripartum management of a patient with SCD requiring urgent C/S at 31 weeks for worsening SCD, development of acute fatty liver, and non-reassuring FHR trace.

**Case Presentation:** Our patient is a 35 y/o G1 P0, 4', 66 kg, with PMH of SCD, pulmonary HTN, chronic osteomyelitis of b/l LE, DVT/PEs, and chronic pyelonephritis. She took suppressive ciprofloxacin, hydroxyurea and hydromorphone sporadically. At 14 wks she presented with saphenous DVT and severe LE skin infections requiring b/l AKAs under GA with ketamine and femoral/sciatic nerve blks. At 25 wks she developed altered mental status from a Klebsiella UTI and Covid pneumonia. An ECHO showed severe pulmonary HTN. She was readmitted with SC crisis and UTI at 29 wks and at 31 wks developed acute fatty liver of pregnancy. LFTs, creatinine, and INR increased; she became oliguric with non-reassuring FHR trace. We placed a 9.5 F IJ introducer and arterial catheter, transfused 2 units PRBCs, and she underwent urgent C/S under GA. Ketamine was used postoperatively as TAP blks were unsuccessful. She was discharged POD #8.

**Discussion:** SCD began as an evolutionary response to malaria. Clinical features include acute chest syndrome, pulmonary fibrosis/hypertension, stroke, hypersplenism, aplastic crisis, bone pain crisis, leg ulceration, CHF, and declining renal function. Management includes opioids, ACE inhibitors, hydroxyurea and transfusion. Pregnancy increases the incidence of vaso-occlusive crisis, acute chest syndrome, pulmonary embolism and DVT (2).

Infection is common with SCD. Osteomyelitis in our pt's LE resulted in b/l AKAs and potential phantom limb pain (central sensitization and peripheral hypersensitivity of cut nerve endings). Since perineural infusion of local anesthetics is effective treatment, we performed single shot femoral/sciatic blks (3).

Hydroxyurea, a myelosuppressive agent, reduces Hgb SS and painful crises but is teratogenic. It was discontinued at 14 wks.

Patients with SCD may develop precapillary pulmonary hypertension resulting from vasculopathy and a nitric oxide deficiency state. Management is with anticoagulation for thromboembolism, oxygen therapy, hydroxyurea and transfusion.

Acute fatty liver of pregnancy may cause coagulopathy, electrolyte abnormalities, multisystem organ dysfunction, hepatic failure, and perinatal mortality. Treatment is expediate delivery. We used GA with TIVA for the C/S to minimize further liver damage.

Internal Hernia Leading to Catastrophic Midgut Infarction in a Parturient Presenting Author: Amy Yan, MD

**Presenting Author's Institution:** Northwestern University Feinberg School of Medicine **Co-Authors:** Alexander G. Samworth, MD - Northwestern University Feinberg School of Medicine

#### Introduction

Bariatric surgery has become a popular treatment for sustained weight loss in morbid obesity. Though uncommon, internal herniation is a complication of Roux-en-Y gastric bypass (RYGB) surgeries. Pregnancy may increase the risk of internal herniation; this diagnosis should be considered in patients with prior RYGB who present with abdominal pain.

#### Case

A 26-year-old G2P0010 at 28w4d with Ehlers-Danlos syndrome presented for evaluation of acute on chronic abdominal pain. She had a complex surgical history consisting of a sleeve gastrectomy converted to RYGB. Her pregnancy was complicated by post-prandial abdominal pain, presumed to be symptomatic cholelithiasis. At 18w0d she had a laparoscopic cholecystectomy. Initial evaluation at our institution revealed a benign exam and normal abdominal CT. On day two her pain worsened and she became tachycardic to 170's from a baseline of 120's. Fetal heart rate tracing (FHRT) remained category one, however continuous FHRT was discontinued as it worsened her abdominal pain. Her clinical status began to deteriorate, and she became hypotensive necessitating pressor support. A TTE showed newly reduced left ventricular ejection fraction of 45% and a fetal non-stress test unfortunately revealed loss of fetal heart tones. She was induced and rapidly delivered a non-viable neonate.

A CTA was obtained to evaluate for a cardiovascular pathology and revealed diffuse bowel ischemia. She was taken to the OR and diagnosed with midgut volvulus and infarction of her entire small bowel. In the ICU she developed ARDS necessitating cannulation for VV-ECMO as a bridge to recovery. Her clinical status gradually improved, and she was de-cannulated three days later. Ultimately, she made meaningful recovery and was discharged one month after initial presentation with plans for a small bowel transplant.

#### Discussion

The rearrangement of the gastrointestinal tract with RYGB puts patients at a lifelong risk of internal hernia formation,¹ with an incidence of 1-5%.² Internal hernias can lead to vascular strangulation and bowel infarction. Pregnancy may increase the risk of internal herniation as the expanding uterus increases intraabdominal pressure and can force

bowel through mesenteric defects.^{1,3} Internal herniation must be considered in obstetric patients with a history of RYGB presenting with unexplained abdominal pain. Consultation with a bariatric surgeon is recommended, as earlier surgical intervention may have improved this patient's outcome. Symptoms are often nonspecific and intermittent, physical examination can be unreliable, and patients may present with negative imaging.^{3,4} It is important for both obstetric and anesthesiology providers to recognize this rare but devastating complication of RYGB to promote optimal maternal and fetal outcomes.

## Management of Interscapular Pain Associated with Labor Epidural Analgesia

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**Co-Authors:** Carmen Lopez, MD - Northwestern University Feinberg School of Medicine

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#### Introduction

Interscapular pain (ISP) associated with labor epidural analgesia was first described decades ago, yet its mechanism and management remain poorly defined.^{1,2} Recent evidence supports the use of dilute epidural solutions delivered via programmed intermittent epidural bolus (PIEB) with patient-controlled epidural analgesia (PCEA). Together, these changes lead to sizable solution volumes administered as boluses. Anecdotally, this has led to an increased prevalence of interscapular pain on our labor unit.

#### Case

A 35-year-old G1P0 with a BMI of 39.1kg/m² and no past medical history presented in spontaneous labor at 39w3d. Combined spinal epidural analgesia was initiated at 3cm of cervical dilation with 15µg of fentanyl and 2mg of bupivacaine in the intrathecal space. An epidural solution of 0.0625% bupivacaine and fentanyl 2µg/ml was started per our typical practice. This includes a PIEB of 10ml every 60 mins, a PCEA of 8ml with a lockout of 10 mins, and a maximum infusion volume of 32mL/hr. She complained of throbbing ISP associated with PIEB and PCEA doses eight hours after epidural placement. A cumulative epidural solution volume of 176ml had been delivered. To manage her pain, 75µg of epidural clonidine was administered, the epidural solution concentration was increased to 0.1% bupivacaine with fentanyl 2µg/ml, and the epidural pump was adjusted to provide a continuous infusion of 8mL/hr with a PCEA of 6ml. Subsequently, the patient's symptoms resolved. Four hours later a cesarean delivery was planned for arrest of dilation at 6cm. Prior to dosing her epidural for surgical anesthesia, 100µg of epidural fentanyl was given. This facilitated the gradual administration of 15ml of 2% lidocaine without ISP recurrence, and an appropriate anesthetic level was obtained. The patient underwent a successful cesarean delivery.

### Discussion

Interscapular pain is an uncommon complication of labor epidural analgesia. Increased epidural space pressure, thoracic spinal cord compression, and meningeal stretching are theoretical mechanisms.³ ISP can be severe and worsens during boluses, limiting the effectiveness of epidural analgesia and impeding the successful conversion to epidural anesthesia. Our patient experienced ISP after 176ml, however patients can

present at varying infusion volumes. This could be related to variable compliance of the epidural space.²

With the increasing use of dilute epidural solutions and PIEB protocols, anesthesia providers should be aware of management strategies for ISP. In this case, switching to a concentrated solution and continuous delivery method, along with administration of epidural clonidine and fentanyl resolved symptoms and prevented recurrence. Replacing the epidural catheter was a final option if the pain persisted. The efficacy of epidural catheter replacement for management of ISP, however, is unknown.

# Trial of Labor After Cesarean Section Resulting in Rupture of the Uterus, Bladder, and Vagina

#### Presenting Author: Sujata Datta, MD

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Trial of labor after cesarean section (TOLAC) is an acceptable alternative to elective repeat cesarean section if obstetrical indications for cesarean section (CS) are absent¹. However, the risk of uterine rupture should be taken into consideration with the following risk factors: history of CS or uterine scarring, multiple prior CS, augmentation of labor with oxytocin, parity greater than three, short interval pregnancy, and advanced maternal age^{1,2.}

We present a case of uterine, bladder, and vaginal rupture in a multiparous 47yo G8P7 patient undergoing induction of labor (IOL) and TOLAC with a history of two prior CS and short interval pregnancy. The patient also had a large for gestational age fetus with suspected trisomy 21 and known cardiac defects. Despite her risk factors, the patient insisted on TOLAC.

She was started on oxytocin for IOL and successfully underwent epidural placement for labor analgesia. During the second stage of labor the patient pushed for 45 minutes with a category II fetal heart rate (FHR) tracing, minimal descent of the fetus, and breakthrough abdominal pain despite adequate dermatomal coverage by the epidural. After discussion, the patient agreed to undergo CS which was converted to emergent when the FHR tracing became category III. Upon entry into the abdomen, uterine rupture with the fetus in the abdomen, as well as bladder and vaginal rupture were noted. The obstetric and urologic team successfully repaired the organs achieving reasonable hemostasis. The neonate was 5.07 kg, with APGARs of 8 and 9 at 1 and 5 minutes.

Throughout the four-hour long case, the patient's anesthetic was maintained by periodic epidural dosing with minimal intravenous anxiolytics. Quantified blood loss was 6.2 L, and she was transfused 4 units of red blood cells, 2 units of fresh frozen plasma, and given 2 grams of fibrinogen. She was discharged on post-operative day 7 with foley catheter in place and outpatient follow-up.

This clinical presentation of uterine rupture included several classic signs – nonreassuring FHR tracing, breakthrough abdominal pain, and failure of descent of the fetus¹. She appropriately underwent emergent CS upon presentation of these signs³. Bladder and vaginal rupture are rarely described in the literature although bloody or decreased foley output and vaginal bleeding may be presenting signs¹. With appropriate early resuscitation, these cases can be safely performed under neuraxial anesthesia.

## **Provider Beware: Reactive Airway**

**Presenting Author:** Mellany A. Stanislaus, MD **Presenting Author's Institution:** The Johns Hopkins Hospital - Baltimore, Maryland **Co-Authors:** 

**Case**: A 47-year-old G3P0110 by IVF with PMH of cHTN and GERD presented in labor at 37w4d. The patient denied having asthma, but a prior anesthetic record noted "reactive airways with bronchitis." Her surgical history included dilation and curettage and myomectomy, and she was taken for a primary cesarean delivery under combined spinal-epidural. She had significant adhesive disease and sustained a small bowel injury during dissection, however, her baby boy was delivered with APGARs of 8 and 9.

After delivery, placental separation proved difficult. The placenta was ultimately removed with administration of oxytocin, however, uterine atony persisted despite receipt of methylergonovine and misoprostol. Per surgeon request, 250 mcg intramuscular (IM) carboprost was administered. About 60 minutes later, the patient became increasingly tachycardic during abdominal closure. She cited burning chest discomfort and pressure despite epidural and intravenous analgesia. Repeated attempts to obtain a NIBP reading were unsuccessful, however, the patient remained awake and her EtCO2 tracing was present/stable. Her mentation began to deteriorate and she was uncooperative for arterial line placement. The decision was made to convert to general anesthesia in the setting of acute delirium. She was intubated after rapid sequence induction. EtCO2 was 47 mmHg immediately after intubation and diffuse wheezing was noted in bilateral lungs fields. She received albuterol with resolution. In the setting of a postpartum hemorrhage of 2.3 L with Bakri balloon placement, bowel resection and presumed bronchospasm, she was taken to the Intensive Care Unit (ICU) after the conclusion of surgery. She was extubated on POD 1 and discharged home on POD 5. Prior to discharge, her allergy list was updated to include carboprost.

**Discussion**: Carboprost tromethamine (Hemabate) is a synthetic analog of prostaglandin  $F_{2\alpha}$  and is used as a second-line uterotonic and for pregnancy termination (1,2). Peak plasma concentrations occur within 15-60 minutes after IM injection (2). Known side effects of the drug include pyrexia, flushing, nausea, vomiting, diarrhea and myalgia (1,2). Caution is advised in patients with asthma, however, there are case reports of bronchospasm occurring in a non-asthmatic patient and a neonate (1,2). A severe case of bronchospasm is reported in an asthmatic within 15 minutes of carboprost administration, ultimately requiring ICU admission, development of acute respiratory distress syndrome and tracheostomy (3). Although less severe than the latter case, the patient in this case report demonstrates that use of carboprost, even with a questionable diagnosis of reactive airway disease, should be with caution and only in the event of a life-threatening hemorrhage.

# Bladder Distension For Baby Barrier: Successful Ultrasound-Guided Pubic Symphysis Joint Injection During Pregnancy

Presenting Author: Emily Bero, MD
Presenting Author's Institution: Mayo Clinic, Minnesota
Co-Authors: Nicholas Canzanello, DO - Mayo Clinic
Susan Moeschler, MD - Mayo Clinic

Background: Pregnancy is a time of anatomic and physiologic change.³ Increased joint mobility and mechanical strain from fetal growth cause back and pelvis pain.³ Treatment consists of oral analgesia, support belts and physical therapy (PT), but pain is often undertreated. We present a patient with resolution of sacroiliac joint (SIJ) and pubic symphysis joint (PSJ) pain after ultrasound(US)-guided injections in pregnancy.

Case: A 30-year-old G2P1 at 32 weeks gestation fell, leading to gluteal pain and acuteon-chronic anterior pelvic pain. She had a second mechanical fall and presented with pain. MRI demonstrated trace subchondral edema at the PSJ and bilateral SIJs. She was admitted for monitoring and pain management. No progress was made with PT and she required opioid analgesia. Pain Service was consulted. Exam showed left 8/10 SIJ pain and 9/10 PSJ pain. US-guided left SIJ injection was done. Upon US of PSJ, the uterus was 2cm from the joint. The procedure was deferred due to proximity. After the SIJ injection, she had resolution of gluteal pain and improved ambulation. However, the PSJ pain persisted, so an US-guided PSJ injection was performed. She was asked to have a full bladder to displace the uterus in a superior and posterior position. A mixture of 2mL bupivacaine 0.5%, 2mL lidocaine 1% and 40mg triamcinolone was injected in and along the PSJ capsule with an in-plane approach (Image 1). On POD0, she no longer needed opioids and was discharged home. On POD1, her pain was resolved at rest and was 1/10 with ambulation.

Discussion: Pelvic pain is common in pregnancy and is likely from a shift in the center of gravity and tissue laxity from biomechanical and hormonal influences.³ An estimated 2.3% and 5.5% of pregnancies are affected by symphysiolysis and unilateral SIJ pain respectively.¹ There is minimal data about PSJ injections in pregnancy. One case report describes a patient at 20 weeks' gestation who received an US-guided PSJ injection that reduced pain from 10/10 to 2/10.² US is preferred to fluoroscopic or palpation-guided procedures because it offers needle visualization without radiation. An in-plane approach ensures continuous visualization of the needle and the PSJ. A key to the PSJ injection is bladder distension, which displaced the uterus, minimizing risk of amniotomy. Our patient benefitted from pain relief, cessation of opioids and improved mobility in a hypercoagulable state. In-plane US-guided PSJ injections with a full bladder may offer a safe treatment for PSJ pain in pregnancy.



## Uterine Rupture: How Can We Improve Maternal Safety?

Presenting Author: Stacy J. Moroz, BS

**Presenting Author's Institution:** Medical College of Wisconsin - Wauwatosa, Wisconsin

**Co-Authors:** Ayse Kula, MD - Medical College of Wisconsin

**Background:** Approximately 50% of maternal mortality may be preventable with timely identification and intervention. We present a case of IUFD and uterine rupture to illustrate specific anesthetic management challenges and highlight the relevance of warning systems in promoting maternal safety in obstetric care.

**Case:** A 21 y.o. G4P1111 female at 31w6d with history of obesity (BMI 39.6), chronic hypertension and classical Cesarean delivery was transferred from an outside hospital with a diagnosis of preterm labor and urinary tract infection (UTI). On admission to our institution, bedside ultrasound indicated IUFD. Patient vitals on arrival were significant for blood pressure of 166/96 mmHg and heart rate of 113 bpm. The anesthesia team was called 1.5 hours after admission for a blood pressure of 78/40 mmHg and heart rate of 155 bpm. On physical exam, the patient was diaphoretic, obtunded and hypothermic (94.8 F). A bedside ultrasound was repeated by the obstetric team, which showed no signs of intra-abdominal bleeding. Vital signs improved initially after aggressive crystalloid resuscitation and vasopressor support. The patient was transferred to the ICU with concern for septic shock given her history of UTI and lactate level of 6.6 mmol/L. However, the patient became hypotensive again and required norepinephrine infusion to maintain mean arterial pressure above 55 mmHg. The decision at that point was to perform a Cesarean delivery to remove the fetus and, in doing so, the potential source of infection. During the exploratory laparotomy, a diagnosis of anterior uterine rupture was made, and 2.5 L of blood were evacuated from her abdomen. The patient received 5 units of PRBC in total during her hospital course. After surgery, the patient was transferred back to Labor and Delivery and discharged on post-operative day 3.

**Discussion:** The Modified Early Obstetric Warning System (MEOWS) chart is a useful tool for predicting obstetric emergencies via continuous vitals monitoring and trigger thresholds to identify the need for rapid response. Our case highlights the importance of routinely monitoring all parturients via MEOWS as part of continued advocacy for maternal safety. We also support the implementation of standard protocols to facilitate sharing of information during patient transfers as well as communication between Obstetric, Anesthesia, and nursing teams on the labor and delivery floor. Further precautions to assist with earlier intervention in obstetric emergencies include utilizing bedside Hemoglobin analyzers and educating physicians on Point of Care Ultrasound (POCUS).

# Abstract #: THURS-CR- Room 4– Coagulation & AFE -01

# The Management for Thrombocytopenic Purpura in Pregnancy

## Presenting Author: Allen Wang, MD

**Presenting Author's Institution:** University of California, San Diego - Fremont, California

**Co-Authors:** Erin I. Martin, MD - University of California, San Diego Lawrence Weinstein, MD - University of California, San Diego

### Introduction

Thrombotic thrombocytopenic purpura (TTP) is a rare and life-threatening disorder characterized by microangiopathic hemolytic anemia, thrombocytopenia, and thrombosis. The disease is defined by a deficiency of ADAMTS13, a protease that is essential in the homeostasis of coagulation. The deficiency of ADAMTS13 can either be hereditary or acquired. In pregnancy, TTP can be precipitated, as ADAMTS13 activity levels decrease proportional to the increase in gestational age. We present a case detailing the management of a parturient with undiagnosed congenital TTP during pregnancy with superimposed preeclampsia.

## Case

A 24-year-old G2P1 parturient at 30 weeks of gestation presented with diffuse bruising and hematuria. Her medical history is significant for a recent hospital admission for pyelonephritis and a cesarean delivery (CD). Laboratory results were significant for a hemoglobin of 5.7 g/dL, platelets of 9000/mcL, creatinine of 1.18 umol/L, urine protein to creatinine ratio of 2.4, lactate dehydrogenase of 1289 IU/L, and reticulocyte count of 8.1%. A peripheral blood smear demonstrated an abundance of schistocytes.

Hematology and Nephrology were consulted to assist in the diagnosis and management of the complex parturient. Based on her symptomatology, laboratory tests, and PLASMIC score, her suspected etiology was consistent with TTP. She was started on empirical management for TTP which included plasmapheresis, blood product transfusions, and high dose steroids.

Her hospital course was further complicated by superimposed severe preeclampsia and the decision was made to proceed with a CD at 30 weeks and 3 days of gestation under general anesthesia. The surgery was notable for postpartum hemorrhage requiring additional blood transfusion therapy. Her post-CD course was uncomplicated, and she was discharged on postpartum day 6.

Additional off-site laboratory tests resulted in a low ADAMTS13 activity levels less than 5% and minimal detection of ADAMTS13 antibodies, which was indicative of congenital TTP. During her postpartum follow-up, her laboratory results were concerning for worsening TTP, and she was admitted to the hospital for additional rounds of plasmapheresis.

### Conclusion

TTP is a rare, life-threatening condition that can be precipitated in pregnancy due to the hypercoagulable state and the decreased activity of ADAMTS13. Our case highlights the importance of a multispecialty team to ensure early recognition of TTP and the need for plasmapheresis to provide optimal maternal and fetal outcomes.

# Labor epidural placement in a patient with von Willebrand disease type 2B: would you do it again?

Presenting Author: Anjana M. Kumar, MD

**Presenting Author's Institution:** University of North Carolina **Co-Authors:** Courtney R. Hood, MD - University of North Carolina Raj Kasthuri, MD - University of North Carolina

Shawn Yu, MD - University of North Carolina

Comprehensive guidelines for the safety and timing of neuraxial techniques in patients with type 2B vWD do not exist.^{1,2,3} A recent large case series describes an approach for safe neuraxial placement in type 1 and type 2 vWD.² However, the series only included 6 patients with type 2 vWD and subtype was not specified. Type 2B vWD is unique due to a gain of function mutation of the vWF multimers leading to increased platelet aggregation. A recent review of vWD type 2B showed significant maternal morbidity related to a high incidence of severe thrombocytopenia and postpartum hemorrhage (PPH).³

We present a 24-year-old G1P0 with type 2B vWD, based on a strong family history from biochemical testing, with bleeding phenotype characterized by history of minor bleeding and bleeding after a gum laceration requiring plasma-derived FVIII/vWF (Humate-P) in the absence of significant prior surgical challenges (ISTH Bleeding Assessment Tool = 4). Her initial pregestational biochemical testing included normal ristocetin-induced platelet aggregation favoring type 2A, but genetic testing showed pathogenic VWF c.3922C >T (p.Arg1308Cys) mutation, confirming type 2B vWD. Her platelet count remained >110k throughout gestation, and was 126k on admission at 38w3d for induction of labor demonstrating factors other than genotype may play a role in the degree of platelet aggregation.³ Given her platelet count, epidural anesthesia was felt to be safe with vWF replacement prior to the procedure. Per hematology's recommendation, she received 5005 units of Humate-P and 1G of tranexamic acid immediately prior to atraumatic epidural placement and delivered vaginally two hours later complicated by a primary PPH of 1050mL. After stabilization, her course was complicated by increased bleeding 6 hours postpartum. CBC revealed hemoglobin of 8.9 g/dL and platelet clumping with a manually verified count of 68k. Continued bleeding prompted redosing of Humate-P. She subsequently underwent a D&E, Bakri placement, and platelet transfusion, which ultimately controlled her bleeding. Following the Bakri placement, she underwent uterine artery embolization. Total QBL for delivery and postpartum was 2.9L. She received a total of 4U of pRBCs and 2U of platelets. Given the hemorrhage, Humate-P was administered every 12 hours for 72 hours postpartum with PO tranexamic acid for 7-14 days. She had no further complications. The decrease in platelet count is consistent with type 2B vWD. We postulate that stress (labor/surgery/hemorrhage) induced increase in circulating abnormal endogenous vWF

likely interfered with hemostasis even in the presence of transfused normal vWF by competing for platelet binding, arguing for platelet transfusions as part of the treatment plan. Given her significant PPH, future use of neuraxial anesthesia remains in question.

# Thromboelastography Guided Neuraxial Placement in Parturients with HELLP: A Case Report

#### Presenting Author: Jean He, MD

Presenting Author's Institution: Massachusetts General Hospital

**Co-Authors:** Erin E. Haggerty, MD - Massachusetts General Hospital, Department of Anesthesia, Critical Care and Pain Medicine

Approximately 1.3% of pregnancies are affected by moderate to severe thrombocytopenia with platelet counts less than 100,000 × 10^6/L, and thrombocytopenia is more common in women with complicated pregnancies or preexisting disorders associated with thrombocytopenia (Reese 2018). Neuraxial analgesia is the most effective method of pain control for labor. Neuraxial anesthesia has a myriad of advantages over general anesthesia in the peripartum period including decreasing the risk of difficult intubation, fetal medication transfer, and superior pain control (Afolabi 2012, Anim-Somuah 2018, Jones 2012). The Society for Obstetric Anesthesia and Perinatology (SOAP) Consensus Statement on Neuraxial Procedures in Obstetric Patients with Thrombocytopenia provides an important framework to approach patients with low platelet counts (Bauer 2021). This statement acknowledges the paucity of data for patients with platelet counts that range between 50,000 × 10^6/L and 70,000 × 10^6/L and states that there may be scenarios when the risk-benefit ratio justifies moving forward with a neuraxial procedure (Bauer 2021).

Viscoelastic testing including thromboelastography (TEG) and thromboelastometry (ROTEM) has become increasingly accessible in the clinical setting, can provide rapid assessment of functional clotting, and the use in obstetrics is expanding (Amgalan 2020). This case report describes two parturients with thrombocytopenia who underwent TEG evaluation prior to placement of neuraxial blockade. Both parturients were found to have hemolysis, elevated liver enzymes, and low platelets (HELLP) syndrome with platelet counts of 60,000 × 10^6/L and 65,000 × 10^6/L, normal INR, PTT, and normal TEG values including reaction time (R), maximum amplitude (MA), and lysis time (LY30). The patients received an epidural or combined spinal epidural (CSE). Neither of the patients experienced complications associated with neuraxial anesthesia, including no spinal epidural hematomas were observed. This case report suggests that TEG may be considered to guide decision-making for patients with HELLP syndrome with platelet counts between 50,000 × 10^6/L and 70,000 × 10^6/L.

# "The Road to Hell is Paved with Good Intentions"- A First Case Report of Anaphylaxis to Tranexamic Acid in an Obstetric Patient

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Background: Tranexamic Acid (TXA) is widely used in obstetric patients to minimise bleeding. All drugs have potential for adverse events, including life-threatening anaphylaxis. We report a case of confirmed TXA-induced anaphylaxis during an otherwise uncomplicated elective C-section.

Case Report: A 35 years old woman presented for her fourth elective C-section under combined spinal-epidural anaesthesia. Significant adhesions were noted and the obstetric team asked for TXA to be given in anticipation of bleeding prior to the delivery of the baby. One gram of TXA was administered over five minutes as a slow intravenous bolus. Within minutes the patient developed a hoarse voice, facial angioedema, widespread urticaria, hypotension and hypoxia. It was evidence that the patient was having an anaphylactic reaction and an emergency situation was declared. The delivery of the baby was expedited to prevent any fetal compromise and to facilitate resuscitation of the mother. Simultaneously, the patient was given high-flow oxygen, intravenous crystalloids and the anaphylaxis was treated with two doses of 0.5mg 1:1000 intramuscular adrenaline, intravenous hydrocortisone and chlorphenamine. The patient responded well to treatment, she became haemodynamically stable and did not require intubation. Mast cell tryptase levels taken at 0, 2 and 24 hours after supported the diagnosis of anaphylaxis. On allergy clinic follow-up there was a positive reaction to TXA on intradermal testing, confirming that she had anaphylaxis to TXA.

Discussion: TXA is a widely used drug, especially in obstetrics. The WOMAN study (1) recommends its use in obstetric haemorrhage, and in its large cohort there was no allergic reactions as a result of its use. Another study looking at allergic reactions in obstetrics did not identify any reactions caused by TXA (2). To our knowledge this is the first report of an obstetric case of life-threatening anaphylaxis to TXA.

Conclusion: TXA is widely used in obstetrics, sometimes on prophylactic basis. Possibility of anaphylaxis should be considered in risk-benefit decisions before administration of this drug.

# Ultrasound-Assisted Thrombolysis for Pulmonary Embolism after Cesarean Section

#### Presenting Author: William Perez, MD

Presenting Author's Institution: Palmetto General Hospital

**Co-Authors:** Guillermo Loyola, Osteopathic Student - OMS-III - Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine, Davie, FI, Michael Minichiello, DO - Palmetto General Hospital

**Introduction:** Venous thromboembotic events are life-threating complications of pregnancy. During the postpartum period its risk is 37-fold higher compared no non-pregnant women.¹ The use of ultrasound-assisted thrombolysis has emerge during recent years as a safe alternative for the treatment of venous thromboembotic events during pregnancy and postpartum period. Here we present a case about postpartum pulmonary embolism (PE) treated with ultrasound-assisted thrombolysis.

**Case description:** A 38-year-old femle who presented 1-week postpartum complaing of shortness of breath and chest pain. A CT angiogram showed a right pulmonary artery PE with signs of right heart strain. She was started on heparin drip and taken ultrasound-assisted EKOS catheter directed thrombolysis. The catheter was left in for tissue plasminogen activator (tPA) infusion for 6 hours bilaterally. After the 6 hours, the catheter was removed and the patient was restarted back on the heparin drip and transioned to a direct oral anticoagulant. The patient tolerated the procedure well and remained hemodynamically stable with no signs of bleeding or hemoglobin changes. She was safely discharge with follow-up with her OB/GYN in 1-week.

**Discussion:** The standard of care for PE includes the use of anticoagulant therapy, such as heparin or low molecular weight heparin, to prevent further clot formation and promote clot lysis. However, in some cases, these therapies may not be sufficient to dissolve the clot and restore blood flow to the lungs. In such cases, thrombolytic therapy, which uses drugs to dissolve the clot, may be considered. EKOS catheterdirected thrombolysis (CDT) is a relatively new and promising treatment option for PE. It involves the infusion of thrombolytic agents, such as tPA, through a catheter directly into the clot. The EKOS catheter uses ultrasound energy to create a mechanical disruption of the clot, which enhances the activity of the thrombolytic agents, improving the rate and efficiency of clot lysis. Catheter-based revascularization therapy has emerged as potential alternative to systemic thrombolysis PE with high clinical success rates > 85% and relatively low rates of major procedural complications < 5%² Intervention with EKOS further reduced right heart strain and resulted in few complications compared with previous trials providing evidence that EKOS is effective and safe long-term for management of submassive PE.³ Overall, EKOS CDT has shown to improve outcomes without compromising safety.



## A Case Report of a Super-Super Obese patient with suspected Pulmonary Embolism requiring neuraxial anesthesia for high-risk C-section

Presenting Author: Wilfredo Borroto, MD

Presenting Author's Institution: LSU New Orleans

**Co-Authors:** Jakayla Harrell, MD - Louisiana State University Health Science Center Department of Anesthesiology

#### Introduction:

Super-super obesity is BMI >60. This group create a unique challenge to anesthesiologists due to habitus and co-morbidities. As intubation can be difficult or impossible, neuraxial anesthesia is often the safest choice but still not without positioning and anatomical challenges. Creating a safe anesthetic plan in a super-super obese patient with multiple co-morbidities requires a multidisciplinary approach. Our case is a 32yo 33wk G1P0 transfer with BMI 91, influenza A, hypoxia, RLE cellulitis, LLE DVT and suspected PE requiring heparin.

#### Case Description:

Our patient is a 32-year-old 33wk G1P0 female with a BMI 91 who presented with LE swelling, pain, and worsening SOB, fever, and chills. Upon initial evaluation she was found to have hypoxia, significant RLE swelling, influenza A+, leukocytosis, and oliguric AKI. On arrival, she was afebrile, HR 120, and sats of 88% on NC, 98% on NRB. US revealed LLE DVT. CTPE was not performed due to habitus. She was started on heparin for suspected PE, tamiflu, IV abx, and admitted to ICU on Bipap. BPP was 2/8 with inability to adequately monitor fetus, so decision for urgent c/s made. A multidisciplinary meeting was held with anesthesia, OB, MFM, ICU, ID and nephrology. Anesthesia concerns included a Mallampati score of IV, short TM distance (< 6cm), wide neck circumference (>40cm), and total body edema, suggestive of a difficult airway. Also, the therapeutic dose of heparin contraindicated neuraxial. The decision was made to temporarily halt the heparin drip and attempt neuraxial anesthesia in 6 hours, in accordance with ASRA guidelines. ENT was consulted for OR presence. The patient presented to the OR on 4L NC, and a CSE was placed without complications. She underwent classical c/s. The epidural catheter was removed, the patient returned to the ICU, and heparin re-started one hour after catheter removal.

### Discussion:

Parturients with super-super obesity create a unique challenge to the anesthesiologist as both general and neuraxial anesthesia carry significant risk. Obese patients on anticoagulation increases case complexity. ASRA has guidelines for the timeline neuraxial procedures and anticoagulation (table 1). Epidural hematoma and permanent neurological damage is of particular concern. As the growing number of super-super obese patients in America increases, it remains important to be familiar with the anatomical and physiological consequences of morbid obesity in parturients to create an anesthetic plan. Multidisciplinary meetings can aid in coordination and improve outcomes in this population.

	Time between the last dose and before catheter placement (hr.)	Time after catheter placement to drug start (hr.)	Time between the last dose and before catheter removal (hr.)	Time after catheter removal to drug start (hr.)	
UFH (prophylaxis ≤ 15,000 IU/d)	4-6	Immediately	4-6	Immediately	
High dose UFH (prophylaxis >15,000 but < 20,000 IU/d)	12	1	12	1	
UFH (therapeutic)	IV: 4-6   SC: 24	IV: 1   SC: 1	IV: 4-6   SC: 8-12	IV: 1   SC: 1	
LMWH (prophylaxis)	12	12	12	4	
LMWH (therapeutic)	24	24	Should remove catheter 4hr prior to therapeutic LMWH	4	

## Management of Parturient with Fontan Physiology

Presenting Author: Neha Agrawal, MD Presenting Author's Institution: Columbia University, New York Co-Authors:

A 32 year old female with double outlet right ventricle who underwent Fontan procedure at 2 years of age who subsequently developed cardiogenic cirrhosis and thrombocytopenia presented for early scheduled induction of labor at 36 weeks. Other history included heart block s/p pacemaker placement, SVTs s/p ablation and asthma.

The patient was well known to the anesthesia service prior to the delivery, reporting excellent cardiac function, stable liver status, and an uneventful pregnancy course. Before induction of labor, she received an early combined spinal epidural (CSE) as well as an arterial line for hemodynamic monitoring and blood sampling. At full dilation, she received a forceps assisted delivery. The patient tolerated the delivery of the baby without any issues. However, patient soon after experienced confusion, which was attributed to the acute postpartum hemorrhage (PPH) of 2L from vaginal lacerations and retained placenta. Generous amounts of vasopressors were used, along with fluid boluses and blood products, which were guided by thromboelastometry (ROTEM). The patient ultimately received 5 units of pRBC, 2 units of FFP, and 1 unit of cryoprecipitate and was discharged on post-delivery day 4.

This patient was well known to the anesthesia service before her delivery, and interdisciplinary meetings were held for the plan, which was invaluable in her ultimate delivery.

Patients with Fontan physiology are prone to arrhythmias and, with a systemic right ventricle, are at risk for heart failure.¹ These patients are also highly preload dependent, as the pulmonary blood flow depends on passive flow from SVC and IVC. Taken together, these aspects of Fontan physiology can lead to challenges in the anesthetic management of labor and delivery, especially in the setting of a PPH. In this patient, an early CSE was placed to blunt the sympathetic response to labor pain, and also as an alternative to general anesthesia should an emergent cesarean section have become necessary. Although this patient was allowed to push for a short time, a forceps delivery was chosen to minimize decrease in preload from the increased intrathoracic pressure by the Valsalva maneuver. Forceps delivery can cause vaginal lacerations, which attributed to the PPH along with the uterine atony.

Due to her Fontan physiology and her asthma, she was did not receive the usual uterotonic agents (higher dose oxytocin, methylergonovine, carboprost). Prompt replacement of intravascular volume was achieved with crystalloid and blood products while blood pressure was temporized with pressors. Pregnant patients are prone to DIC and this patient was already at risk of coagulopathy due to her thrombocytopenia and cirrhosis. ROTEM was employed during the patient's treatment to guide transfusion.

# Flatline ROTEM: Machine Error or Amniotic Fluid Embolism?

Presenting Author: Christian R. Tilley, MD

**Presenting Author's Institution:** NewYork-Presbyterian/Weill Cornell Medicine - New York, New York

Co-Authors: Jaime A. Aaronson, MD - NewYork-Presbyterian/Weill Cornell Medicine

### Introduction:

Amniotic fluid embolism (AFE) is difficult to diagnose as there is no consensus for diagnostic criteria. Patients with AFE are often coagulopathic in the setting of disseminated intravascular coagulation (DIC); young, healthy parturients easily mask these deranged pathophysiologic states when changes in heart rate and blood pressure occur due to preserved cardiac function. Thus, timely diagnosis and management are essential in order to prevent severe maternal morbidity and mortality. Standard laboratory results for coagulation factors and fibrinogen can take >1hr to result and may lead to a delay in diagnosis, formulaic resuscitation, and unnecessary transfusion of products. However, point of care viscoelastic testing (ROTEM or TEG) is becoming commonly implemented into labor and delivery (L&D) units and employed by anesthesiologists to quickly identify and efficiently treat coagulopathy. In cases of rapid, massive hemorrhage, utilizing and understanding ROTEM can not only save lives but can direct appropriate blood product administration.

### Case:

A healthy 39 year-old G1P0 was admitted to L&D for elective induction of labor. Her labor course was uncomplicated, and she delivered a liveborn infant. Immediately after delivery, the patient was noted to be tachycardic (130s) and hypotensive (50s/30s). Due to hemodynamic instability out of proportion to the estimated blood loss, a ROTEM sample was sent which showed a flatline on the INTEM, EXTEM, and FIBTEM. To rule out machine error, a repeat specimen was sent – the results of which were the same. Differential diagnosis included AFE, pulmonary embolism, hypovolemia, among others. Ultimately, a diagnosis of AFE was made. With the immediate use of goal-directed transfusion therapy, correction of the coagulopathy and hemostasis was achieved. However, the patient's postpartum course was complicated by acute kidney injury (AKI) and acute pulmonary edema without requiring intubation. After supportive therapy she was discharged to home on hospital day 11 and continues to do well with complete resolution of AKI.

### Discussion:

Postpartum hemorrhage – a major obstetric emergency – continues to be the leading obstetric cause of maternal death worldwide. Coagulopathy – from AFE or other causes

 – can lead to massive hemorrhage with severe maternal morbidity or mortality. The use of point-of-care viscoelastic testing to manage coagulopathy and postpartum hemorrhage can result in significant reduction in bleeding, transfusion requirements, complication rates, and hospital costs.

1		EXTEM	2	INTEM	3	1000		FIBTEM
		[DEFAULT] ST: 13:19:20 RT: 00:26:28		[DEFAULT] ST: 13:20:12 RT: 00:25:36	**		[DEFA ST: 13 RT: 00	ULT] 121:08 1:24:40
a		CT: • 1182 s		CT: • 1262 s [0122 0208]	62		CT:	• 1448 s (0039 0079)
		CFT:		CFT:	2		CFT:	
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21		A10:	29	A10:	28		A10:	
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		MCF:		MCF:			MCF:	
# Abstract #: THURS-CR- Room 4– Coagulation & AFE -09

# An Uncommon Initial Presentation of Amniotic Fluid Embolism

**Presenting Author:** Daniel Webster, MD **Presenting Author's Institution:** Rush University Medical Center **Co-Authors:** 

#### Introduction

Amniotic fluid embolism is a rare perinatal complication, occurring in roughly 1 out of 15,000 deliveries in the United States.¹ A 1979 review placed the associated mortality rate at an astounding 86%, though more recent studies have cited a rate somewhere between 9 and 44%.^{1,3} Given the high rate of mortality, it is imperative that clinicians recognize and respond quickly to presentations concerning for this condition.

#### <u>Case</u>

We present a 33-year-old G7p3124 otherwise healthy female at 29w0d presenting for repeat cesarean section due to persistent bleeding in the setting of placenta previa and eclampsia.

On arrival to the operating room, a combined spinal-epidural was administered with 15 mcg of fentanyl, 0.1 mg morphine, and 1.6 mL of 0.75% bupivacaine, and a phenylephrine infusion was initiated at 50 mcg/min. The infant was delivered uneventfully with apgars of 6 and 9. Immediately following placental delivery, the patient began coughing with subsequent unresponsiveness, seizure-like activity, and profound hypotension. The Phenylephrine infusion was titrated along with doses of ephedrine and epinephrine for hemodynamic support. An arterial line was placed, and labs were drawn. She briefly returned to consciousness but following a second episode of seizure-like activity she was intubated for protection of her airway.

The patient was transported to the SICU on procedure completion. Documented QBL was 760mL and labs were consistent with DIC (fibrinogen 485 to 54, PT-INR .93 to 1.76, PTT 25 to 59.5, PLT 235 to 94). TTE revealed right heart strain, an ECG revealed normal sinus rhythm, and a CT study was negative for PE. A total of 9 units of pRBCs, 6 units of FFP, 5 units of cryoprecipitate, and 4 units of platelets were transfused. She received 24 hours of Pitocin and 2x1g doses of tranexamic acid, and a foley balloon was placed to tamponade the uterus. She remained hemodynamically stable following resuscitation and was extubated the following day. Her epidural catheter was removed following resolution of coagulopathy. Both mother and baby were discharged without long term morbidity after short ICU stays.

#### **Discussion**

Amniotic fluid embolism can often present with hemodynamic instability, fetal distress, respiratory distress, cardiac arrest, neurologic symptoms, coagulopathy, and less

commonly uterine atony, bronchospasm, cough, headache, and chest pain.² Prompt recognition and treatment can improve outcomes; therefore, providers should be aware of and vigilant for both common and uncommon presenting signs and symptoms.

# Abstract #: THURS-CR- Room 4– Coagulation & AFE -10

# Amniotic Fluid Embolism: An Atypical Presentation

Presenting Author: Jace Battrell, MD, MSMPPresenting Author's Institution: The University of Illinois at ChicagoCo-Authors: Heather C. Nixon, MD - University of Illinois- Chicago

**Background:** Amniotic fluid embolism (AFE) is a rare complication of pregnancy, affecting as little as 2 in 100,000 pregnancies (2,3), that typically presents with cardiopulmonary collapse, severe coagulopathy, seizure and an anaphylactoid reaction during labor or post-delivery (3). This rare disease has been reported to have mortality rates upwards of 24-80% (1). Additionally, AFE may present with an atypical course, as we describe in this case, with waxing and waning cardiovascular compromise and hypoxia, with delayed coagulopathy and seizure activity.

Case Report: The patient is a 32-year-old G1P0 at 30+4 weeks GA with PMH of chronic hypertension and obesity (BMI 31) who underwent emergent CD under general anesthesia due to terminal fetal bradycardia on admission to the OB triage. A classical incision was made due to a large (12cm) fibroid being found after incision, requiring significant uterine manipulation to clear the placental membrane. This patient's intraoperative course was complicated by fluctuating hypotension and hypoxia, requiring numerous boluses and infusions of vasopressors and IV fluids. No concealed bleeding was detected on examination and fluid resuscitation was adequate. Intraoperative POCUS exam revealed right heart strain, LV underfilling without pulmonary edema or LV failure. No clots were seen via US assessment. Intraoperative labs were not indicative of coagulopathy and primarily revealed an elevated protein to creatinine ratio, which was deemed PreEx with SF due to presenting BPs. Intraoperative EBL was 1200mL. Five hours post-delivery, the patient showed signs of coagulopathy and seizure activity with weaning of sedation in the ICU. Sanguineous oozing was noted from her central line sites with generalized tonic-clonic seizures. Massive transfusion was initiated with medical seizure suppression. ECMO is not readily available to our service. Repeat bedside TTE on POD #1 showed normal cardiac function. The patient was extubated on POD 3 and discharged home on POD 8 in stable condition with no neurological deficits.

**Discussion:** AFE is an extremely rare and lethal syndrome. Our case demonstrates an atypical course of intermittent hemodynamic instability that could be correlated to TTE findings of right heart strain followed by intermittent resolution. This fluctuating course differentiated the diagnosis of PE. Also, this case highlights the need for repeated laboratory assessment as her coagulopathy did not manifest for many hours following surgery, and neurological monitoring in suspected cases where general anesthesia may suppress or mask seizures. Lastly, AFE under general anesthesia highlights the utility of POCUS to guide management and diagnosis.

# Abstract #: THURS-CR- Room 4– Coagulation & AFE -11

# Delivery After Amniotic Fluid Embolism: Should We Prepare for Recurrence?

Presenting Author: Shannon Haley, MD, PhD

**Presenting Author's Institution:** Thomas Jefferson University Hospitals - Narberth, Pennsylvania

**Co-Authors:** Garrett Gerney, MD - Thomas Jefferson University Suzanne L. Huffnagle, DO - Thomas Jefferson University Etty Sims, MD - Thomas Jefferson University John T. Wenzel, MD - Thomas Jefferson University

#### Introduction:

AFE occurs when AF enters the maternal pulmonary circulation causing CP collapse and DIC. It is now thought to be an immediate hypersensitivity reaction similar to anaphylaxis, which precipitates SIRS; is it likely to recur? (1) We present our preparation for C/S of an AFE survivor.

#### Case:

4 years ago, a 29 y/o G1P0 female presented for IOL. After ROM, she became unresponsive and FHR decreased. She had a C/S 5 min later. ACLS was started for PEA; ROSC was achieved in 30 min. TEE showed RH failure; massive DIC ensued. She was resuscitated with blood, pressors, and nitric oxide/epoprostenol. She required CPB on POD 2 for removal of a massive thrombus in the IVC/RA/RV.

4 years later, she returned for repeat C/S/PPTL. Tests were WNL except Covid+ (mild sx). Crystalloid preload flowed through two 16G IVs , then a CSE was placed. Arterial and CVP monitors were available; diphenhydramine, hydrocortisone, famotidine, atropine, ondansetron, ketorolac, infusions of epinephrine, norepinephrine, phenylephrine and 20% lipid emulsion (LE) were ready. She delivered a female infant. QBL was 495 mL and she was discharged on POD #2.

#### Discussion:

AFE was believed to cause CP collapse from obstruction of the pulmonary circulation. Now it appears similar to acute hypersensitivity reactions. Entry of AF/antigens into maternal circulation activates immuno/inflammatory responses, leading to PA vasoconstriction/RH failure.

Complications in AFE survivors may include depression, PTSD, liver dysfunction, and thyroid abnormalities. One study even discourages future pregnancy. Only 16 cases of successful delivery following AFE exist, making the recurrence rate 0% (95% CI = 0-20%). (1) But, a zero numerator does not imply NO risk. Why has AFE not recurred? An

abnormal concentration of AF leukotrienes may be implicated, and would vary per pregnancy, as each conceptus would be antigenically different.

If AFE is unlikely to recur, should we prepare? Stiller gave corticosteroids just before amniocentesis and delivery but suggests rapid availability of CPR. (2) We chose to prepare, not prophylax. We assembled invasive monitoring, prepared medications to treat an "anaphylactoid" reaction or cardiovascular collapse, and readied atropine, ondansetron, ketorolac ("A-OK") and LE to help stabilize. Ondansetron and atropine block serotonin and vagal stimulation; ketorolac inhibits thromboxane, attenuating coagulopathy; (3) genistein in LE reduces pulmonary HTN;  $\gamma$ -linolenic acid produces pulmonary vasodilation, decreasing RH failure. (4)

#### Conclusion:

We present an uneventful repeat C/S in an AFE survivor. We review the pathogenesis of AFE, why recurrence is unlikely, and what preparation to consider. We suggest vigilance and preparation of resuscitative medications, invasive monitors, and AFE specific treatments.

# Abstract #: THURS-CR- Room 4– Coagulation & AFE – 12

# Amniotic Fluid Embolism and PEA Arrest in a Patient with Placenta Accreta Spectrum

### Presenting Author: Alexandra Feldner, MD

**Presenting Author's Institution:** Vanderbilt University Medical Center - Nashville, Tennessee

**Co-Authors:** Ashley Lewis, MD - Vanderbilt University Medical Center Stephanie Woodward, MD - Vanderbilt University Medical Center

Introduction: Amniotic fluid embolism (AFE) is a rare and potentially devastating complication of pregnancy with an incidence of 1.9-6.1 per 100,000 births and mortality rate of 20-60%.^{1, 2} The pathophysiology of AFE is thought to involve a maternal response to a breach in the maternal-fetal physiologic barrier, which leads to a release of endogenous inflammatory mediators causing acute pulmonary vasospasm and subsequent coagulopathy.^{1,3} AFE may present as cardiac arrest during labor, after rupture of membranes, or after cesarean but may also present with hypotension, dyspnea, cyanosis, bleeding, or fetal heart rate abnormalities.^{1,2} The differential diagnosis for cardiac arrest in pregnancy includes but is not limited to hemorrhagic shock, thromboembolic disease, left heart failure, anesthetic complications, and AFE.³ Echocardiography can narrow this differential.^{2, 3} We present this case as an example of AFE with multiple episodes of cardiac arrest in order to educate anesthetic providers on the management of a condition with extremely high maternal mortality.

Case Report: A 37-year-old G10P3063 at 33w2d with placenta accreta spectrum presented to the emergency room with vaginal bleeding. The decision was made to proceed with cesarean delivery and hysterectomy with general surgery, urology, maternal fetal medicine, gynecologic oncology, and obstetric anesthesiology teams. After ureteral stent placement, 1-3L of profuse vaginal bleeding was noted. Massive Transfusion Protocol was initiated, and the obstetric team immediately proceeded to incision. Thirty minutes later, CPR was initiated for PEA arrest. ROSC achieved after 1 minute. A second episode of PEA arrest occurred 9 minutes later, and CPR was performed for 2 minutes before ROSC. TEE showed severely depressed biventricular function and a large clot extending from the right atrium into the right ventricle. DIC was noted clinically and confirmed by labs. Pulmonary edema was observed by frothy pink secretions and frequent desaturations. Postoperatively, patient was admitted to the ICU, brought back to the operating room for exploratory laparotomy and abdominal closure, and discharged home on post-op day 6.

Learning Objectives:

- 1. Identify clinical presentation of AFE
- 2. Understand the use of echocardiography in peripartum cardiac arrest
- 3. Review treatment of the sequalae of AFE including DIC and pulmonary edema

A double diagnosis: aortic dissection and pregnancy

Presenting Author: Grace DeSena, BA

**Presenting Author's Institution:** University of Florida College of Medicine - Gainesville, Florida

**Co-Authors**:

#### Introduction

Aortic dissections occur in 0.0004% of all pregnancies, with up to one-fourth of the cases resulting in maternal mortality.¹ Pregnancy creates a hyperdynamic circulatory state that increases risk for aortic dissection, which is compounded by estrogen-induced weakening of the aortic media.²

#### **Case Presentation**

A 36-year-old G3P1011 with ADHD (on Adderall 30mg) presented to the ED with sudden-onset chest pain. CT revealed an ascending aortic dissection and a previously undiagnosed 28-week IUP. TTE demonstrated normal biventricular function without valvular abnormalities. She was hospitalized in the CICU where her systolic BP was maintained between 110 and 120 mmHg with labetalol and nicardipine infusions while a care plan was developed. Repeat CT on day 4 of admission showed no interval changes. Fetal heart tracings showed multiple one-to-two-minute decelerations daily. The patient emphasized the pregnancy was unintended and the baby would be placed for adoption. She refused cesarean delivery (CD) except if indicated by category 3 tracing. On hospital day 6, CD was performed under general anesthesia secondary to a non-reassuring fetal heart tracing. The anesthetic plan was designed to minimize hypertension and tachycardia with consideration of the patient's wishes for general anesthesia. Fentanyl was administered prior to induction of anesthesia and she received a clevidipine infusion intraoperatively. Ascending aortic and transverse hemiarch replacement was completed 72 hours later. Both mother and baby are doing well.

#### Discussion

While standard of care for Type A aortic dissections is emergency surgical repair, the timing of repair can be complicated by the maternal-fetal relationship. Considerations when determining treatment approach including maternal hemodynamics, fetal

monitoring and surgical timing should incorporate maternal preferences, fetal viability, type of dissection, and risk of rupture.³ Current literature suggests that CD followed by aortic repair may have equivalent maternal outcomes and improved neonatal outcomes when compared to simultaneous delivery and repair, and repair preceding delivery.⁴ The decision was made to perform CD followed by repair of the aorta in a staged fashion because CD at the time of aortic repair poses an increased risk of uterine hemorrhage due to administration of high-dose heparin on bypass in addition to the risk of uterine atony with general anesthesia.

dissection.pdf

# Peri-delivery management of a patient with acute psychosis lacking decisionmaking capacity

#### Presenting Author: Catherine Bergeron, MD

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Co-Authors: Patricia L. Dalby, MD - University of Pittsburgh
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#### Introduction

Peripartum care of patients with limited decision-making capacity requires thorough understanding of informed consent and ethics. We describe a challenging case of this nature.

#### **Case Description**

A 38-year-old G4P3 with schizophrenia and diabetes admitted psychiatrically in the context of an acute psychotic episode (auditory hallucinations and exhibited paranoia and emotional dysregulation) at 30+6 weeks after recent 6-week admission for peripartum psychotic decompensation. The involuntary inpatient admission continued through the third trimester of pregnancy to ensure medication adherence and to re-titrate clozapine necessitating a planned transfer to obstetrics for cesarean delivery. Medical evaluation deemed a lack of medical decision-making capacity for upcoming labor and delivery. Her mother was found to be a substitute decision-maker. Multidisciplinary inter-hospital coordination outlined a plan of care in various situations, including managing scenarios where consent from surrogate may be provided, without assent from patient. Further considerations included patient's frequent declining of medical procedures in the psychiatric hospital (e.g., blood pressure checks, non-stress tests).

#### Discussion

Decision-making capacity is evaluated on a patient's ability to communicate a choice, to understand relevant information, to appreciate medical consequences of the situation, and to reason through treatment choices. Situations relevant to anesthesiology and care team management are in Figure 1. In this patient, obstetricians were in favor of delivery at 37 weeks given poorly controlled diabetes mellitus and large for gestational age fetus (with associated risk for shoulder dystocia).

Considerations for the patient declining fetal monitoring and routine vital signs checks added complexities to care planning, necessitating close collaboration with the patient and a substitute decision-maker who provides informed consent based on patient values. If the patient's wishes are unknown, decisions are made in the patient's best interests.

Care coordination across hospitals and departments including anesthesiology, obstetrics, psychiatry, nursing, care management, and neonatology allowed for comprehensive care. A pharmacological management plan detailing pharmacological options in the event of agitation or a complete declining of an intervention that endangers the life of the mother and the fetus was developed during multidisciplinary meetings.

# Conclusion

Informed consent to treatment is complex for individuals affected by mental health disorders who lack decision-making capacity. Treatment planning focuses on making necessary resources available during labor and delivery, which can last several hours or even days. A team approach to planning and coordination of care is essential.

Figure 1 decision-making capacity Bergeron.pdf

# To Tie or Not to Tie? Ethical Considerations for Sterilization Procedure for Pregnant Patient with Schizophrenia

Presenting Author: Kathleen M. Daly-Jensen

**Presenting Author's Institution:** Oregon Health and Science University - Portland, Oregon

# **Co-Authors:**

# Introduction

A 44-year-old G6P3023 at 26w 2d presents as a transfer from a rural hospital for management of PPROM. The patient's history was complicated by:

- Schizophrenia in *acute psychosis*
- HIV+ on ART with undetectable viral load
- C/S in 2015 with pt-reported PPTL
- Housing instability
- Giant cervical fibroid that requires C/S for current pregnancy
- Bilateral PCN tubes for hydronephrosis from cervical fibroid
- Desire for permanent sterilization
- Anemia

Consent for PPTL obtained at outside hospital, but due to acute psychotic presentation, team requested evaluation of patient's decision-making capacity (DMC) and an ethics consult. She was accompanied by her partner who was determined to be her surrogate decision-maker (SDM), if needed.

# Ethical Considerations:

- <u>State law</u>
- 1. Our state SDMs may not make decisions regarding sterilization
- <u>Hospital policy</u>
- 1. In our hospital, DMC is determined by:
- a. Ability to understand basic information about the treatment or procedure
- b. Ability to understand and appreciate consequences
- c. Ability to process information rationally
- d. Ability to communicate choices
- Hx of eugenic sterilization

- 1. There is a long history of eugenic sterilization, specifically involving women with mental health conditions
- 2. The last known involuntary sterilization in our state occurred in 1981. Statewide, in total, 2,648 individuals were known to be involuntarily sterilized
- 3. The history of involuntary sterilization of patients with mental health conditions makes it even more important to obtain clear consent from our patient when it comes to a sterilization procedure

# Case Progression:

Ethics consult is obtained - the patient is determined to lack DMC. It is also noted that her partner, the SDM, is unable to consent to her sterilization due to state law. Recommendation is made to reevaluate DMC on day of surgery. Acute psychosis is treated with olanzapine. At 33w 5d, the patient's DMC is reevaluated prior to C/S, and she is determined to have DMC. The requested PPTL is performed at the time of C/S.

# Discussion:

When a patient lacks DMC, a SDM can help physicians provide care that is aligned with patient goals. Limitations placed on SDMs help protect the patient from irreversible, lifealtering procedures. This case is an example of the importance of protecting vulnerable patients with mental health conditions who lack DMC, particularly when it comes to sterilization procedures.

This case also demonstrates how a patient's DMC is not static and can change throughout a patient's hospitalization. Frequent reevaluation of DMC is required to provide the most ethical care to our patients.

This report cites our state laws, which may differ state-to-state.

### Patient Advocacy: Considerations for Quality of Life and Ethics Regarding Reproductive Rights and Neonatal Palliative Care for Fetuses with Congenital Anomalies

Presenting Author: Elia Rieder, MD

**Presenting Author's Institution:** University of Illinois- Chicago **Co-Authors:** Aswathi Jayaram, MD - University of Illinois-Chicago Heather C. Nixon, MD - University of Illinois- Chicago

#### Background:

Up to 3% of pregnancies are found to have congenital anomalies. Many of these anomalies contribute greatly to infant mortality and morbidity. Expectant mothers learn about these conditions earlier in pregnancy and are counseled on in utero interventions and fetal prognosis. Patients must then decide whether to continue the pregnancy with palliative care and withdraw life-sustaining treatment or proceed with an abortion. These decisions are made alongside a multidisciplinary team that is bound by law, ethics, and providers' own ideas of morality. The obstetric anesthesiologist must understand these considerations and partner with patients as they navigate their options.

#### Case:

18 yo G1P0 female at 21w 1d from outside state presented for MFM consult for fetal congenital diaphragmatic hernia (CDH) with both liver herniation and poor prognostic markers. After counseling regarding post-delivery prognosis and quality of life, she opted to decline fetal intervention, stating her preference for palliation without aggressive intervention. She was informed that if she carried to term, efforts would be made to resuscitate the infant, such as intubation, ventilation, and chest compressions and could not be ethically withheld. The patient presented for a second opinion and possible termination of pregnancy given that abortion could not be performed in her home state. After a multidisciplinary approach, the neonatology team expressed that they were not comfortable providing comfort care solely to the infant with CDH upon full term delivery. Our center coordinated funds for an induced abortion at 22 weeks gestation so that the patient could spend time with the delivered infant. Her delivery was uneventful.

#### Discussion:

The interplay between current and changing laws, the ethics of fetal resuscitation and the complexity of fetal prognosis counseling based on ultrasound evaluation can be complex and challenge patient autonomy. In our case, the identified liver herniation of the CDH was not compatible with a long-term positive outcome, yet the patient did not have the option to decline aggressive interventions if carrying to term. Likewise, the

patient's options were limited obtain an abortion in her home state and required transfer of care. It is the duty of the physician to provide unbiased counseling in the era of antiabortion laws. The anesthesiologist must familiarize themselves with each individual patient's scenario including their experience of choice while navigating the health care system and serve as a patient advocate, creating a safe and supportive environment.

# Preparedness for Plan D, When Plans A-C Fail; Planning and Ethical Considerations for a Parturient in Psychosis During Labor.

# Presenting Author: Lauren P. Newhouse, MD Presenting Author's Institution: University of Illinois at Chicago - Chicago, Illinois Co-Authors:

Introduction: Women with mental health disorders are among the most vulnerable populations obstetric anesthesiologists may encounter. Ensuring proper care for these women and their fetuses requires the execution of extensive, multidisciplinary planning. The emergent nature of situations involving these patients may also require unique ethical considerations, of which there is presently limited guidance in the literature. Addressing these points necessitates a detailed plan - one that ensures that the family and/or power of attorney agree with and understand the plan and its manifold back up measures providing as much preparedness for the unexpected as is practicable. We present a successful term birth in a parturient whose labor coincided with delusion that caused her to try to "help get the baby out", and incidentally led her to pull out her intravenous access and epidural before a crash cesarean section.

Case: 25 y.o. G1P0 at 39+1 wga with a past medical history of schizophrenia, trauma, and cocaine use was admitted for elective induction of labor. The patient was initially admitted to psychiatry for decompensated psychosis at 34 wga. Multidisciplinary team meetings were held between psychiatry, obstetrics, and anesthesia to plan a detailed elective induction of labor for when the patient was most lucid after 36 wga. Consent for all procedures was obtained with the patient's POA; both planned and emergency scenarios were detailed. Staffing was prepared for all teams to have personnel available for the induction. The patient was lucid the day of induction and aware of her pregnancy, so the decision to move forward was agreed upon by all teams. A preinduction epidural with hourly monitoring was initiated. The patient was cooperative throughout her labor course, and her sister was at bedside. However, the patient became agitated during pushing and attempted to leave her bed to help "get the baby" out of her". Fetal heart tones decreased, and the patient had immediate vaginal bleeding; a crash c-section was called. During this event, the patient was further agitated and began behaving combatively with staff, ultimately pulling her intravenous access and epidural. Intramuscular sedation of lorazepam was administered by

anesthesia and an IV was placed. The patient was then immediately put under general anesthesia; a healthy term baby was subsequently delivered.

Discussion: Successful management of this case necessitated early multidisciplinary discussion and shared decision-making with the care teams and the patient's POA. Given the emergent nature of this case, it was crucial for all scenarios and ethical considerations to be discussed in detail before the induction of labor. This case serves as a principal example of successful coordination of multidisciplinary planning and adaptability of all care teams amidst a high-risk situation.

### EXIT to Airway Anesthetic for a Fetal Neck Teratoma

Presenting Author: Jennifer N. Tripi, MD

**Presenting Author's Institution:** University of North Carolina Hospital - DURHAM, North Carolina

Co-Authors: Courtney R. Hood, MD - University of North Carolina

A 30-year-old G2P1 was referred to our hospital at 32 weeks' gestation for evaluation of a fetal neck mass. Ultrasound revealed a complex neck mass with cystic and solid components measuring 14.6 x 8.9 x 10.1 cm. The mass appeared to be arising from the anterior left fetal neck below and at the level of the mandible with involvement of the fetal neck soft tissue. Polyhydramnios was also present with an amniotic fluid index of 31.5 cm.

At 35 weeks the patient underwent an Ex-Utero Intrapartum Treatment (EXIT) procedure under general endotracheal anesthesia. The patient received a pre-induction arterial line, two peripheral IVs, and a lumbar epidural catheter. Following rapid sequence induction and intubation, anesthesia was maintained on 1 MAC sevoflurane, remifentanil (0.1-0.2mcg/kg/min), propofol (50mcg/kg/min), and nitroglycerine infusions (0.25-0.5mcg/kg/min). After hysterotomy, the fetus was delivered to the shoulders, and a 24G IV was placed by the pediatric anesthesia team in the right hand. This was placed in the event of partial mass resection being required at the time of the EXIT, with significant blood loss expected. Fortunately, the mass was not compressing the trachea and mass resection was not required at that time. No fetal medications were administered. A warm amnioinfusion of lactated ringers was circulated during fetal exposure. The fetal airway was secured by the pediatric ENT team via direct laryngoscopy, with flexible bronchoscope confirmation by the pediatric pulmonology team. The fetus was then delivered fully with APGAR scores of 4, 5, and 7 at 1, 5, and 10 min, respectively. Total placental bypass time was 22 minutes and the fetus experienced no episodes of bradycardia during the case.

After fetal delivery, the anesthetic focused on improving uterine tone by administering methylergonovine and oxytocin, and discontinuing nitroglycerine and sevoflurane. The patient was maintained on a total IV anesthetic for the remainder of the case, with adequate uterine tone and quantitative blood loss of 800 mL.

The patient was discharged from the hospital on post-operative day four. The neonate underwent a cervical lymphadenectomy and modified radical neck dissection at day of life 32, with pathology confirming non-malignant teratoma and no signs of residual tumor. The infant remains in the hospital and is tracheostomy dependent. This case illustrates a successful execution of a complex anesthetic for EXIT procedures.



# Multidisciplinary Management of Severe Hemolytic Disease of the Fetus and Newborn Requiring Multiple Intrauterine Transfusions

Presenting Author: Patricia Fuentes, n/a

**Presenting Author's Institution:** University of Texas Southwestern - Dallas, Texas **Co-Authors:** Nguyen Nguyen, DO - University of Texas Southwestern

Hemolytic disease of the fetus and newborn (HDFN) remains a challenging but treatable disease process with the advancement of prenatal therapies. Minimally invasive management of HDFN with intravascular intrauterine transfusion (IUT) has a high success rate despite lack of published universal best practices. Procedural complications still exist with anesthetic management remaining an integral aspect of the multidisciplinary approach for IUT. We describe our multidisciplinary and anesthetic management in a case of HDFN requiring multiple IUTs which ultimately resulted in emergent cesarean delivery (CD) and neonatal demise.

Our patient is a 33 yo G4P2 at 30 wga with known fetal anemia and hydrops due to Anti-C and D alloimmunization, CD x1, and preeclampsia without severe features. Her OB history included term fetal demise due to alloimmunization followed by CD at 33 wga in subsequent pregnancy with alloimmunization treated with three IUTs. This current pregnancy a decision to proceed with a fifth IUT was made after observation of persistent fetal tachycardia (HR 160s). Anesthesia was initiated in the OR with combined spinal-epidural initially requiring significant vasopressor support. After maternal blood pressure stabilized. IUT commenced. Blood Bank, anesthesia technicians (for point-of-care testing POC), MFM, nursing and NICU were all immediately available for the IUT. Starting POC fetal hemoglobin was 5.6. Initial attempts to cannulate the umbilical vein at cord insertion site proved difficult and required fetal paralysis for further attempts. Only 40mL out of 80mL of irradiated Oblood was transfused to the fetus. Mom and fetus in stable condition at end of IUT. Several hours later an emergent repeat CD was called due to fetal tachycardia and minimal variability. Despite no intraoperative events, the fetus later expired likely due to acute on chronic anemia and hypoxia.

Advances in treatment of HDFN with minimally invasive procedures such as IUT are generally well tolerated by mom and baby. IUT for HDFN requires a multidisciplinary approach with the goal of anesthetic care aimed to minimize maternal and fetal risk, maintain adequate uteroplacental blood flow, and optimize surgical conditions¹. However, as elucidated in this case, severity of HDFN and comorbidities such as preeclampsia likely contributed for a poor outcome for baby despite multidisciplinary approach. Consequently, treatment planning for IUT should be individualized with special attention to maternal safety, counseling, and fetal conditions (e.g. gestational

age, comorbidities, HDFN severity, need for repeat procedures and emergent delivery planning) to adequately counsel moms and families.

An Unexpected Weekend EXIT

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#### Case report

A 20-year-old nulliparous woman presented at 40 weeks gestation to labor and delivery with ruptured membranes. She received routine prenatal care with expectations of an uneventful vaginal delivery. However, on admission, ultrasound examination revealed an incidental finding of a large fetal neck mass. While the amniotic fluid index and fetal heart rate tracing were normal, the team initiated delivery planning to avoid emergent delivery due to concern the neck mass would compromise the airway and inhibit endotracheal intubation. Thus, an EXIT procedure was planned to preserve oxygen delivery to the fetus while airway evaluation and possible intervention occurred. Emergency neonatal airway equipment, including video laryngoscopy and bronchoscopy, was set up in the operating room.

A pre-induction arterial line, two large-bore IVs, and lumbar epidural were placed in the mother. General anesthesia was initiated with rapid sequence induction and intubation with proprofol and remiferitanil infusions for maintenance. Shortly before hysterotomy, sevoflurane at 2.0 MAC was added to promote uterine relaxation and preserve blood flow to the neonate.

Upon delivery of the baby's head and shoulders, a 9x9cm anterolateral neck mass compromised the baby's airway and respirations. Initial attempts to intubate the baby via direct laryngoscopy and rigid bronchoscopy were unsuccessful. A subsequent tracheostomy was aborted due to distorted anatomy from the highly vascularized neck mass which bled significantly when incised. After 45 minutes, the trachea was successfully intubated, and the baby was delivered. The baby was transferred to a second operating room where a tracheostomy was performed. Estimated blood loss

during the tracheostomy was 150mL, necessitating transfusion of O-negative, uncrossed blood.

After delivery of the baby, the mother was maintained on total intravenous anesthesia and the epidural was loaded with lidocaine and morphine; the procedure concluded without difficulty. Her post-operative course was unremarkable. The baby was admitted to the NICU for further workup and possible excision of the neck mass.

# Discussion

Preoperative planning for an EXIT procedure is often done weeks in advance and requires interdisciplinary coordination with obstetric and pediatric anesthesiology, obstetricians, neonatologists, pediatric otolaryngology, and nursing teams. Instead of weeks, the team had hours, as the patient could go into labor at any moment. The anesthetic plan for an EXIT procedure should promote both uterine relaxation as well as increased perfusion to promote oxygen delivery to the fetus while the fetus' airway is evaluated prior to umbilical cord clamping. Significant blood loss from both mother and baby should be anticipated.

# A Case Report of Maternal Death and Disparities in Obstetric Health Care

Presenting Author: Michael Luba, BS
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Co-Authors: Renee Davis, MD - University of Cincinnati
Mary Roberts, MD - University of Cincinnati

Racial disparities exist throughout the health care system and are prevalent in maternal and perinatal medicine. When adjusted for other maternal characteristics, babies born to black women had poorer outcomes than babies born to white women through high and upper-middle income countries. ¹ Further, black women are at higher risk for severe morbidity and mortality associated with postpartum hemorrhage.² A 28 year old G2P1001 black female at 36w1d with a history of tobacco use, gestational diabetes, anemia, and limited prenatal care who presented to the emergency department in cardiac arrest after a witnessed collapse at home. Upon EMS arrival, the patient was pulseless and unresponsive, thus advanced cardiac life support (ACLS) protocol was initiated with epinephrine. Upon arrival to the ED, two large bore peripheral IVs were placed and the patient was intubated with subsequent improvement in oxygen saturation. As ACLS was continued, resuscitative hysterotomy was performed by the present OBGYN providers. Due to initial concern for abruption, the patient was given 2 units of packed red blood cells and pitocin was injected into the uterus. Further OB evaluation suggested abruption was unlikely, and transfusion was stopped. Continued rhythm checks showed fluctuation between asystole and PEA. No shocks were indicated. The patient was administered epinephrine, bicarbonate, and calcium, with failure of improvement in clinical status. Examination showed no cardiac activity, spontaneous breaths, movement, or reflexes, and time of death was pronounced. Autopsy determined the cause of death was a ruptured intracranial aneurysm. On chart review, it was discovered that the patient had a concern for pre-eclampsia at the last prenatal visit but had not been able to present for further evaluation. The infant was initially intubated and underwent targeted temperature management but was eventually diagnosed with hypoxic ischemic encephalopathy and care was withdrawn. The physiologic changes of pregnancy, including increased cardiac output and circulating blood volume, may have caused the intracranial aneurysm to rupture. Thus, the ultimate cause of death may have been non-preventable. However, racial and economic disparities in health care may have contributed to poor prenatal care and preeclampsia in our patient, contributing to the adverse outcome of her pregnancy. As

providers, obstetric anesthesiologists have a unique opportunity to identify high risk patients, and reduce disparities in our healthcare system.

# SPINAL ANESTHESIA FOR CESAREAN DELIVERY IN PREGNANT TEENAGER

Presenting Author: Borislava Pujic, Anesthesiologist

Presenting Author's Institution: CCV - Novi Sad, Vojvodina

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Summary: The adolescent period, according to World Health Organization (WHO), is period between 10 and 19 years. (1) Teenage pregnancy is an on-going problem around the world. About 2.5 million girls under the age of 16 give birth each year and such births are more common in rural than urban areas (2). These pregnancies are often associated with poverty, a low level of education, family violence or rape. Associated conditions and circumstances combined with these pregnancies can increase morbidity and mortality, especially in girls under the age of 14y (3).

Case report: We present a case of 14y old female, Roma ethnicity, with her first pregnancy at 37 weeks EGA. She was admitted to the high-risk pregnancy service at 36 weeks EGA, 5 days before her ultimate delivery. Pregnancy was reportedly uncomplicated. The baby's father was 17y old, but he abandoned her during pregnancy, leaving her parents to take care of her. She had a prior diagnosis of acute lymphocytic leukemia (ALL) which was treated medically between the age of 2 to 10 years. At the time of delivery she was in complete remission. She had finished only elementary school, and physically looked older than 14y. Because of her adolescent pregnancy, a psychologist was consulted.

She presented to for an emergent cesarean delivery (CD) in active labor with premature rupture of membranes, at 4cm cervical dilation and blood pressure of 140/80mmHg. After receiving appropriate information regarding the procedure, the patient chose to be delivered under spinal anesthesia (SA) and to see her child. CD was performed with SA, with a 25G Pencil Point needle in sitting position on 1st attempt. Bupivacaine 0.5% 12mg and fentanyl 25mcg were injected. Ten minutes later, a healthy baby girl, birth weight 2500g, was born with Apgar scores 10/10 in 1 and 5 minutes. EBL was 600ml. Post-op course was uneventful and she was discharged home 5 days later.

Discussion: In Serbia, adolescent pregnancy accounted for 1.74% of recorded pregnancies over a twelve year period (2007-2019) (4). This places Serbia in a group of countries with very low number of adolescent pregnancies. As the young female was 14y old, her mother was present during all examinations, and also signed all written consents. (Under Serbian law, all persons under age of 18 must have a parent's signature for medical procedures.) (5) This young mother, with supportive parents, who

were willing to help her in raising baby, was in much better circumstances than many adolescent mothers.

# Are anesthesiologists the right persons to perform neonatal resuscitation?

Presenting Author: Manuel Vallejo, MD

**Presenting Author's Institution:** Virginia Commonwealth University, Virginia **Co-Authors:** Fatoumata Kromah, MD - Virginia Commonwealth University, Virginia

1 million newborns die each year due to asphyxia at birth (1). Around 10% of all infants will require some intervention. 1% of all newborns necessitate intensive resuscitation at birth (2). We describe two cases in which an anesthesiologist was involve in the resuscitation of the neonate.

Case No 1: 38 y/o G3P0 at 41 wks GA, with GDM presented in labor due to ROM. She remained in labor for 16 hrs and pushed for 2h 40 minutes. A CD was performed as the fetus showed signs of non-reassuring heart rate. At delivery, meconium stain was noted. Despite PPV and simulation, there was no respiratory effort, APGAR 1/5, HR 70/min. As the NICU team was late due to a faulty paging, the anesthesiologist intubated the infant, after which HR increased, and breath sounds became present. The newborn remained in NICU discharged PPD for 3 days, and on 4. Case No 2: Healthy 28 y/o G3P0 at 41 wks GA presents for IOL. Labor lasted for 28 hrs and pushing for 1h 40 min. She delivered a floppy, grey, 9 lbs baby who was grunting and was not making an adequate respiratory effort with APGAR 3/6. The anesthesiologist dosing the patient before delivery noticed that the nursing team was struggling. The anesthesiologist then started PPV and stimulation. The NICU team was paged. The newborn was taken to the NICU and remained on nasal CPAP for one day, followed by nasal oxygen. The baby returned to their parents on the PPD2 and was discharged home PPD3. on

**Discussion:** Due to specialized training in airway management and critical care, anesthesiologists are well-suited for neonatal resuscitation (3). However, many national societies state that obstetrician and anesthesiologists should not switch their primary focus from taking care of the mother to neonatal resuscitation. In clinical practice, there are situations in which a delay in the arrival of the neonatal resuscitation team may lead to the anesthesiologist's involvement in neonatal resuscitation. Most anesthesiologist in the L&D department lack formal NRP training (4). NRP might decrease the risk of unintentional injuries that has occurred in the past when anesthesiologists performed neonatal resuscitation (5).

# Abstract #: THURS-CR- Room 6- PDPH-01

### Epidural Blood Patch in a Parturient with Subdural Hematoma and Midline Shift

Presenting Author: Andrew Sprowell, MDPresenting Author's Institution: Beth Israel Deaconess Medical CenterCo-Authors: Phil E. Hess, MD - Beth Israel Deaconess Medical Center

BACKGROUND: Subdural hematoma (SDH) is a rare and devastating complication of post-dural puncture headache (PDPH).¹ Generally, epidural blood patch (EBP) is the definitive treatment for PDPH, however, neuraxial procedures are considered contraindicated in patients with increased intracranial pressure (ICP) due to concerns for herniation.

CASE REPORT: On postoperative day 4 (POD4) after cesarean delivery (CD), a 28 y/o G1P1 female was transferred to the Neuro ICU at our hospital for management of SDH. Past medical history was noncontributory. Shortly after arriving to an outside hospital in spontaneous labor at 40w6d, she was diagnosed with pre-eclampsia. Labor epidural analgesia with 17g Tuohy was provided and converted to cesarean anesthesia for fetal intolerance of labor. After surgery she was ambulating well and denied headache. On POD3 she developed an acute onset of occipital headache with neck radiation and was treated with magnesium for presumed severe preeclampsia. On POD4 she continued to have severe frontal and occipital headache. Despite nursing documentation describing a positional headache, a diagnosis of PDPH was not made at this time. She was subsequently noted to be somnolent but arousable. Computed tomography (CT) scan revealed acute-on-chronic 7 mm left-sided SDH and 5 mm midline shift. On arrival to our hospital, she was alert and oriented, CT angiogram ruled out cerebral venous thrombosis and arteriovenous malformations, and interval CT was stable. Positional, frontal/occipital headache with intermittent double vision and photophobia were more appreciated. On POD6, the obstetric anesthesia service was consulted to evaluate for EBP. Given presence of a midline shift and partial herniation at the midbrain and foramen magnum, we recommended lumbar and brain MRI to confirm the CSF leak as a cause of SDH before consideration of EBP. Given the MRI evidence of low CSF pressure and exclusion of primary occupying brain mass (Fig. 1), epidural blood patch with 34 mL of sterile autologous blood was performed on POD8 with immediate and permanent resolution of symptoms. She was discharged from the ICU to home on POD10.

DISCUSSION: In most case reports of PDPH-related SDH, surgical intervention was performed if neurological impairment or significant brain compression were present.² To our knowledge, there are no existing case reports describing EBP in the setting of acute PDPH-induced SDH with midline shift and peri-herniation. Unique features of our case report include atypical presentation of PDPH, unclear SDH chronicity on initial radiology reports and persistent midline shift despite overall intracranial hypotension. MRI imaging

was essential to diagnose CSF leak in the lumbar epidural space, rule out secondary brain pathology, and evaluate intracranial pressure to allow for safe placement of an epidural blood patch.



# Abstract #: THURS-CR- Room 6– PDPH-02

#### Epidural labor analgesia after prior epidural blood patch with fibrin sealant

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Presenting Author's Institution: Anesthesia Practice Consultants - Ada, Michigan
Co-Authors: Rashad Albeiruti, MD - Anesthesia Practice Consultants

#### Introduction

Interventional radiology (IR) procedures have become increasingly widespread as noninvasive treatment technologies continue to emerge and evolve. We present a case of a successful labor epidural placement in a patient who had previously undergone an epidural blood patch with fibrin sealant placed by neuro IR secondary to recurrent spontaneous CSF leaks.

#### Case Report

A 37yo G2P0 with a history of recurrent dural tears due to bone spurs at T12-L1 as demonstrated on CT myelogram was referred by MFM for OB anesthesia consultation. She was treated years prior with several epidural blood patches, then was later referred to neuro IR at a university facility for further management of her chronic intracranial hypotension from CSF leaks. She underwent a fluoroscopically-guided epidural blood patch under general anesthesia. An introducer was used at the L3-4 level to place a 4 French, 100cm vertebral catheter. A total of 60 mL of autologous blood was injected through the catheter between C5 to L3, with 5 mL of fibrin sealant deposited at the T11 and L1 levels. This procedure successfully closed the CSF leak but did result in rebound intracranial hypertension headaches.

Roughly five years later, she presented to our institution for planned IOL secondary to gestational hypertension. After thorough multidisciplinary planning and discussion of risk/ benefit with the patient, a labor epidural was placed at L3-4 with no complications, providing excellent analgesia. A PCEA was utilized, consisting of 0.125% bupivacaine and 2 mcg/mL fentanyl, running at 10 mL/hour. She would subsequently undergo an urgent cesarean section due to persistent category 2 FHT. The epidural was successfully dosed for surgical anesthesia with 10 mL of 2% lidocaine with 1:200,000 epinephrine. Postoperatively, the catheter was removed uneventfully.

#### Discussion

To our knowledge, there are no case reports of labor epidural catheter placement after a previously performed epidural blood patch with fibrin sealant. Our main consideration was potential alteration or obliteration of the native epidural space as a result of the fibrin patch. This could result in increased likelihood of inadvertent dural puncture or patchy local anesthetic spread and analgesic coverage. While special care was taken during epidural placement given the aforementioned risks, the patient's entire clinical course was unremarkable.

Prior to her OB anesthesia consult, our patient met with her neuro IR physician who did not feel there were any contraindications to performing neuraxial anesthesia. We were also able to correspond with the IR team in advance, having been able to review a variety of outside patient records. This highlights the importance of using a multidisciplinary team approach when it comes to managing patients who have previously undergone procedures that may directly impact a laboring patient's anesthetic management.

#### Abstract #: THURS-CR- Room 6– PDPH-03

# Treatment of Post-Dural Puncture Headache with Atropine/Neostigmine Combination

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INTRODUCTION: Post-Dural Puncture Headache (PDPH) is the most common complication of neuraxial anesthesia in obstetric patients. 1 Treatments such as caffeine, acetaminophen, and blood patches have been proposed and implemented in clinical practice with fair success. Mahmoud et al published a double-blind randomized control trail comparing neostigmine/atropine combination therapy vs. saline placebo and found pain scores were significantly better with neostigmine/atropine than placebo and significantly decreased the need for epidural blood patch. It is hypothesized that the central effects of both atropine and neostigmine influence both cerebrospinal fluid secretion and cerebral vascular tone. 2

PURPOSE: To present a case report of atropine/neostigmine combination treatment for a patient who failed first-line medical therapy for PDPH.

CASE: Our patient is a 29-year-old female with history of bladder exstrophy and hypertension s/p classical cesarean section and extensive lysis of colonic adhesions. Our anesthesia team attempted placement of a combined spinal epidural prior to the cesarean section was complicated by accidental dural puncture twice and placement of an intrathecal catheter, which failed to provide adequate anesthesia for the procedure, and she underwent general anesthesia. Post- operatively, she developed an ileus and a headache which was worsened with standing and was associated with photophobia and mild neck stiffness. Acetaminophen/caffeine along with a sphenopalatine block failed to alleviate her headache. Epidural blood patch was considered but given a high suspicion for anatomic abnormalities in this patient from her bladder exstrophy and from her two wet taps by experienced providers, our team looked for alternative treatment options. Our patients received neostigmine 20 µg/kg and atropine 10 µg/kg per the dosing protocol published by Mahmoud et al. Our team used standard ASA monitors and was observed by nurse and anesthesia team following administration. The patient reported pain decreased from 7/10 to 0/10 within 24 hours. Patient noted mild tremors and subjective fever 15 minutes after treatment administration which subsided after a cool cloth was applied to patient's forehead. Oral

temperature at that time was 98.1 degrees F. Otherwise, patient reported no symptoms or adverse reactions. The patient also noticed resolution of bowel obstruction, with several bowel movements over the next 24 hours.

CONCLUSION: Atropine and neostigmine combination therapy may offer an alternative option to treating PDPH when traditional therapies such as caffeine, epidural blood patch, and sphenopalatine blocks are unsuccessful.

### Abstract #: THURS-CR- Room 6- PDPH-04

# A Case of Pneumocephalus with Atypical Symptoms Following Labor Epidural

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Pneumocephalus is a rare but documented complication of inadvertent dural puncture. Traditional symptoms include sudden-onset severe headache, occasionally associated with neck or back pain. Given the broad differential diagnosis of postpartum headache, proper diagnosis is important for management decisions which can be made more difficult in the setting of atypical symptoms.

A 28 year-old G2P0010 female patient with no significant past medical or obstetric history presented at 32 weeks gestation for induction of labor after recent diagnosis of intrauterine fetal demise (IUFD). During lumbar epidural placement, there was inadvertent dural puncture. The needle was immediately removed and epidural placed one interspace higher, also with loss-of-resistance to air. The patient was counseled on signs and symptoms of post-dural puncture headache (PDPH). When seen for routine follow-up on post-delivery day one (PDD1), she reported a mild positional headache that improved with oral acetaminophen. Though she had been counseled about the possibility of epidural blood patch, the patient felt well enough to go home and was discharged that same

On PDD 2, patient presented to the ED reporting a left-sided headache with radiation to the neck and retro-orbital regions. CT head was performed, revealing "moderate volume intraventricular gas." She was admitted to neurology and treated with IV fluids, acetaminophen, ketorolac, and high-flow oxygen with mild improvement of her pain. In addition, she remained under strict flat bedrest protocol. On PDD6, repeat CT head showed "interval resolution of pneumocephalus."

Despite radiologic resolution, the patient's headache persisted and a new positional component was revealed. On PDD7, the anesthesiology team was consulted, unaware of admission to this point. Epidural blood patch was performed, also with LOR to air. Immediately post-blood patch, the patient reported resolution of headache. One hour after blood patch, the patient developed a worsening headache, not improved by position with associated photophobia. CT head was performed which showed "interval development of pneumocephalus."

The patient remained in the hospital for three more days post-blood patch undergoing medical treatment with continued waxing/waning symptoms. By the time of discharge, her symptoms improved enough to perform activities of daily living.

Management of postpartum headache includes a broad differential diagnosis and management is based on underlying etiology. Although pneumocephalus was identified, because of atypical symptoms and possible contribution of a low-pressure headache, it was difficult to expertly manage our patient's care. In addition, the reappearance of air on repeat CT scan, likely redistribution of existing air from the spinal column, was unexpected and further confounded her treatment course.

# Abstract #: THURS-CR- Room 6- PDPH-05

### Intraparenchymal Hemorrhage in the Postpartum Patient

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#### Introduction

Postpartum headache (PPHA) affects up to 40% of females in the puerperium. The majority of PPHA are primary headache disorders. Secondary headaches are less common, which include obstetric and anesthetic causes such as preeclampsia (PEC) and post-dural puncture headaches (PDPH), respectively. However, it is important to consider the wide differential diagnosis of PPHA including intracranial hemorrhage (ICH), tumor, stroke, vasculopathy, and infection. Timely recognition of these potentially fatal etiologies is critical in preventing adverse outcomes, as described in this case.

#### Case

A 39 year old G1P0 female with history of tension headaches, fibroids, and gestational thrombocytopenia presented at 40 wga with rupture of membranes. She received an uneventful combined spinal-epidural for labor analgesia. Vaginal delivery was complicated by 4th degree lacerations with successful repair. On postpartum day (PPD) 1, the patient was mildly hypertensive with a mild frontal headache, worse when supine, confusion, and emesis. Headache persisted on PPD2, but she declined analgesics. PEC labs were normal. She was discharged PPD2.

On PPD3, patient came to the hospital with a constant severe headache that disrupted her sleep. Vitals were within normal limits. She had a non-focal neurological exam, but worsening headache in supine position. Due to severity of headache refractory to medications and low likelihood of PDPH, further work up was recommended. Brain magnetic resonance imaging revealed a 2.7cm right acute anterior temporal intraparenchymal hemorrhage (IPH) with subarachnoid and subdural extension (Fig 1).

Interventional Neuroradiology was consulted and she was admitted to the ICU for serial neurologic exams. Management included seizure prophylaxis with levetiracetam and SBP goal < 150 mmHg, though she never required antihypertensives. Diagnostic angiogram showed right MCA vasospasm and possible right external carotid artery dural arteriovenous fistula (AVF). Due to possibility of a missed cortical vein thrombosis (CVT), hypercoagulability workup was completed and found to be normal. PPHA gradually improved over time with resolution of abnormalities on repeat angiogram 7 weeks postpartum.
### Discussion

ICH occurs in less than 0.1% of pregnancies, but is responsible for up to 12% of all maternal deaths. It typically presents with altered mental status, seizures, blurry vision, or weakness. This patient's PPHA was an IPH likely due vascular lesion such as AVF versus CVT. However, clinical picture was complicated by history of tension headaches, possible postpartum PEC, and subtly of presenting symptoms. Given the high morbidity and mortality of ICH, PPHA requires prompt medical attention to determine if further imaging and follow-up is warranted.



## Abstract #: THURS-CR- Room 6- PDPH-06

## Post Epidural Blood Patch Complications: What to anticipate?

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### **Co-Authors:**

Epidural blood patch (EBP) is the definitive treatment for severe manifestation of postdural puncture headache (PDPH) not responsive to conservative management with caffeine and analgesics. Its objective is to patch a tear in the dura which is causing leakage of CSF by injecting blood into the epidural space. EBP is reserved and used for the most severe PDPHs, not responding to conservative management. Case Report: A 32 year old G8P5 with history of hypothyroidism, postpartum hemorrhage, gestational hypertension, rheumatoid arthritis who presented at 38 weeks due to IUGR. She was admitted to L&D for induction of labor. An epidural was placed for labor analgesia after 3 attempts. She had an uneventful vaginal delivery. Approximately one day postpartum, she began complaining of neck pain believing she strained her neck while sitting up for her epidural. Pain was aggravated with head movement and improved with lying flat and had no relief with Tylenol or Ketorolac. Later that day the patient complained of severe posture dependent headaches and Acetaminophen + Butalbital + Caffeine was started. She opted for a blood patch due to inadequate pain relief. 20mL of blood was injected with sterile precautions via EBP. Significant relief of headache was noticed, vitals post procedure were within normal limits and she was discharged home. She presented the next morning in respiratory distress with an O2 sat in the 60s, which improved with O2 via nonrebreather mask. She had a fever of 103.9. CXR showed bilateral perihilar infiltrates. UA showed moderate leukocyte esterases and >50 WBCs. No neurological deficits were found. CT angio was negative for pulmonary embolism. An echocardiogram ruled out peripartum cardiomyopathy. She was started on broad spectrum antibiotics Piperacillin/Tazobactam, Linezolid and was admitted to the MICU. Blood cultures were positive for E. Coli bacteremia, likely from the urine. Patient was discharged on PO antibiotics.

Discussion: EBPs are generally safe. A full aseptic technique should be utilized both for the epidural and the blood draw. Complications of EBPs include back pain, nerve damage, bleeding and infection. Specifically, there have been reports of rare adverse effects such as "chronic adhesive arachnoiditis, subdural or spinal hematoma, seizure, cerebral venous sinus thrombosis, transient bradycardia, infection, intracerebral hemorrhage, facial nerve palsy, visual disturbance, incontinence, monoplegia, cerebral ischemia, cauda equina syndrome, pneumocephalus, formation of a calcific epidural mass, and scarring of the epidural space with distortion of epidural anatomy." Our patient presented with high fever post EBP. It is critical to rule out epidural abscess which requires immediate neurologic evaluation, MRI of spine and surgical decompression.



## Abstract #: THURS-CR- Room 6- PDPH-07

## Cerebral venous sinus thrombosis following epidural blood patches for postdural puncture headache

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Background: Cerebral venous sinus thrombosis (CVST) is a rare condition with an incidence of 13.2 to 15.7 per million patient-years¹. It occurs predominately in females, and 20% of the cases happen during pregnancy or postpartum period². The exact mechanism of postpartum CVST remains unclear. Pregnancy is a risk factor. Requiring an epidural blood patch (EBP) can predispose CVST development, with the blood patch's ability to cause cerebral vasoconstriction, possibly impeding on cerebral blood flow and contributing to thrombosis³. We describe a case of CVST in a postpartum patient who required a decompressive hemicraniectomy after failed EBP.

Case presentation: A healthy 22 year-old G3P3 with epidural analgesia for vaginal delivery developed classical post-dural puncture headache (PDPH) symptoms on postpartum day 1, and was initially managed conservatively with caffeine and hydration. On day two, she received an EBP with resolution of her pain. Her headache recurred on day 4, and received second EBP without relief. She was admitted for neurological workup and started on prophylactic heparin. Initial CTA/CTV did not show thrombosis, but CT showed bulky hyperdense pituitary gland with concern for pituitary hemorrhage and possibly pituitary apoplexy/Sheehan's syndrome; this was later ruled out. On day 7, her headache became unilateral with diffuse right-sided paresthesia. Brain imaging found CVST. She was started on enoxaparin. On day 9 neurologic symptoms worsened, repeat imaging showed expanded hematoma with midline shift and mass effect. She underwent emergent decompressive hemicraniectomy. She later developed fever and mastitis. She tested negative for factor V Leiden and Factor II G20210A mutation, anti-B2 glycoprotein antibodies and anticardiolipin antibodies. She was discharged on postpartum day 24 with a modified Rankin score of 4 indicating moderately severe disability.

Conclusion: CVST is a rare condition, and a large percentage of cases develop in the pregnant or postpartum population. After unsuccessful blood patches, brain imaging is

indicated to rule out CVST and other intracranial pathology. Despite negative workup, if symptoms persistent or change, additional workup is necessary. Early diagnosis and management can lead to decreased morbidity.

## Abstract #: THURS-CR- Room 6– PDPH-08

Clinical Course of Pneumocephalus Complicated by Postdural Puncture Headache After Labor Epidural Anesthesia

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**Introduction:** Pneumocephalus (PC) and Postdural Puncture Headache (PDPH) are potential complications of unintentional dural puncture (UDP) during labor epidural anesthesia that can present with overlapping symptoms.¹ PDPH often presents as a postural HA occurring within 36 hours accompanied by neck stiffness and treated with Epidural Blood Patch (EBP).¹ The HA of PC often presents within 24 hours with neurological symptoms.¹ PC is diagnosed with a computed tomography (CT) scan and treated with 100% oxygen.¹ We present a 33-year-old female who underwent labor epidural anesthesia complicated by pneumocephalus and postdural puncture headache after UDP.

**Case Presentation:** A 33-year-old G6P4115 female with past medical history of prior PDPH presented for induction of labor on 5/5/22 and had an epidural for labor anesthesia. During epidural placement, UDP was noted, and the patient developed an immediate HA. She had a successful vaginal delivery. On 5/7/22, the patient reported a postural HA accompanied by ear pressure and decreased hearing. She underwent EBP which ultimately failed after 3 attempts at epidural placement. During the procedure, the patient reported a frontal occipital HA with accompanying neck stiffness. A CT scan was done and showed pneumocephalus with air in the frontal horn of the left lateral ventricle (A), basal cisterns (B), and upper cervical canal (C) (Figure 1.) 100% oxygen was started which resulted in HA improvement. However, she was still experiencing postural HA with neck stiffness. She agreed to a second EBP attempt which was successfully performed. She felt immediate symptom relief and was discharged the next day on 5/9/22.

**Discussion:** The overlap in presentation between PDPH and PC poses a challenge to diagnosis, and it is made more difficult when both occur concomitantly as in our patient. Small and self-limiting PCs can be missed or under-diagnosed if not considered early in differential. Since post dural HA usually presents after 36h of dural puncture, patients will likely be treated for concomitant PDPH, while PC is left untreated. Recognition of distinguishing clinical features and symptom onset may aid in prompt investigation and treatment. In our patient, the defining features were the sudden onset HA and

neurological deficit (ear pressure/reduced hearing). Several reports have described similar PC presentation.^{1,2} Thus, clinicians should have PC on the differential if the HA presents immediately after UDP especially if there are accompanying neurological deficits. Furthermore, clinicians should be aware of the possibility of both PC and PDPH occurring concomitantly.



Figure 1. Head CT without contrast

## Abstract #: THURS-CR- Room 6- PDPH-09

## Nebulized Dexmedetomidine in the Treatment of Obstetric Post-Dural Puncture Headache: A Case Report

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Leonard Soloniuk, MD - Loma Linda University

Background: Obstetric post-dural puncture headaches (PDPH) remain debilitating and difficult to treat. Conservative, pharmacologic, and invasive treatments have variable effects and carry increasing risk in their respective order. Multimodal treatment plans have been developed to improve treatment outcomes and reduce risks of treatments. A case series was reported of administering dexmedetomidine (DEX), 1 µg/kg in nebulized form, twice daily for three days to treat PDPH with promising results.¹ A randomized, double-blind controlled study had the active treatment with DEX, 1 µg/kg in nebulized form, twice daily for 72 hours or until improvement in symptoms.² This study demonstrated significant reductions in visual analog pain scores (VAS) and Lybecker scores with the DEX treatment.

Case Presentation: A 29-year-old term female G2P1 with a history of diabetes, a high BMI (36 kg/m2), and prior cesarean section under spinal anesthesia presented for repeat scheduled cesarean section. Multiple attempts were made to access the intrathecal space without success, and an attempt was made to identify the epidural space with a 17-gauge Tuohy needle. An accidental dural puncture occurred with the Tuohy needle. The patient developed classical signs and symptoms of a PDPH postoperatively. Conservative management with bed rest, acetaminophen, hydrocodone, butalbital/caffeine, ibuprofen, and intravenous fluids was attempted with no success. There was minimal improvement in pain (VAS from 7 to 6) or functional status. Twenty-four hours after the dural puncture, dexmedetomidine, 1 mcg/kg in nebulized form, was administered with rapid and complete resolution of headache and pain (VAS = 0) after the single dose.

Conclusion: Our case demonstrates the use of dexmedetomidine as an adjunctive treatment for PDPH. Further prospective studies should clarify the role of DEX in the treatment of PDPH and evaluate the efficacy, safety profile, and mechanism of action of dexmedetomidine in the setting of PDPH.

### Abstract #: THURS-CR- Room 6– PDPH-10

## Treatment of Postdural Puncture Headache with Neostigmine and Atropine after Unintentional Dural Puncture with a Tuohy Needle

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**Background**: Limited effective therapies for postdural puncture headache are available despite the potential for serious long term complications. A novel treatment with neostigmine and atropine was proposed by Mahmoud et al for postdural puncture headache caused by 22 gauge Quincke needles. Treatment with neostigmine and atropine as a result of accidental dural puncture from a larger Tuohy has not been studied.

**Case Description**: A 28 year old G2P0 developed a postdural puncture headache after known unintentional dural puncture with a 17 gauge Tuohy needle. She was initially treated with two failed blood patches. Her symptoms recurred and she declined a third blood patch, however she did agree to an infusion of atropine and neostigmine. Within the hour after the infusion she reported complete resolution of her symptoms and was discharged later that day. Her headache did recur two days after discharge, but resolved with oral analgesics.

**Discussion**: This case suggests that neostigmine and atropine may be either be an effective treatment for postdural puncture headache even when the dural puncture is a result of a larger gauge needle, or may be considered as a conservative temporizing measure when a blood patch may need to be delayed.

### Abstract #: THURS-CR- Room 6– PDPH-11

## The L5-S1 interspace in Difficult Spinal Anatomy – Lessons Learned from Inadvertent Dural Puncture Management in a Patient with Cerebral Palsy and Severe Scoliosis

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Co-Authors: Luis Chabla-Penafiel, MD - Columbia University

**Background**: Cerebral Palsy (CP) is a non-progressive, neurologic disorder characterized by motor, sensory and intellectual impairment, with a prevalence of 1-4/1000 live births.[1] 1:9 have biological children; pregnancy is associated with increased risk of preterm birth and adverse pregnancy outcomes.[1]

In addition to cognitive impairment (66%), epilepsy (50%), GERD, and urologic disorders, 70-80% develop muscle spasticity, contractures, and deformity.[2] Fixed deformities of the limbs and trunk may present challenges to performance of neuraxial anesthesia.

Case Report: A 39 y.o. G2P1, 36w 6d gestation, BMI 26kg/m² with spastic cerebral palsy, right lateral scoliosis with axial rotation, hip obliquity and rheumatoid arthritis presented for elective repeat cesarean delivery. PMH: chronic hypertension, autonomic dysfunction with sinus tachycardia on metoprolol, gestational diabetes, and anxiety. Prenatally, heparin 10K BID SC, was prescribed, because of contractures and limited mobility; it was discontinued for >24hrs preoperatively. Prior delivery was with combined spinal epidural anesthesia (CSE, L3/4)- difficult placement noted.

Preprocedural ultrasound scan identified vertebral levels and midline, but resolution was poor. Numerous attempts at 2 sites were required. Inadvertent dural puncture occurred at 8cm with a 17G Hustead needle at presumed L3/4. A 19G multiorifice epidural catheter was placed 4cm intrathecally. Hyperbaric bupivacaine 0.75% 1.6ml, fentanyl 15 mcg and morphine 0.15mg was administered in divided doses, with additional 0.5ml bupivacaine 0.75% required to achieve a T4 sensory level. The procedure was uneventful. The catheter was left in situ postoperatively but inadvertently became dislodged.

Severe postdural puncture headache (PDPH) developed on POD1. Conservative measures failed. The chronic pain service successfully performed fluoroscopic guided epidural blood patch (EBP, 30ml) at L5/S1 on POD3 in the prone position, with headache resolution.

**Discussion:** Fluoroscopically guided EBP was sought due to the severe deformity and difficult neuraxial procedure (Fig). L5/S1 was selected, being the widest interlaminar space and least affected by inability to flex and by arthritic and degenerative

changes. X-Ray imaging revealed difficulty interpreting vertebral levels, the original insertion appearing higher than L3/4.

Neuraxial needle insertion at L5/S1 (Taylor approach) has been advocated in the setting of difficult anatomy and we now think that this interspace should have been considered as our primary approach. The dural sac extends to at least S2, [3] making spinal anesthesia feasible. A single shot spinal risks inadequate spread above the lumbar curve so CSE may be prudent, given uncertain intrathecal dosing with short stature and severe spinal deformity.[4]



Figure: A-Postero-anterior & B-Lateral X-Rays lumbar spine during fluoroscopy-guided epidural blood patch

Peripartum cardiomyopathy and operating room placement of sheaths for extracorporeal membrane oxygenation prior to Cesarean delivery in a morbidly obese parturient

Presenting Author: Terry James Biel, MD MBAPresenting Author's Institution: University of Colorado Health - Denver, ColoradoCo-Authors: Cristina Wood, MD MS - University of Colorado Health

INTRODUCTION: Cardiovascular conditions are a leading cause of pregnancy-related mortality in the United States[Peterson]. A broad differential and pre-delivery optimization are vital to reduce maternal morbidity and mortality, including interdisciplinary coordination and advanced anesthetic interventions.

CASE: A multiparous patient with body mass index 60, history of cesarean delivery (CD), and family history of cardiomyopathy and early cardiac death was admitted at 36 3/7 weeks gestation with pre-eclampsia with severe range blood pressures and acute decompensated heart failure meeting New York Heart Association class IV criteria, including pronounced orthopnea.

On admission, she was in sinus tachycardia and had left ventricular ejection fraction of 20% on transthoracic echocardiography, with normal right ventricular systolic function and no valvulopathies. She met Modified World Health Organization Pregnancy Risk Classification group IV criteria, with an estimated cardiac event rate greater than 27% [ACOG]. She received an arterial line, diuretics, antihypertensives, and levetiracetam.

On hospital day 2, her orthopnea resolved but her hypertension worsened, requiring nicardipine infusion, and she was indicated for CD. An epidural catheter and large bore peripheral intravenous access were placed. Cardiothoracic surgery placed vascular sheaths in the operating room prior to delivery, and remained on standby for veno-arterial extra-corporeal membrane oxygenation.

Uncomplicated CD proceeded under epidural block, with delivery of a vigorous neonate followed by tubal ligation. Oxytocin was given as a 2 u/2 mL bolus followed by a controlled infusion of 5 u/hr. Quantitative blood loss was 800 mL. She was diuresed during the case and transitioned from nicardipine to low-dose norepinephrine.

Further diuresis was held overnight. On post-operative day (POD) 1 she had flash pulmonary edema requiring bilevel positive airway pressure, aggressive diuresis, and afterload reduction. She was discharged POD 8 on room air and with guideline-directed medical therapy. She was seen in cardiology clinic a few weeks later, where her symptoms met NYHA class II criteria, and was ordered for further imaging, but has since been lost to follow-up.

DISCUSSION: The underlying etiology of heart failure significantly influences its management but is challenging to elucidate in parturients. Etiologies may compound one another, such as worsening pulmonary hypertension secondary to pulmonary edema, hypoxemia, and hypoxic pulmonary vasoconstriction. Interdisciplinary coordination is crucial to management and ensuring indicated interventions.

# Complete Heart Block Mimicking Seizures in Parturient with Severe Features of Preeclampsia

Presenting Author: Hebah Ismail, MD Presenting Author's Institution: NYU Grossman School of Medicine Co-Authors:

#### Introduction

Management of parturients with severe features of preeclampsia (PreE SF) includes magnesium (Mg) boluses and infusions for eclamptic seizure prophylaxis.¹ However, Mg toxicity can lead to heart block. There are reports of heart block presenting as seizure-like activity.² In a parturient with PreE SF, it can be difficult to distinguish between eclamptic seizures and Mg-induced heart block mimicking seizures. I present a case of heart block presenting as seizure-like activity in a parturient with PreE SF on Mg.

#### **Case Report**

A 37-year-old G4P1201 parturient presented at 33weeks gestation with nausea, vomiting and sharp abdominal pain. Her history was complicated by anti-phospholipid syndrome, on enoxaparin.

Upon admission, she was noted to have severe range blood pressures requiring treatment with labetalol. Her urine protein-creatinine ratio was 0.87. She was diagnosed with PreE SF and started on a Mg infusion. Her Mg level was 6.0 mg/dL after 7 hours and the Mg infusion was turned off 2 hours later. Shortly after, the patient complained of feeling nauseous then her eyes were noted to roll into the back of her head and her arms shook. The episode lasted for 10 seconds. The OBs suspected eclamptic seizure, restarted the Mg infusion and began to induce labor.

Six hours later, a labor response code was called for 2 more witnessed episodes of seizure-like activity that lasted for 10-20 secs with associated emesis and confusion. The Mg infusion was continued and she was taken to the operating room for emergent cesarean delivery under general anesthesia given emesis and confusion. Delivery was uneventful but emergence was complicated by 2 episodes of complete heart block and associated desaturation. Patient was transferred to the ICU intubated with a propofol infusion; video EEG and telemetry were started. The patient had 2 further episodes of eyes rolling back and shaking of arms with complete heart block on ECG and no seizure activity on EEG. Mg was discontinued and the patient did not have any further episodes of heart block or seizure-like symptoms. She was discharged home on hospital day 5.

#### Discussion

In PreE SF, Mg infusions are routinely started. Mg toxicity can lead to heart block, usually at Mg levels above 10 mg/dL. Heart block can present as seizure-like activity with eyes rolling and rhythmic movements of the upper extremities. This patient developed heart block at therapeutic Mg level of 6 mg/dL, which presented as seizure-

like activity, leading to the incorrect diagnosis of eclamptic seizures. Episodes of heart block only resolved once the Mg infusion was discontinued and her Mg levels normalized. This case highlights the importance of recognizing true seizures versus seizure-like activity from heart block in parturients on Mg infusions for PreE SF.

### Arterial Ischemic Stroke in a Parturient with History of Migraine Headaches

Presenting Author: Nicole Dayton, MD Presenting Author's Institution: University of Michigan Co-Authors:

Background: Arterial ischemic stroke (AIS) in pregnancy is a serious, life altering complication that may present with atypical symptoms. Most commonly presenting in the third trimester and early postpartum period, the incidence of maternal stroke is approximately 30 in 100,000 pregnancies.1 Hypertensive disorders of pregnancy and cardiac dysfunction increase the risk of AIS, and in women diagnosed with preeclampsia, stroke represents 40-70% of maternal mortality. We describe the management of acute-onset AIS presenting for cesarean delivery due to breech presentation.

Case: A 35-year-old G3P1112 at 33 3/7 weeks gestation with a history of migraines presented to the ED with a persistent headache following resolution of a prior migraine, altered mental status, left-sided facial numbness, and left homonymous hemianopsia. On presentation, vital signs were notable for HR 89 and BP 159/94 with repeat BP readings remaining elevated. Laboratory work was significant for troponin < 0.01 ng/mL, hemoglobin 10.3 g/dL, and platelets 330,000/mcL. Head MRI revealed an acute right posterior cerebral artery infarct (Image 1) without evidence of hemorrhagic conversion. Upon imaging completion, the patient noted improvement of her headache and sensory symptoms despite a persistent left visual field deficit. She was diagnosed with preeclampsia with severe features, started on a magnesium infusion, and the decision was made to proceed urgently for cesarean delivery.

Given the patient's clinical status, improving neurologic symptoms, and recent imaging, spinal anesthesia was performed without complication. Intraoperative blood pressure goals were set to systolic BP 140-160 and maintained via phenylephrine infusion and noninvasive blood pressure measurements. She recovered well without complication and was discharged home on postpartum day 6 in stable condition.

Discussion: Our case highlights several anesthetic considerations for the management of acute stroke in pregnancy. Studies suggest that patient's with known intracranial pathology in the absence of symptoms or imagining suggestive of increased intracranial pressure (ICP) may safely undergo neuraxial anesthesia. Our patient had no signs of impending herniation or increased ICP, and in the absence of recent anticoagulation, a neuraxial anesthetic was felt to be safe and preferable. Furthermore, permissive hypertensive was allowed intraoperatively to further support intracranial and uteroplacental perfusion.

Stroke recognition was complicated by the patient's history of migraines and initial resolution of symptoms, however her symptomatology prompted further investigation leading to a timely diagnosis and treatment. Given training in intensive care, it is important to remember the role of the anesthesiologist in recognition of key pregnancy related stroke symptoms as rapid recognition and management is vital to improve long term outcomes.

## Atypical Case of Delayed Onset Postpartum Eclampsia

**Presenting Author:** Guillermo Loyola, Osteopathic Student - OMS-III **Presenting Author's Institution:** Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine, Davie, FI,

**Co-Authors:** Michael Minichiello, DO - Palmetto General Hospital William Perez, MD - Palmetto General Hospital

**Introduction:** Late postpartum eclampsia is a rare event characterized by the occurrence of seizures 48 hours after delivery.¹ It is commonly associated with women who have had preeclampsia or eclampsia during pregnancy.² However, although infrequent, it has been reported in women with no previous medical history and uneventful pregnancies.¹ Here we present a case of a previously healthy women with late postpartum eclampsia.

**Case Presentation:** 35-year-old obese female, G7P3A4, was admitted on postpartum day 25 due to altered mentation. Her history is remarkable for 3 preterm live births by cesarean section. The patient was brought by her family due to an acute onset of confusion and bizarre behavior. During the initial assessment she was alert, awake, cooperative, able to answer questions, and follow commands. No history of recent illness or sick contacts. Vitals showed blood pressure 142/69 mmHg. No meningeal signs during the physical exam were noted. Blood work, urinalysis, toxicology, and CT head were unremarkable. The following day she had a tonic-clonic seizure that required lorazepam, fosphenytoin, and propofol for abortion. She was intubated for airway protection and transferred to the intensive care unit. Magnetic resonance (MR) imaging and MR venography was unremarkable. Cerebrospinal fluid (CSF) analyses were not consistent with infectious or autoimmune processes. Electroencephalogram epileptogenic potential in the left parasagittal region. The patient was extubated on day 3 and recovered with no complications.

**Discussion:** Late postpartum eclampsia is a rare condition that can present after 48 hours and up to 6 weeks after birth.¹Refers to the development of seizures commonly associated with signs and symptoms of preeclampsia.² However, in healthy patients with uncomplicated pregnancies the diagnosis remains challenging as eclampsia can occur without clinical or biological evidence of pre-eclampsia.⁴ Nevertheless, risk factors such as preterm pregnancy, multiparity, history of cesarean section, older maternal age, and obesity can provide some context for the patient's symptoms.^{3 4} Still, a thorough medical evaluation, including blood tests and imaging studies, is necessary to determine the underlying cause of the symptoms. It is important for patients and health care providers to be aware of the risk of delayed postpartum preeclampsia and eclampsia and take appropriate action to prevent adverse outcomes.

# Preeclampsia - Eclampsia



# Pregnancy-associated aortic dissection and anesthetic complications in Marfan syndrome

#### Presenting Author: Grace DeSena, BA

**Presenting Author's Institution:** University of Florida College of Medicine - Gainesville, Florida **Co-Authors:** 

#### Co-Autnors:

#### Introduction

Marfan syndrome is a connective tissue disorder that affects many organ systems. Aortic wall weakening and dural ectasia must be considered in the anesthetic management of parturients with Marfan syndrome.

### **Case Presentation**

A 28-year-old G3P2002 with 21-week IUP and Marfan syndrome presented to the ED for chest pain radiating to her back that began during sexual intercourse. CT scan revealed a type III aortic dissection and TTE showed a 5.1 cm aortic root dilatation with severe aortic insufficiency. Her dissection was initially medically managed with labetalol, nifedipine, hydralazine, methyldopa, and clonidine. Cesarean delivery under epidural was performed at 25w 2d due to worsening hypertension from preeclampsia. Six months after delivery, she underwent aortic root and valve replacement.

#### Discussion

A multidisciplinary team is crucial for balancing the maternal-fetal conflict of increased risk of aortic rupture with continued pregnancy versus preterm delivery. Medical management of blood pressure in type III aortic dissections may be more difficult with preeclampsia, and general anesthesia and aortic root replacement carries a significant risk to mother and fetus. Neuraxial anesthesia is the preferred anesthetic management but can be complicated by underlying dural ectasia, seen in 63-92% of patients with Marfan syndrome.¹ Dural ectasia increases the risk for dural puncture and is associated increased risk of incomplete or failed spinal anesthesia.² Moreover, general endotracheal anesthesia may be made even more difficult due to unusual airway anatomy and positive pressure ventilation risks the creation of pneumothorax. While dural ectasia can lead to unintentional dural puncture with an epidural needle, this patient tolerated the procedure well without complications. Ultimately, this complex

scenario needs careful planning and preparation to ensure best outcomes for mother and baby.

# Late onset of Postpartum Posterior Reversible Encephalopathy Syndrome Following Obstetric Hemorrhage

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**Presenting Author's Institution:** General Hospital Sremska Mitrovica - Sremska Mitrovica

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Posterior reversible encephalopathy syndrome (PRES) in pregnancy represents a relatively rare clinical condition which has a complex origin. PRES is characterized by headache, seizures, cortical blindness and altered consciousness and the gold standard for confirmation is magnetic resonance imaging (MRI). Pathophysiologic mechanisms underlying the cerebral alterations have not yet been fully understood, however brain hyperperfusion leads to cerebral edema or vasospasm and infarction (1).

A 37-year old multiparous patient (G4P3) at 38 weeks gestational age with a history of essential hypertension was admitted to the Emergency department with hemodynamic instability, unconsciousness and significant vaginal bleeding. Hypovolemic shock caused by placental abruption was diagnosed and she was immediately transferred to the operating room where an emergency cesarean delivery under general anesthesia was performed and a subtotal hysterectomy due to uteroplacental apoplexy (Syndrome Couvelaire). The subsequent postoperative period was complicated with Clostridium difficile colitis and pyrexia, and despite methyldopa 500 mg TD, on postoperative day 15 the patient's blood pressure was not adequately controlled and visual disturbance occurred. Two days later after a sudden increase in blood pressure, the patient became blind in both eyes, but papilledema was not diagnosed. Computered tomography images of the brain revealed hypodense lesions in cortical and subcortical areas of the parieto-occipital regions (Figure 1), and transcranial Doppler showed accelerated blood flow suggesting vasospasm. The patient was transferred to a tertiary level neurology hospital, and MRI confirmed the diagnosis of PRES. The patient was treated with nimodipine for cerebral vasospasm, benzodiazepines and antihypertensive drugs, and over the subsequent 7 days she improved with minimal visual disturbance.

This case report supports the theory that hypertension is not the main etiology of PRES, however it can be an important trigger. Despite a delayed onset of PRES, hypovolemic shock coupled with infection and release of inflammation factors may have triggered it. The majority of publications report cases of PRES immediately postpartum. Our patient had essential hypertension, and late onset of PRES suggesting that other factors apart from hypertensive vasospasm had an impact.

The risk of PRES may be prolonged in the postpartum period, especially in hypertensive patients with the presence of systemic inflammatory response syndrome. Even in low-resource settings, PRES can be diagnosed promptly and treated effectively.

### **Difficult Airway in Preeclamptic Patient**

Presenting Author: Erica Coffin, MD

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**Co-Authors:** Tarun Ahuja, DO - Allegheny Health Network Zachary C. Drennen, DO - Allegheny Health Network

We present a 28F G1P0 admitted at 33w1d with pre-eclampsia with severe features. BP remained controlled until day 4 when she was consistently > 160/80, thus she was induced for labor. After 28 hours her cervical exam revealed no response to fetal scalp simulation, therefore a C-section was planned. A CBC was obtained upon the beginning of her IOL, however upon collecting a new sample her labs had clotted; thus GETA was deemed appropriate. A RSI was performed and upon first attempt of securing her airway, a video laryngoscope was used. The airway appeared swollen and erythematous, however vocal cords were visualized. Upon insertion of the ETT, the view was obscured by bleeding. We switched providers, and remained unsuccessful. We then mask ventilated and were able to obtain adequate tidal volumes, at which point we informed the OB team to start. Next, we trialed both a regular LMA and an intubating LMA without success. Tidal volumes with mask ventilation were no longer effective and the patient had desaturated to the mid 40s, thus a percutaneous cricothyrotomy was performed. ENT later revised her tracheostomy and a right tonsillar bleed was found, necessitating a right tonsillectomy. The patient was admitted to the ICU during which POD 0 she was liberated from mechanical ventilation. POD 9 her tracheostomy was decannulated and she was discharged POD 10.

The obstetric difficult airway not only occurs more frequently but is also tougher to predict. This plus reduced apnea time, increased aspiration risk, and the urgency surrounding difficult clinical scenarios involving two patients can produce extremely stressful situations for anesthesia providers. Our case shows the risk associated with foregoing neuraxial anesthesia in an obstetric patient. It also shows the importance of making every effort to investigate thrombocytopenia and coagulopathy. Ultimately, the decision to proceed with neuraxial anesthesia is different for each case and should be based on the clinical context as well as risk-benefit ratio. Roughly 12% of obstetric patients will experience thrombocytopenia with 1% experiencing severe thrombocytopenia (< 100k). Additionally, the risk of spinal epidural hematoma with a platelet count >70k is extremely low in the obstetric population. In the case of our patient, her last platelet count was >24 hours ago which coupled with her rapidly worsening pre-eclampsia forced us to proceed with GETA. In the event of a failed intubation, providers should be knowledgeable in the obstetric difficult airway algorithm.

The World Federation of Societies of Anaesthesiologists published a resource that outlines the obstetric difficult airway algorithm.

Emergency cesarean for a patient with atypical hemolysis, elevated liver enzymes, and low platelet syndrome complicated by ruptured subcapsular hematoma

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### Introduction

Hemolysis, elevated liver enzymes, and low platelet (HELLP) syndrome is a rare complication on the spectrum of hypertensive disorders of pregnancy. In the case of atypical HELLP syndrome, hemolysis, elevation in liver enzymes, and decreased platelets can occur before elevated blood pressures.¹ We describe a case of a parturient with atypical HELLP syndrome complicated by ruptured subcapsular liver hematoma that initially presented with heartburn.

## <u>Case</u>

34 yo G2P1001 at 36w1d with a history of anxiety, migraine headache, and hypothyroidism who presented to triage with a chief complaint of heartburn. Of note, her pregnancy was complicated by previous COVID-19 infection and fetal growth restriction. Her heartburn was treated in triage with ondansetron and famotidine without symptomatic improvement. Her blood pressure on presentation was 120/74 mmHg. After approximately 45 minutes, fetal bradycardia developed and the patient was emergently transferred to the OR for cesarean under general anesthesia with delivery of a viable male infant (Apgars 8 and 9 at 1 and 5 minutes, respectively). Transversus abdominis plane (TAP) blocks were performed in PACU for post-operative pain control. Her postoperative laboratory results were concerning for atypical HELLP (platelets 122 x 10⁹/L, AST 434 IU/L, ALT 542 IU/L). Later on POD #0 she developed right upper quadrant (RUQ) pain, that worsened despite TAP block, with symptomatic hypotension; RUQ ultrasound showed a 14 x 7 x 17.9 cm subcapsular liver hematoma. Emergent angiogram was performed demonstrating foci of bleeding in the liver, which was treated with gelatin sponge particle embolization of right and left hepatic artery segmental branches. Her hemoglobin decreased from 12.1 g/dl to 6.1 g/dl requiring 3 units of pRBCs and 1 unit of platelets. Platelet nadir was 70 x10^9/L on

POD #3, two days following capsule rupture. Transaminitis worsened following embolization with maximum AST 2737 IU/L and ALT 3692 IU/L. Following embolization and transfusion she remained hemodynamically stable and was discharged on hospital day #9.

## **Discussion**

The chief complaint of heartburn in a normotensive and otherwise hemodynamically stable parturient at 36w1d is not typically cause for alarm. The initial fetal heart rate tracing was classified as category II and ultimately progressed to category III on further monitoring. General anesthesia for cesarean and post-operative TAP blocks were performed without complication. This report details an unusual presentation of atypical HELLP syndrome complicated by emergency cesarean and eventual need for IR embolization due to large, multifocal subcapsular hematomas. This case further highlights the interdisciplinary management of obstetric related hemorrhage.



## Case Report: Urgent Repeat Cesarean Delivery Due To Preeclampsia With Severe Features In Jehovah's Witness With Decompensated Cirrhosis

Presenting Author: Ling-Qun Hu, MD F.A.S.A

**Presenting Author's Institution:** The Ohio State University - Columbus, Ohio **Co-Authors:** Amar Alnemer, n/a - Ohio State Wexner Medical Center Joanne Du, n/a - Ohio State Wexner Medical Center Qian Fleming, MD - Ohio State Wexner Medical Center Matthew McKiernan, MD - Ohio State Wexner Medical Center Meiqin Zhou, n/a - Ohio State Wexner Medical Center

**Introduction:** Blood products during surgeries are life-saving measures; a Jehovah's Witness (JW) refusal of blood products during surgery can lead to catastrophic outcomes. Management can be extremely complicated if patients have 1) an obstetric history of repeat cesarean deliveries (CD); 2) a history of liver failure and renal insufficiency; 3) inadequate prenatal care and required urgent/emergent care; and 4) unexpected complications associated with delivery care. We present a case in which a Spanish-speaking JW with hypertensive disorders of pregnancy, diabetes mellitus, and multisystem organ failure sought urgent care for her 2nd CD, which was complicated by hypothermia.

**Case Presentation:** This patient was a 40-year-old woman, gravida 5 para 2203, ASA 4, who presented at 36w4d for urgent CD due to preeclampsia with severe features. Past medical history was significant for 1 CD, IUFD, placental abruption, alcoholic cirrhosis complicated by ascites, thrombocytopenia, anemia, hypoalbuminemia, IgA nephropathy with nephrotic syndrome, T2DM, and class II obesity. Due to her religious belief, the patient initially refused all blood products. A blood product refusal consent form was then explained in detail by the anesthesia team. Careful explanation of the consent form prompted her to accept all blood products.

She underwent a repeat low transverse CD, with 2L of ascites drained upon abdominal opening, resulting in significant hypotension. 5% human albumin (1L) and crystalloid (1L) were given in addition to a total of 20 mg ephedrine, with a resolution of hypotension. Her intraoperative blood loss was 279mL. Her post-anesthesia course was complicated by persistent intrathecal opiate-induced hypothermia, with oral temperatures as low as 34.2°C requiring Midazolam 1 mg. A Bair Paws OR Warming Gown was used and replaced with a Bair Hugger machine and a whole-body blanket. After 3 hours in the PACU, her temperature rose to 35.7°C, and she was transferred to the obstetric floor and discharged on postoperative day 5.

**Discussion:** This case created a potentially devastating scenario with a high risk of postpartum hemorrhage due to previous CD, preeclampsia, antenatal anemia, cirrhosis

with thrombocytopenia and ascites, intravascular depletion due to hypoalbuminemia, and persistent intrathecal opiate-induced hypothermia. In addition, urgent care was required, there was a language barrier, and the patient initially refused blood products for postpartum hemorrhage. Proactive perinatal management avoided triggering the devastating cascade of postpartum hemorrhage in a patient with multiple risk factors.

# Unexpected prolonged neuromuscular blockade in an eclamptic patient requiring emergent cesarean delivery

Presenting Author: Kathryn Clark, MB BCh BAOPresenting Author's Institution: BC Women's Hospital and Health CentreCo-Authors: Giselle Villar, MD FRCPC - BC Women's Hospital and Health Centre

Abstract: Neuromuscular monitoring in obstetric patients undergoing general anesthesia is not routinely done as neuromuscular blockade after a single dose of succinylcholine without subsequent use of nondepolarizing neuromuscular blockers will typically resolve at the end of surgery. When only succinylcholine is given, the most recent ASA guideline(1) recommends the use of neuromuscular monitoring to guide extubation when there are clinical signs of delayed recovery. We present a case of a parturient with delayed recovery following an emergent caesarean delivery. Written informed consent was obtained for publication of the case.

Case Report: A 31 v.o. G1P0 female presented at 38.5 weeks' gestation with severe hypertension, headache, and blurry vision. On arrival laboratory studies revealed HELLP syndrome with platelets of 75 x10^9/L and urine protein creatinine ratio of 2859 g/mol. She was initiated on magnesium and nifedipine, and the decision was made to proceed with urgent cesarean delivery. However, prior to transfer to the operating room, the patient experienced a seizure with subsequent prolonged fetal bradycardia. Rapid sequence induction of anesthesia and intubation with propofol and succinylcholine (160 mg) were performed, followed by emergent delivery of the fetus. Maintenance of anesthesia consisted of propofol, remiferitanil and sevoflurane. At the end of surgery and after all anesthetic medications had been discontinued for 20 minutes, there were clinical signs of residual neuromuscular blockade associated with global reduced muscle power, small tidal volumes and mild hypercarbia. Two hours after initial succinylcholine administration, there was still evidence of muscle blockade with peripheral nerve stimulation and the decision was made to obtain neuroradiological imaging. Head CT revealed low-attenuation changes evident in bilateral and subcortical posterior occipital lobes consistent with posterior reversible encephalopathy syndrome. Three hours after initial succinvlcholine administration, the patient met extubation criteria and her endotracheal tube was successfully removed. She was then transferred to the high acuity unit where she was monitored for the next 24 hours. A blood sample was drawn and sent off to measure serum pseudocholinesterase (PChE) activity with results currently pending.

Discussion: There is controversy whether routine peripheral nerve monitoring of neuromuscular blockade should be mandatory following succinylcholine.(2) In our case, the clinical signs were prominent at alerting the anesthesiologist of residual blockade and this was confirmed with peripheral nerve stimulation. In analysis of the underlying etiology, it is possible that the prolonged neuromuscular blockade was associated with a

deficiency of PChE, a result of potentiation of blockade by magnesium and nifedipine, or potentially an intracranial process.

Anesthetic management for cesarean delivery for patient with surgically corrected spina bifida cystica with neurologic deficits and pre-eclampsia

Presenting Author: MADELINE BIRELEY, MD Presenting Author's Institution: UPMC - Pittsburgh, PA - PITTSBURGH, Pennsylvania Co-Authors: Catherine Bergeron, MD - UPMC - Magee Womens Hospital Patricia L. Dalby, MD - University of Pittsburgh Christopher Smith, MD - University of Pittsburgh

#### Introduction

Pregnant people with spina bifida (SB) pose anesthesiology management challenges. SB is a neural tube defect that occurs in utero.¹ Although pregnant patients with SB can deliver vaginally, these patients are more likely to undergo cesarean delivery than those without SB (OR 1.2; 95% CI [1.1-1.3]).² Complex spine anatomy makes neuraxial techniques challenging or unreliable, with some clinicians avoiding neuraxial anesthesia altogether.³ Others judge that pre-existing neurologic deficits may obviate concerns regarding direct cord injuries. This case report reviews management of a patient with SB and complex spinal and abdominal anatomy undergoing cesarean delivery for pre-eclampsia.

#### Case

A 31-year-old G1P0 presented for induction of labor for pre-eclampsia without severe features. She had SB with L1 myelomeningocele status post repair, hydrocephalus status post ventriculoperitoneal shunt, neurogenic bladder, incontinence with vesicostomy, and scoliosis. Her spinal anatomy was complicated by low lying conus terminating at L4-L5 level, as well as severe thecal sac narrowing at L4-L5 and L5-S1 level (Fig 1). After shared decision making with the patient, neuraxial labor analgesia by an experienced anesthesiologist was offered and requested by the patient. Despite uncomplicated placement, epidural analgesia failed: she had ongoing pain not responsive to supplemental medications upon foley bulb placement. She and the clinical team decided to abandon labor induction in favor of primary cesarean delivery due to failed induction of labor. Coordination with urologists was made due to anticipated complex abdomen. General endotracheal anesthesia was induced with uneventful video larvngoscopy intubation. Given location of vesicostomy preventing Pfannenstiel incision, a primary classical cesarean delivery was performed via a supraumbilical midline incision. Intraoperative course was uneventful with 700mL estimated blood loss. Bilateral transversus abdominus plane blocks were done for postoperative pain control. She was extubated and transferred to post-anesthesia care in stable condition. Postpartum course was uneventful.

### Conclusion

Given complex anatomy and potential neurologic complications, patients with SB can pose perioperative challenges during obstetric care and delivery. Pregnant patients with SB benefit from prenatal neuraxial imaging and anesthesiology consultation, specifically to evaluate for tethered cord and conus termination level. Shared decision making is essential when making decisions about neuraxial techniques and delivery planning. However, contingency planning for a cesarean delivery under general anesthesia with a multidisciplinary team is also critical given care complexity and higher rates of failed neuraxial anesthesia.



Figure 1. Sagittal lumbosacral MRI without contrast of this patient. Arrow indicates termination level of the conus medullaris.

## Perioperative management of caesarean delivery for patient with alcoholic cirrhosis and esophageal varices

Presenting Author: MADELINE BIRELEY, MD Presenting Author's Institution: UPMC - Pittsburgh, PA - PITTSBURGH, Pennsylvania Co-Authors: Catherine Bergeron, MD - UPMC - Magee Womens Hospital Patricia L. Dalby, MD - University of Pittsburgh Christopher Smith, MD - University of Pittsburgh

#### Introduction

Pregnant patients with cirrhosis are rare. Severe hepatic disease in pregnancy poses potential risks including bleeding from esophageal varices, hepatic encephalopathy, and ascites.¹ Multiple maternal-fetal complications exist including preterm labor, intrauterine growth restriction, and intrauterine death.² Due to these elevated risks, parturients with cirrhosis pose challenges to medical management in labor and delivery. We review the peri-delivery management of a pregnant patient with cirrhosis, Model for End-Stage Liver Disease (MELD) Score 13, whose pregnancy was complicated by intrauterine growth restriction requiring preterm delivery.

#### **Case Description**

A 33-year-old G3P0020 female with alcoholic cirrhosis presented for cesarean delivery after prolonged inpatient hospitalization starting at 25 weeks due to absent end diastolic velocities and fetal growth restriction. She had portal hypertension and esophageal varices, chronic pancreatitis, gestational diabetes mellitus, hypertension, and systemic lupus erythematous. She had cesarean delivery at 28 weeks and 5 days gestation due to fetal decelerations and low biophysical profile with reversed end diastolic flow. Blood products were readily available, and large bore intravenous access was achieved preoperatively. She received single shot spinal anesthesia with bupivacaine and intrathecal morphine, and intraoperative course was uncomplicated with estimated blood loss of 800mL. Postoperatively, bilateral single shot transversus abdominus plane blocks were performed for pain management. On post-operative day 6, she developed confusion and elevated ammonia, concerning for hepatic encephalopathy, and patient was started on lactulose. She was discharged on post-operative day 7 with improved mental status.

### Discussion

Given increased likelihood of complications from pregnancy and delivery (Table), prenatal care should include consultation with anesthesiology early in pregnancy. Vaginal delivery carries risks for variceal hemorrhage due to valsalva maneuvers, whereas cesarean delivery carries risks for complicated anatomy and bleeding from superficial abdominal varices. Coagulation status, eligibility for neuraxial anesthesia, and the risks and benefits of either mode of delivery, including the potential need for massive resuscitation and blood transfusion, should be assessed and discussed with the patient and care teams. Patients are also at risk of developing cardiovascular complications such as cardiomyopathy and high output heart failure, and anticipation of volume shifts is critical in these patients. Pregnant patients with cirrhosis are high risk for peripartum complications and benefit from a multidisciplinary care team including obstetricians, hepatologists, and anesthesiologists.

Table. Interactions between pregnancy and cirrhosis physiology including anticipated complications in labor and delivery.

Complications from cirrhosis	Implications in Pregnancy
Esophageal varices	Expected to worsen in pregnancy due to increases in circulating volume, venodilation, portal flow changes with diversion of blood through azygous venous system and reflux esophagitis
Bleeding	Bleeding risk increased as well due to increases in effective circulating volume, dilutional thrombocytopenia compounding thrombocytopenia from splenic sequestration and reduced hepatic production of thrombopoietin, intraabdominal pressure and can be exacerbated by valsalva maneuvers in the second stage of labor. Worsening hepatic synthetic function also exacerbates these risks.
Ascites	Expected to improve with pregnancy due to increased intraabdominal pressure and the gravid uterus opposing extravasation from the splanchnic system.
Encephalopathy	Risk for encephalopathy does not seem to be greatly impacted with pregnancy. The risk for worsening hepatic function in pregnancy can increase risk for encephalopathy.
Anemia	Worsens in pregnancy as these patients often have anemia of chronic disease, which can become compounded by dilutional anemia of pregnancy with increased plasma volume
Thrombocytopenia	Portal hypertension worsens in the second trimester due to increased circulation volume and pressure from the uterus compressing the inferior vena cava. Worsening portal hypertension can result in worsening hypersplenism.
Cardiovascular Manifestations	Due to increases in heart rate, cardiac output, and plasma volume, as well as a decrease in systemic vascular resistance, pregnancy results in hyperdynamic circulatory state. These changes can also be seen in cirrhosis; thus, patients can develop high output heart failure. Risk is highest immediately after delivery, when rapid uterine involution results in autotransfusion of uterine circulating volume and rapid increase in preload.
Hepatic Decompensation	Increased risk of decompensation and failure. A MELD score of 10 or greater predicted liver-related complications with 83% sensitivity and specificity, whereas MELD scores less than 6 predicted positive outcomes with least complications.

## Program Material Friday, May 5, 2023

#### Case Reports & Research Abstracts #2 (breakout rooms)

Room 1 - Uterotonics, PPH & PAS

- Room 2 Neuraxial Anesthesia For Cesarean Delivery
- Room 3 Cardiac & HTN
- Room 4 Teams, Communication & Education
- Room 5 Vasopressors, Hypotension, Neonatal Outcomes
- Room 6 Postpartum Recovery and Depression
- Room 7 Racial & Ethnic Disparities/ Ethics

## Opening Remarks

Amy Lee, MD & Ashraf Habib, MD

#### Gertie Marx Research Competition (main stage)

Moderator: Brian Bateman, MD Panelists: Brendan Carvalho, MD, Ruth Landau, MD, Jill Mhyre, MD, Arvind Palanisamy, MD, Paloma Toledo, MD, Cynthia Wong, MD

#### **Concurrent Sessions**

#### Oral Research Presentations #1 (main stage)

Fred Hehre Lecture Introduction: Medge Owen, MD Speaker: Vernon Ross, MD

#### **Concurrent Sessions**

#### Sol Shnider Track #1 (main stage)

Moderator: Tiffany Angelo, MD

- Personalized v. Protocolization Hans Sviggum, MD & Scott Segal, MD
- Opioid Rx Britany Raymond, MD
- Drug & Equipment Shortages Daniel Katz, MD

#### Research Track #1 (breakout room)

Journal Editor's Panel – From Reviews to Publications Moderator: Ashraf Habib, MD

- How to Provide a Good Review Cynthia Wong, MD
- How to Write the Statistical Analysis Section of your Manuscript Brian Bateman, MD
- How to Utilize Social Media to Disseminate Research Ruth Landau, MD

## Abstract #: FRI-RA- Room 1– Uterotonics, PPH & PAS -01

## Oxytocin vs carbetocin at cesarean delivery in parturients with class III obesity: Double-blind, randomized control, non-inferiority trial.

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### Introduction

Obesity in pregnancy, defined as a body mass index (BMI) above 30 kg/m², has an increasing incidence worldwide, and is identified as a cause of maternal and fetal morbidity, associated with high rates of cesarean deliveries and postpartum hemorrhage (PPH). Class III obesity is defined as BMI above 40 kg/m². The required doses of oxytocin [ED90 (95%CI)] 0.75 IU (0.5-0.93), and carbetocin 68 mcg (95%CI 52-77) in parturients with BMI  $\geq$  40 kg/m² are higher than those with BMI < 40 kg/m² by 2 and 4 times, respectively. [1,2]

This study aimed to demonstrate the non-inferiority of carbetocin 80 mcg against oxytocin 1 IU during elective cesarean delivery in parturients with Class III obesity. We hypothesized that with equipotent dosing, carbetocin would be non-inferior to oxytocin in these patients.

### Methods

This was a randomized double blind, non-inferiority study. We enrolled non-laboring fullterm parturients with a BMI  $\geq$ 40 kg/m² without any additional conditions predisposing to uterine atony and PPH, undergoing elective cesarean delivery under neuraxial anaesthesia. Patients were randomized to receive carbetocin 80 mcg bolus followed by placebo infusion or oxytocin 1IU bolus followed by infusion of 20 IU in 1000 ml Ringer's lactate. The bolus was diluted to 10 ml with normal saline and administered over 1 min, while the infusion was delivered at 125 ml/h.

The intensity of uterine tone was evaluated by palpation by the obstetrician at 3, 5, 10 minutes from the delivery of the drug, utilizing a verbal numerical rating score (VNRS) scale of 0 (boggy) to 10 (firm). The primary outcome was the uterine tone at 3 min. Secondary outcomes included uterine tone at 5 and 10 min, blood loss, need for additional uterotonic medications and side effects.
To examine the hypothesis, if the upper boundary of the 95% CI for the difference in VNRS between the two groups was less than the predetermined margin of 1.2, non-inferiority of the primary outcome was implied.

# Results

We included 47 women in the analysis. The uterine tone was not significantly different between carbetocin and oxytocin at 3, 5 and 10 min after delivery (Table). The need for additional uterotonics, blood loss and side effects were also not significantly different across study groups. Hypotension was the most prevalent side effect, seen in approximately 25-40% women. The blood loss was similar between groups, but the calculated blood loss was approximately twice that of estimated blood loss.

# Discussion

In parturients with Class III obesity, when used in equipotent doses, carbetocin is noninferior to oxytocin for adequate uterine tone at elective cesarean delivery. The single shot administration of carbetocin provided equivalent intensity and duration of adequate uterine tone, as demonstrated by similar requirements for additional uterotonics in the post-operative period.

Table 1.pdf

# Relevant Factors Associated with Post-Partum Hemorrhage in a Rural Medical Center

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#### Introduction

Postpartum hemorrhage (PPH) is a severe complication of pregnancy, affecting approximately 14 million women a year¹, is a major cause of maternal mortality worldwide, and accounts for 20% of cases of maternal deaths². Prevention of PPH remains a challenge. Risk factors for PPH include high infant birthweight, induced labor, chorioamnionitis, and multiple gestations, which are well-established. However, these risk factors have only moderate positive predictive value for PPH and hence have limited clinical value⁶. The aim of this study was to investigate causative factors of the increasing PPH rate at our institution.

#### Methods

After Investigative Review Board (IRB) approval, a retrospective electronic medical record review was performed over 20 months comparing parturients diagnosed with PPH to parturients without a diagnosis of PPH. Variables analyzed in the electronic medical record included admission source, admission status, and discharge status. Demographic data was also incorporated, including age, race, and ethnicity. Other variables analyzed included day of week, primary payer, relative expected mortality, relative expected length of stay (LOS), Intensive Care Unit (ICU) LOS, observed charges, procedure physician, ordered blood tests, imaging, laboratory analysis, and pharmacy medications. Descriptive statistics included frequencies and percentages for categorical data and mean and standard deviation for continuous variables. The Chi-square test was used for nominal data and *t*-test for interval data with a p < 0.05 being significant.

#### Results

From February 2020 through October 2021, there were 1367 controls versus 255 patients with post-partum hemorrhage (PPH). No differences were noted with respect to week day, admission source, emergency room patients, admission status, length of stay, demographic data (age, race, ethnicity), ICU LOS, diagnostic imaging, and discharge status. However, differences were noted with respect to primary payer (p = 0.0007), relative expected mortality (p < 0.0001), relative expected LOS (p = 0.0002),

charges (p = 0.016), direct cost (p = 0.043), blood tests (p = 0.004), laboratory (p = 0.006), pharmacy (p < 0.0001) and procedure physician provider (p < 0.0001).

#### Conclusion

The increased cost associated with a woman experiencing PPH is multifactorial. This increased cost can be a burden on women and should push us to further study and implement preventative strategies including increased awareness for parturients with commercial insurance and revision of institutional PPH treatment protocols.

# Anaesthetic Management of Placenta Accreta Spectrum in a UK tertiary centre: A cohort study of 34 cases.

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### Introduction

Placenta accreta spectrum (PAS) is a broad disorder ranging from an adherent placenta to invasion of adjacent organs by placental tissue. It is major contributor to maternal morbidity, causing postpartum haemorrhage and peripartum hysterectomy. The prevalence of PAS is up to 1:300 pregnancies [1] with increasing incidence [2]. Optimal anaesthetic management is an area of ongoing debate [3].

#### <u>Methodology</u>

Ethics approval was obtained and data were retrospectively gathered from patients with PAS who delivered at a tertiary London hospital between 2009-2022. Records were searched for demographics, anaesthetic and surgical interventions, blood product use and postoperative course.

# <u>Results</u>

Thirty five patients were identified; 1 was excluded due to incomplete data. Patients had a mean age (SD) of 36 (4.6) years, mean

body mass index (SD) of 29 (6.9) kg.m⁻² and mean gestation (SD) of 35+0 (1.0) weeks. Risk factors included mean prior caesareans (range), 1.7 (0 - 4), uterine surgery in 24%, pre-eclampsia and hypertension in 3%, whilst smoking occurred in 12%.

Accreta was present in 74%, increta in 12% and percreta in 15%. 76% of patients had elective surgery. A neuraxial approach was used in 94%. Of these, 73% were combined spinal epidurals, spinals 9%, epidurals 9%, dural puncture epidurals 6% and spinal and thoracic epidural 3%. Conversion to general anaesthetic was necessary in 12%.

Mean (range) blood loss was 2.9 (0.5 - 7.0) L. Transfused products included mean red cells (range) 2.2 (0 - 8) units, mean fresh frozen plasma (range) 2 (0 - 6) units, mean platelets (range) 0.16 (0 - 1) pools and mean cryoprecipitate (range) 0.54 (0 - 3) pools. A cell saver was employed in 48% of cases with a mean volume (range) of auto-transfusion of 230 (100 - 900) mL.

Balloon catheters were inserted in 55% and inflation occurred 76% of the time. Embolisation was required in 32%. The mean (SD) (range) length of surgery was 180 (52 - 360) min. Hysterectomy was performed in 44%, subtotal hysterectomy in 3% and the uterus was conserved in 53%. 91% of patients were transferred to the birth centre high dependency unit postoperatively, however 6% required intensive care admission. The mean postoperative stay (SD) was 5.6 (3.0) days. Complications occurred in 9% of patients including ileus, collections and radial nerve injury.

#### **Discussion**

The sole use of regional anaesthesia for PAS in 94% of cases supports the safety of this approach and is higher than comparable data [3]. Low rates of complication and critical care admission are attributable to meticulous planning and streamlining services provided by a multidisciplinary accreta team. The benefits of this approach have been recognised by NHS England which has commissioned our hospital as one of ten specialist centres in the UK for patients with PAS.

### Development and Validation of a Prognostic Model for Postpartum Haemorrhage

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#### Introduction

Postpartum haemorrhage (PPH) is a leading cause of direct maternal mortality and morbidity. However, it is difficult to predict and many women without risk factors experience severe PPH. There are currently no widely accepted prognostic tools as they either perform poorly, are specifically focused on certain patient subgroups, or require non-routine clinical investigations or biomarkers and thus not generalisable. By using readily available patient information, we constructed a prognostic tool to predict the risk of PPH in the general obstetric population.

#### Methods

We created a prediction tool using risk factors obtained from a literature search.¹ Odds ratios of individual risk factors identified were converted to regression coefficient weights based on methods described by Moon *et al.*² These weights were adjusted by consensus between the authors and integer scores were ascribed to each risk factor according to their weights. We validated our tool in a retrospective cohort of women who gave birth at a London tertiary hospital from 1st January 2021 to 31st December 2021. Receiver operator characteristic (ROC) curve analysis was used to assess the discrimination performance of our tool in this cohort. Calibration of the score was assessed by plotting estimated probabilities of PPH against PPH scores. We assessed the performance of our tool in predicting three definitions of PPH: ≥500ml, ≥1000ml and ≥1500ml blood loss. Data analysis was performed using R version 4.1.1.

#### Results

6334 women were included in the validation of our risk score. Of the women in our study, 49.9% experienced  $\geq$ 500ml blood loss, 15.1% had  $\geq$ 1000ml blood loss and 5.3% had  $\geq$ 1500ml blood loss. Overall, the median (IQR; range) blood loss for all patients was 460ml (300-750ml; 0-8000ml). The median (IQR; range) risk score was 2 (1-3; 0-12). The Area Under the ROC Curve (AUC) achieved by our risk prediction tool was 0.719

(95% confidence interval [CI]: 0.707-0.731) for predicting ≥500ml blood loss; 0.661 (95% CI: 0.644-0.678) for ≥1000ml; and 0.661 (95% CI: 0.633-0.689) for ≥1500ml.

# Discussion

Our PPH risk score performed moderately well for predicting postpartum bleeding over a range of definitions for PPH. The development of such a tool facilitates risk stratification and aids management of women at risk of PPH, potentially improving outcomes for both mother and child. Further research will look at increasing the performance of the score through adjustment of score weights and assessing changes to clinical care through implementation of the score in practice.

Figure1.pdf

# Placenta Accreta Spectrum with conservative management: Leaving Placenta In Situ (LPIS)

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**Background:** Placenta Accreta Spectrum (PAS), refers to the range of pathologic adherence of the placenta. The generally accepted approach to PAS is cesarean hysterectomy(C-Hyst) after delivery of the fetus. However, higher maternal morbidity and mortality can occur because of severe hemorrhage, requiring massive blood transfusion. LPIS involves a lower rate of maternal morbidity and can help women who desire future fertility, avoid hysterectomy.

**Cases Presentation:** LPIS consists of delivery of the baby, followed by closure of the uterine cavity with LPIS and waiting for its complete spontaneous resorption. This is a series of 11 patients with PAS managed by LPIS at our institution. Gestational Age at delivery ranged from 32 to 36 weeks. 5 out of 11 patients underwent Uterine Artery Embolization (UAE) after delivery of the fetus. During CD, the average blood loss was 650 mL (range: 200–1.000 mL). Median time to resolution of PAS was 18 weeks. The uterus was successfully preserved in six (55%), hysterectomy was performed in 5 (45%) patients. The anesthetic approach used involved providing neuraxial anesthesia (Combined Spinal-Epidural) with a regular spinal dose of bupivacaine (10-12mg) and opioids (fentanyl 15 Micra + morphine 0.15mg) for delivery of the fetus via CD, with no attempt at placenta removal. After delivery of the fetus, the bleeding was assessed and the decision made to either start closing or perform UAE &/or hyst. In the event of significant bleeding, General Anesthesia was unavoidable in order to provide patients' comfort and ensure safety. The patient was induced via RSI with propofol, fentanyl and neuromuscular blocker, and intubated after the fetus was delivered. All patients had 4 PRBC:4 FFP:1plt on hold. At the end of the procedure, patients received post-operative (post-op) pain management and were followed-up for 72 hours. We observed that hospitalized patients who had undergone PAS conservative management seemed to experience more pain as compared to those undergoing regular C-Hyst. Higher pain scores were noted in the immediate post-op period until 48h post-op. With the conservative approach, anesthetic goals shifted to focus significantly on optimal post-op pain management. To that purpose, some patients had the epidural left in place for 48h, and others received Quadratus Lumborum blocks/ catheters at the end of the procedure, after catheter removal. Both groups received a continuous, pure local anesthetic infusion (0.1% ropivacaine) through their respective catheters.

**Discussion:** LPIS may be an appropriate management strategy for carefully selected and counseled patients with PAS. Four patients had subsequent pregnancies with live births at or near term. With proper pre-op counseling, careful anesthetic and pain management, LPIS may be the future for preserving fertility.

#### Antithrombotic Management and Bleeding Complications Among Pregnant Patients with Atrial Fibrillation and Atrial Flutter: A Retrospective Cohort Study Using the Premier Database

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### Introduction

Atrial fibrillation/atrial flutter (AF) are the most common pregnancy-associated arrhythmias and the prevalence of AF is increasing.¹ The CHA₂DS₂-Vasc Score predicts stroke risk in patients with AF and is used to determine when patients should initiate antithrombotic agents.² Guidelines for the management of AF during pregnancy recommend using the CHA₂DS₂-Vasc score to guide antithrombotic management as there is no pregnancy specific guideline.³ The prothrombotic state of pregnancy and the risk of obstetric bleeding add additional complexity to the risk-benefit discussion of starting antithrombotic medications in pregnancy. The objective of the study was to determine if there is a difference in bleeding and stroke events among patients managed with different antithrombotic agents.

#### Method

A retrospective cohort study was conducted using the Premier inpatient administrative database. Patients who had vaginal or cesarean delivery between 2016-2020 and a diagnosis of AF were included. The exposure of interest was antenatal use of antithrombotic medication: enoxaparin/heparin, apixaban/rivaroxaban, warfarin, aspirin, or 2 or more antithrombotic agents. Odds ratios were estimated from logistic regression and reported with associated 95% confidence intervals. The primary outcome was the rate of bleeding events (intracranial hemorrhage, gastrointestinal or obstetric bleeding) during delivery hospitalization. The secondary outcome was stroke during delivery hospitalization.

# Result

There were 4,789,673 deliveries during the defined timeframe. Of those, 1160 had a pre-existing diagnosis of AF (prevalence 24/100,000). Antithrombotic medications prescribed in the cohort were enoxaparin (20.8%), aspirin (9.6%), heparin (8.5%), warfarin (2.2%), apixaban (0.8%), rivaroxaban (0.6%), and 2 or more antithrombotic

agents (6.4%). No antithrombotic agent was used in 69% of the cohort. Aspirin was not associated with a bleeding event (unadjusted OR 0.99, 95% CI [0.28, 2.56]). Use of enoxaparin or heparin and use of 2 or more antithrombotic agents were associated with a bleeding event (OR 1.83 [1.16, 2.89]) and (OR 2.12 [1.09, 4.12]), respectively. There was only one thrombotic stroke event in the cohort, thus the outcome could not be compared across groups.

### Discussion

Use of anticoagulants was associated with increased bleeding events. Risk of bleeding was highest with use of 2 or more antithrombotic agents. There was no association between bleeding events and aspirin use. Risk of stroke appeared to be low with all regimens or no antithrombotic therapy. Further longitudinal studies will need to be performed to see if antithrombotic therapy mitigates risk of thromboembolic or bleeding events outside of other indications for anticoagulant therapy such as rheumatic disease, left ventricular dysfunction, and prior embolic or thrombotic event.

Aim 3 Figure.pdf

### New insights into placental NAD⁺ handling

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Nicotinamide adenine dinucleotide (NAD⁺) is an important redox cofactor and signaling molecule, regulating a wide variety of cellular processes including metabolism, inflammation, circadian rhythm, and the stress response among others. In many systems, cellular NAD⁺ levels are known to decline with age, contributing to disease susceptibility. Importantly, NAD⁺ is a modifiable target, with growing evidence for the benefits of NAD⁺ augmentation on renal, cardiac, endothelial, neuronal, and musculoskeletal physiology.(1)

Little is known about NAD⁺ handling in the placenta, but based on its role as a critical player in cellular homeostasis in other systems it is likely central to maintaining placental metabolic health, potentially among other functions.

Our previous work highlighted metabolic dysregulation as a consequence of normal aging in placenta and a stimulus of labor onset(2). Here we hypothesize that NAD⁺ decline may be part of the metabolic dysregulation characterizing aged placenta.

Methods: In this study, we measured placental NAD⁺ via enzymatic assay in 36 specimens collected from healthy pregnancies in mothers requiring cesarean delivery. Further, we isolated placental RNA and used qPCR to measure expression of 5 enzymes representing 3 distinct NAD⁺ synthesis pathways, to explore their correlation with [NAD⁺]. Finally, we isolated primary mouse trophoblasts and measured NAD⁺ synthesis upon supplementation of growth media with NAD⁺ salvage pathway substrate nicotinamide.

Results: We found a significant negative correlation between gestational age and placental [NAD⁺] (p=0.009, Figure 1). Further, we found a significant correlation between placental [NAD⁺] and expression of *NAMPT* (p=0.005), a gene encoding the enzyme which catalyzes the conversion of nicotinamide to NMN in the first step of the NAD⁺ salvage pathway. Our *in vitro* studies demonstrated that supplementation of nicotinamide results in augmentation of trophoblast [NAD⁺], but not in the presence of a pharmacological *NAMPT* inhibitor.

This study creates useful insights into NAD⁺ handling in the placenta, suggesting that placental [NAD⁺] declines with gestational age, and that the placenta appears capable of generating its own NAD⁺, likely primarily through the salvage pathway. Future work

will examine the consequences of NAD⁺ depletion in the placenta, with regard to metabolism and cell signaling. Of further importance, we will examine whether aberrant NAD⁺ handling in the placenta contributes to disease states in pregnancy and whether manipulation of [NAD⁺] can alter cellular states and pregnancy outcomes *in vivo*.

2023 SOAP abstract Figure 1.pdf

# Association of the 0-10 Uterine Tone Score with Uterotonic Administration in Cesarean Delivery

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#### Introduction / Background

Uterine atony is reported in approximately 6% of primary cesarean deliveries (CD) yet no universal, objective measure exists to describe uterine contractile tone.¹ The 0-10 numeric rating scale of uterine tone or 'uterine tone score' (UTS) demonstrates good to excellent interrater reliability and good interrater agreement but its clinical interpretation is unknown.²

#### Objective

This study investigated the association between the UTS and postpartum uterine tone in CD, and the UTS that was most predictive of inadequate uterine tone.

#### **Design and methods**

This was a pilot review of parturients undergoing CD at University of Chicago between December 2021- February 2022. Quota sampling was used to obtain 100 records; data on oxytocin dose and second-line uterotonic drug administration were collected; UTS ratings from 0 to 10 (0=poor tone; 10=excellent tone) were reviewed at 0, 3 and 10 minutes (mins) post-placental delivery. Inadequate uterine tone was defined as the need for escalation in oxytocin dose or second-line uterotonic drug (methylergonovine or carboprost) administration. A logistic regression model was used to assess the association between UTS and uterine tone. ROC (receiver operating characteristic) curves were used to determine the optimal threshold for insufficient uterine tone.

#### Results

One hundred patient charts were reviewed. After exclusion of incomplete data, 87 charts at 0 and 3 mins, and 88 charts at 10 mins were analyzed. Eighty-six patients received regional anesthesia; 2 received general anesthesia. Forty-four underwent elective CD (initial oxytocin dose of 300mU/min), and 44 underwent intrapartum CD (initial oxytocin 600mU/min); 27 patients required an escalation in oxytocin dosing while 13 received a second-line uterotonic and increased oxytocin. Mean (SD) UTS at 0, 3 and 10 mins were 6.7 (1.8), 7.1 (1.8) and 8 (1.7). For every 1-point decrease in uterine tone, the odds ratio (95% CI) for uterine atony increased by 0.5 (0.36, 0.69), 0.34 (0.21, 056) and 0.52 (0.36, 0.75) at 0, 3 and 10 mins respectively (p< 0.0001). Cut-point scores of 5, 7 and 8 mins had the highest probability (95%CI) for inadequate tone [0.62 (0.483; 0.757), 0.474 (0.342; 0.606) and 0.466 (0.349; 0.582)] at 0, 3, 10 mins

respectively, based on Youden's J Statistic. There was no significant difference in the predictive values at each time point. ROC curves (Fig 1) demonstrate AUCs of 0.785 (0 mins), 0.835 (3 mins) and 0.718 (10 mins). The results are limited by their retrospective nature.

# Conclusion

These findings indicate that decreasing 0-10 UTS values are associated with increased odds for inadequate uterine tone in CD, with very good discriminatory power whether measured at 0, 3 or 10 mins post-placental delivery. Further study is needed to define the utility of the UTS in guiding uterine atony management.

Image- Uterine Tone Scores in Parturients Undergoing Cesarean Delivery- A Pilot Study.pdf

#### Institutional Comparison of Demographic Variables in Patients Receiving Neuraxial versus General Anesthesia for Cesarean Section

Presenting Author: Yannan Huang, BAPresenting Author's Institution: University of Cincinnati College of MedicineCo-Authors: Ira Hamilton, MD - University of Cincinnati

<u>Background</u>: Neuraxial anesthesia (NA) is the gold standard for cesarean delivery (CD). The use of general anesthesia (GA) is associated with increased maternal and fetal adverse outcomes. Nationally, the estimated GA rate for CD is approximately 6%. [1,2] Our overall rate of GA use for cesarean deliveries ranges from 9-17%. Historically, certain patient demographics have been associated with an increased use of general anesthesia.

<u>Objective</u>: As part of an effort to reduce our GA rates for CD, we sought to understand if specific patient variables differed between patients receiving NA and GA at our institution.

<u>Methods</u>: We conducted a retrospective chart review on patients who underwent CD from January 2021 through December 2022. Patients were identified via monthly data reports. Information collected included race, ethnicity, interpreter status, BMI, ASA class, and OB experience status of anesthesiologist. BMI data was classified into NIH weight ranges. Data analysis was performed using Chi-squared test with a significance level set at 0.05.

<u>Results</u>: Data from 1643 patients with CD performed between January 2021 through December 2022 were analyzed (n=790 in 2021 and n=853 in 2022). GA was used in 17.2% and 14.5% of cases in 2021 and 2022, respectively, with an average GA rate of 15.8%. NA was used in 82.8% and 85.5% of cases in 2021 and 2022, respectively, with an average NA rate of 84.2%.

GA rates were higher when a non-OB experienced anesthesiologist staffed the CD (17% for non-OB vs. 12% for OB experienced, p=0.017).

GA rates were higher for patients in lower BMI categories (p < 0.0001). The rates for patients in underweight, normal, overweight, obese I, obese II, and obese III categories were 50%, 26%, 19%, 16%, 12%, and 12%, respectively.

Increasing ASA status correlated with an increased GA rate. ASA II patients had a GA rate of 14%, ASA III patients had a GA rate of 18%, and ASA class 4 had a significantly increased GA rate of 85% (p< 0.001).

Other variables analyzed did not show a significant difference between groups. In particular, GA rates between racial and ethnic groups did not show a statistically significant difference: among Black patients, 16% underwent GA; among Hispanic patients, 17% underwent GA; among Asian patients, 18% underwent GA; and among

White patients, 15% underwent GA (p=0.67). Patients requiring an interpreter had similar GA rates compared to patients who did not (17% vs. 15%, p=0.17). <u>Conclusion</u>: At our institution, we have found that GA rates are higher in patients receiving care from non-OB experienced anesthesiologists. We also observed increased GA rates in patients with lower BMI range and higher ASA class. We did not find any difference in GA rates among different racial and ethnic groups. This information will help inform our efforts to reduce preventable GA rates for CD.

# Understanding Local Contributors to Maternal Hemorrhage in Cesarean Delivery

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#### Background:

Obstetric hemorrhage is a leading preventable cause of maternal morbidity and mortality. Racial and ethnic disparities in hemorrhage rate and severity have been demonstrated.¹ To improve maternal outcomes, examination of local factors related to hemorrhage is necessary.

Objective: In performance improvement methodology, understanding the problem is the first step to sustainable system change. At our institution, 27% of cesarean deliveries (CD) from 2018-2021 were complicated by hemorrhage. Previous data analysis demonstrated racial and ethnic disparities in maternal outcomes, including hemorrhage. We sought to understand the local contributors to hemorrhage during CD further thus completed a retrospective review of CD with and without hemorrhage. These results will be used to devise interventions to reduce hemorrhage.

#### Setting:

An 800-bed academic Level 4 Maternal Care Center housing a 13 bed Labor and Delivery unit with approximately 2500 deliveries per year and a CD rate of 33%.

#### Methods:

A 36-month retrospective chart review spanning from August 2018 to August 2021 was performed. The inclusion criteria comprised of CD at greater than or equal to 37 weeks gestation of a singleton, non-anomalous fetus in vertex position. The described data extraction yielded a sample of 1,814 hospital records for analysis.

#### **Results:**

Compared to non-Hispanic White women, non-Hispanic Black women had 1.341 times greater odds of obstetric hemorrhage (OR = 1.341, p = .014), Hispanic/Latino women had 1.471 times greater odds of hemorrhage (OR = 1.471, p = .041) and Other racially categorized women had 1.306 times greater odds of hemorrhage (OR = 1.306, p = .132). WHO Obese 3 category patients showed a statistically significant finding with 2.141 times greater odds of obstetric hemorrhage compared to normal weight category patients (OR = 2.141, p = .028). Women reporting previous or current tobacco use had reduced odds of obstetric hemorrhage compared to women without tobacco use history

(OR = 0.75, p = .015). Patients who received anesthesia via labor epidurals or general endotracheal anesthesia (GETA) had increased odds of obstetric hemorrhage (OR = 2.211, p < .001; OR = 3.638, p < .001 respectively) compared to those who received a primary spinal anesthetic. Analyses of patient's age, relationship status, SARS-CoV-2 diagnosis, insurance status, prenatal care initiation, and intrapartum oxytocin administration did not increase odds of obstetric hemorrhage.

#### Conclusion:

At our institution, Non-Hispanic, Black and Hispanic/Latino race, severe obesity, labor epidural anesthetic conversion, and GETA in the setting of CD demonstrate significantly increased odds of maternal hemorrhage. Local providers will be educated about these associations for risk stratification.

#### Quantifying the Accuracy of Clinician Risk Assessment for Postpartum Hemorrhage Lewis AN, Villela Franyutti D, Domenico H, Byrne D, Farber MK, Ende HB

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#### Introduction

Preemptively identifying patients at increased risk of postpartum hemorrhage (PPH) may reduce associated morbidity, as treatment delays correlate with PPH severity.¹ PPH risk has historically been determined by individual provider clinical judgement; however, with over 40 risk factors identified,² cognitive aids or risk assessment tools may provide enhanced risk prediction. Our aim was to measure accuracy of PPH risk assessment performed by unaided individual clinicians, to inform future study and comparison to alternative risk assessment methods.

#### Methods

Following IRB approval and participant written informed consent, we prospectively collected PPH risk predictions from obstetric care team members at two large, tertiary medical centers January-December 2022. Predictions were collected from a convenience sample of vaginal and cesarean deliveries. For each assessment, clinicians quantified a patient's predicted PPH risk (0-100%) and their confidence in the prediction (5-point Likert scale, not at all confident to completely confident). Anticipated mode of delivery at the time of prediction was collected. Medical records were reviewed 24 hours postpartum to assess for the dichotomous outcome of PPH defined as blood loss  $\geq$  1,000 mL. Accuracy of predictions were assessed using area under the receiver operating curve (AUC) with 95% confidence intervals. Differences in predictive accuracy between groups were tested using Delong's test for subgroup comparisons or logistic regression with prediction/variable interactions for full cohort comparisons.³

#### Results

A total of 915 predictions were collected, with 104 (11.4%) experiencing PPH. PPH risk predictions for cesarean delivery (CD) were more accurate than for vaginal delivery (VD) (AUC 0.82 [0.73-0.91] vs. 0.56 [0.49-0.63], p< 0.001). There were no significant differences in prediction accuracy according to physician specialty (obstetrics 0.67 [0.50-0.85], anesthesia 0.69 [0.61-0.78], p=.84) or physician experience level (attending

0.66 [0.56-0.75], trainee 0.76 [0.65-0.87], p=.18); however, there was a difference noted between physicians (0.70 [0.62-0.78]) and nurses 0.55 [0.44-0.66]), p =.03. Provider confidence had no effect on the accuracy of the provider predictions (Figure 1).

#### Discussion

We provide baseline data regarding the accuracy of clinicians' assessment of PPH risk, to inform future comparisons with alternative assessment methods. Predictions prior to CD were more accurate than those prior to VD, possibly due to timing of predictions or higher incidence of PPH following CD. Importantly, a clinician's confidence did not correlate with accuracy, suggesting the possibility of overconfidence in inaccurate predictions. Future work is needed to refine how we quantify clinicians' baseline performance of PPH risk prediction and to compare that performance to other risk assessment methods.



# Effect of Tranexamic Acid on Blood Loss during Cesarean Hysterectomy for Placenta Accreta Spectrum Disorder

Presenting Author: Alex Darwish, MD
Presenting Author's Institution: Lom Linda University
Co-Authors: Daniela Karagyozyan, MD - Loma Linda University
Ruofan Yao, MD - Loma Linda University

**Background**: Several trials have investigated the use of intraoperative tranexamic acid (TXA) in reducing postpartum hemorrhage (PPH), need for transfusion, and need for hysterectomy during cesarean section. Few have investigated the impact of TXA on morbidity in cesarean hysterectomy in patients with placenta accreta spectrum (PAS) disorder.

**Objective**: Assess the effect of TXA on blood loss in cases of placenta accreta spectrum disorder.

**Design**: This is a single center retrospective cohort study carried at Loma Linda University, academic institution, tertiary level medical center. Our academic institution has developed into a PAS disorder referral center over the last 5 years. The study includes patients with PAS spectrum disorder who had cesarean hysterectomy in our institution between 2015-2022.

**Patients/Participants**: We identified 116 patients who had a cesarean hysterectomy for placenta accreta spectrum disorder between the years 2015 and 2022. We did not exclude any patients based on comorbidities, obstetric history, or other patient factors. Of these 116 patients, 33 received TXA and 83 did not. We compared basic demographic information between patients in the two groups to ensure that patient factors would not confound our data analysis.

**Main Outcome Measure(s):** The primary outcome of interest was blood loss during surgery. Blood loss was estimated by both quantitative measures and combined surgeon and anesthesiologist assessment. The mean blood loss was compared between the group of patients who received TXA versus those who did not. Secondary outcomes of interest included need for additional uterotonics, post-operative length of stay, total volume, number, and type of transfused blood products. There were no major maternal side effects documented in both groups

**Statistical Analysis Plan:** We performed a number of unpaired T-tests between the group of patients who received TXA and those who did not receive TXA to assess the significance of differences in primary and secondary outcomes. Intraoperative use of TXA in cesarean hysterectomy for PAS disease did not result in statistically significant decrease of blood loss

**Conclusion:** Our data and the statistical analysis indicates that intraoperative use of TXA in cesarean hysterectomy for PAS disease did not result in statistically significant decrease of blood loss. There was no statistically significant difference between our two patient groups in both primary and secondary outcomes. Lack of complications in both groups indicates that TXA administration to patients undergoing cesarean hysterectomy is safe and warranted as a third line medication to prevent PPH.

**Discussion:** Our study was not able to confirm decreased blood loss after TXA administration probably because of several limiting factors: small patient size, retrospective review type, however our data may be of use in future meta-analyses that seek to further investigate this question using patient populations from multiple centers.

Pain during cesarean delivery: a patient-related outcome study assessing the incidence and risk factors for pain and intravenous medication during cesarean delivery

Presenting Author: Jose Sanchez, B.S. Presenting Author's Institution: Columbia University, New York Co-Authors: Kelsey Goldman, Student - Tenafly High School Jean R. Guglielminotti, MD, PhD - Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons Rohan Prabhu, MD, MPH - Columbia University

#### Introduction

The incidence of pain during cesarean delivery (PDCD) remains unclear. Most studies have relied on interventions addressing insufficient analgesia/anesthesia (e.g., neuraxial replacement, intravenous medication (IVM), general anesthesia) to define the rate of PDCD,¹ while very few assessed self-reported pain.^{2,3} We designed this study to assess the incidence of PDCD as reported by patients, IVM administration, and risk factors for PDCD and IVM.

#### <u>Methods</u>

Between May-Sept 2022, all English-speaking patients undergoing a CD under neuraxial anesthesia in an academic tertiary hospital were approached. Within 48 hours of CD, participants responded to a 16-question survey assessing expectations, neuraxial block testing, PDCD and management with IVM. Demographic, obstetric and anesthesia outcomes were extracted from EMR. PDCD was defined when "pain" was reported at the start, during CD or both. The primary outcome was PDCD. Secondary outcome was IVM (at the team's discretion) categorized as: Group 1 = midazolam alone, Group 2 = analgesic combination (midazolam, fentanyl, morphine, ketamine, dexmedetomidine, and combinations of these), Group 3 = non-analgesic adjuvants (diphenhydramine, nalbuphine, propofol, and combinations of these). Conversion to general anesthesia (GA) was recorded. Risk factors for PDCD and IVM were identified using multivariable regression models.

#### **Results**

There were 403 patients enrolled. Of them, 46 (11.5%) reported pain and 127 (31.5%) IVM (Table received 1). The most common IVM administration was the analgesic combination (Group 2). Overall, analgesic medication administration (opioids only or Group 2) occurred in 67/403 (16.6%) patients. There were 7 GAs (1.7%). Risk factors for PDCD were substance use disorder and intrapartum epidural with or without top-ups (Table 2). Risk factors for IVM were self-reported pain, unplanned but not intrapartum CD, longer surgical duration, and epidural with 2 or more top-ups (Table 2). Discussion

In this prospective study including scheduled, unplanned, and intrapartum CD, the rate of self-reported pain was 11.5%, which is lower than previously reported for scheduled cases. Analgesic IVM administration (opioids only or analgesic combination) occurred in

16.6% of patients suggesting that IVM is mostly given with clinical indications (although not all patients reporting pain received analgesics and some received analgesics without reporting pain).

Though testing of the neuraxial block was performed in all cases, it was not associated with self-reported pain or IVM. As previously reported, intrapartum CD was associated with PDCD, though the number of top-ups was only associated with IVM but not with self-reported pain. Further evaluation of pain predictors and how to optimize intraoperative pain medication are needed.

Table - PDCD and IVM - Jan 29.pdf

# Dexmedetomidine for maternal shivering during cesarean delivery: Impact on core maternal temperature

**Presenting Author:** Sagar Patel, MD **Presenting Author's Institution:** Brigham & Women's Hospital **Co-Authors:** Krishna Patel, n/a - Private Noor Raheel, MBChB, MPH - Brigham and Women's Hospital

#### Introduction

Avoidance of maternal hypothermia is a key recommendation of SOAP's Enhanced Recovery After Cesarean consensus statement for the benefits of lower surgical site infection risk, shorter hospital length of stay, and improved Apgar scores (1). While the treatment of maternal shivering with intravenous (IV) dexmedetomidine (DEX) during cesarean delivery (CD) under neuraxial anesthesia is common to promote patient comfort and facilitate monitoring, its impact on maternal temperature is not well defined. Shivering is a heat generating phenomenon, thus we hypothesized that the blunting of shivering with DEX would lead to more hypothermia during CD.

#### Methods

Patients at a single tertiary center who received DEX during CD under neuraxial anesthesia from 10/2021 – 09/2022 were identified. A cohort of controls who did not receive DEX and who had CD under neuraxial anesthesia from a 1-month period (09/2022) was identified. Survey of 12 of our obstetric anesthesiologists affirmed that their use of DEX was used to treat intraoperative shivering when given as the sole agent, but as an adjunct for intraoperative sedation if given in conjunction with propofol. Patients who received both DEX and propofol were therefore excluded. Additional exclusion criteria were greater than 3L of IV fluid administration, blood transfusion, bladder irrigation, and lack of continuous maternal temperature monitoring via our bladder temperature-enabled Foley catheters. Maternal baseline temperature was recorded starting at 8 minutes to allow for equilibration, and subsequent minute-by-minute temperature was captured. Hypothermia was defined as T < 36°C and hyperthermia as T  $\geq$  38°C. Among control and DEX patients that were normothermic at baseline, the proportion with any intraoperative hypothermia and mean time spent hypothermic was compared.

#### Results

After exclusion criteria, stratifying for normothermia at baseline, 117 of 219 DEX and 99 of 196 control patients met inclusion criteria. Intraoperative hypothermia occurred in 55.6% of controls and 21.4% of DEX patients (p < 0.0001). Among patients who were normothermic at baseline and became hypothermic intraoperatively, the proportion of time hypothermic was 45.0% in the control group and 41.4% in DEX group (p=0.654).

#### Conclusion

Shivering, a thermogenic physiologic response, is often unpleasant to the awake CD patient and can disrupt the capture of accurate vital signs. Aside from active warming, DEX has gained popularity as a pharmacologic treatment for maternal shivering. Our findings demonstrate that DEX does not increase the incidence or duration of hypothermia during CD under neuraxial anesthesia in patients who are normothermic at baseline. Closer surveillance and active warming for non-shivering normothermic patients is warranted.

Temperature overlay .pdf

Comparison Between Traditional Seated Position Versus Seated Position with Dorsal Table Tilt on Time to Successful Spinal Placement in Elective Cesarean Deliveries: A Prospective Trial

**Presenting Author:** Thomas R. Gruffi, MD **Presenting Author's Institution:** Mount Sinai West - New City, New York **Co-Authors:** Ghislaine C. Echevarria, MD, M.S. - Mount Sinai West Bryan Mahoney, MD - Mount Sinai West

#### Introduction:

Patient positioning during the anesthetic procedure is critical for proper and easy neuraxial placement. Fisher et al. compared interspinous space width from lumbar spine X-rays from patients in the seated position with and without hip flexion. Mean lumbar interspinous space width at L2-3, L3-4, and L4-5 increased significantly by 7%, 11% and 21%, respectively.¹ Jones et. al investigated the potential to increase the size of the target area for neuraxial anesthesia using a dorsal table tilt. Using an ultrasound on 20 pregnant women, the interlaminar distance was measured at the L3-4 space with expected increases in the mean size of the target area with increasing table tilt.² In a study performed by Shankar et al., a significant positive relationship between interspinous gap and ease of spinal anesthesia was concluded.³ Based on these studies, we hypothesized applying a table tilt of 5 degrees during spinal anesthesia will lead to a shorter procedure time and reduce the number of needle redirections and levels attempted.

Methods:

This was a single site trial. Simple randomization was used to assign patients into one of two study groups. The control group had a spinal technique with no tilting of the table while the experimental group had a 5 degree table tilt. Eligible providers were residents in their second or greater rotation on OB, the OB anesthesia fellow, and attending physicians. Inclusion criteria were full-term parturients having a cesarean delivery that required a single-shot spinal anesthetic. Primary outcome measure was time to placement of block (time from the insertion of the introducer to the recognition of CSF flow through the spinal needle). Secondary outcome measures were the number of redirections and the number of vertebral levels attempted. Aim was to include 40 patients in the cohort.

#### . Results:

Current data is based on 17 patients. No tilt had a median time to spinal space of 23.34 seconds. Tilt had a median time to spinal space of 39.32 seconds (p = 0.181). There were 10 patients requiring 0 redirections, 5 patients requiring 1 redirection, and 2 patients requiring 2 redirections (p = 0.067). All patients had successful placement at 1 vertebral level.

# Conclusion:

At this time, there is no significant difference in timing to placement of spinal needle, number of redirects, or number of vertebral levels attempted. Continued data collection will contribute to these results.

# Time to first recognition of postpartum abnormal sensorimotor deficits following neuraxial anesthesia or analgesia - a retrospective cohort study.

**Presenting Author:** Thomas Yang, BMBS FANZCA **Presenting Author's Institution:** BC Women's Hospital - Vancouver, British Columbia **Co-Authors:** Wee-Shian Chan, MD FRCPC - BC Women's Hospital

**Introduction:** Delayed recognition of postpartum peripheral neuropathy may have a negative impact on quality of recovery. Our primary aim was to determine the mean time to first recognition of abnormal sensorimotor deficits in patients diagnosed with postpartum peripheral neuropathy at our institution following neuraxial anesthesia or analgesia. As a secondary aim, we sought to determine the mean time to first ambulation, stratified by mode of delivery.

**Methods:** Following institutional ethics approval, patients with postpartum neurologic deficits following neuraxial placements referred for anesthesiology and/or obstetric internal medicine consultation from 2013-2022 were retrospectively identified using an administrative database. Risk factors associated with postpartum neuropathy (e.g. duration of second stage, maternal BMI), anesthetic technique and obstetric outcomes were collected. The primary outcome was mean time to first recognition of neurologic deficit stratified by modes of delivery (vaginal, instrumental, attempted vaginal to unscheduled cesarean and scheduled cesarean), measured from the time of delivery to the time of neurologic deficit first reported to the anesthesiology team by the patient or nursing staff. Secondary outcomes were mean time to ambulation, measured from time of delivery to first observed ambulation. Descriptive statistics were performed.

**Results:** To date, 50 cases have been reviewed. 44 (88%) patients were diagnosed with peripheral neuropathy. Remaining 6 (12%) patients had full sensory and motor recovery deemed to be related to residual local anesthetic block. The mean (SD) time to first recognition of neurologic deficit for all patients after delivery was 18.0 (13.3) h. When patients with residual local anesthetic block were excluded, the mean (SD) time to first recognition of neurologic deficit was 19.0 (13.9) h. The mean (SD) time to ambulation was 25.4(13.9) h. When stratified by mode of delivery, women who attempted vaginal delivery and required intrapartum cesarean delivery had the longest mean(SD) time to first recognition of neurologic deficit at 21.5 (16.8) h, and longest mean(SD) time to first ambulation at 30.3 (14.8) h.

#### **Discussion:**

Patients at our institution with abnormal neurologic deficits who were subsequently diagnosed with peripheral neuropathy were not recognized until approximately 19 hours post-delivery. A follow-up study is needed to better understand how detection of postpartum neurologic deficits can be made earlier, particularly in women who attempted labor but required intrapartum cesarean delivery.

Time to first recognition of postpartum abnormal sensorimotor deficits following neuraxial anesthesia or analgesia - a retrospective cohort study YANG.pdf

# Comparison of motor block regression times following spinal and epidural anesthesia for cesarean delivery – a retrospective cohort study

**Presenting Author:** Kathryn Clark, MB BCh BAO **Presenting Author's Institution:** BC Women's Hospital and Health Centre **Co-Authors:** Simon Massey, MB BCh, MRCP, FRCA, FRCPC - BC Women's Hospital and Health Centre Luc Saulnier, BA (Hons.), MA - BC Women's Hospital and Health Centre William Shippam, MBChB FRCA FRCPC - BC Women's Hospital and Health Centre

**Introduction:** Prolonged motor block regression following neuraxial anesthesia should trigger a careful review by an anesthesiologist to monitor for serious neurologic complications. The ability to perform straight leg raise (+SLR) 4h after neuraxial anesthesia has been suggested as a time threshold to trigger review.(1) Using this time threshold, we have observed a large number of our patients triggering review following spinal anesthesia, making the review process too labor-intensive and impractical.(2) We sought to characterize motor block recovery times following spinal and epidural anesthesia after cesarean delivery. We hypothesized that the median time to motor block regression is significantly greater than 4h after spinal anesthesia. Methods: This was deemed a quality improvement study and ethics approval was not required. Data from 200 patients receiving spinal (n=100) and epidural (n=100) anesthesia for elective or urgent cesarean deliveries were retrospectively collected from anesthesia and nursing records. Hyperbaric 0.75% bupivacaine with 10-15 mcg fentanyl and 100 mcg morphine and 2% Lidocaine with 1:200.000 epinephrine. 50-100 mcg fentanyl and 1.5-2 mg morphine were used for spinal and epidural anesthesia, respectively. Sensory and motor evaluations were performed as per standard institutional protocol. Sensory levels were tested Q1h until ice felt at L2, then Q2h until full sensory recovery. Motor function was assessed Q1h until +SLR. The primary outcome was median time to block regression, defined as time of intrathecal injection or epidural top-up, to time of +SLR analyzed using Kaplan-Meier curves with hazard ratio (HR) obtained via Mantel-Haenszel method. Secondary outcomes were median time to

+SLR stratified by spinal dose and median time to full sensory recovery.

**Results:** The median [IQR] time to +SLR was significantly longer after spinal 5.8h [4.2-6.7] compared to epidural 4.0h [3.2-5.3] anesthesia (HR 0.55; 95% CI 0.41-0.73, p< 0.0001). When stratified by dose, median [IQR] times were similar across all 3 doses of 0.75% bupivacaine at 1.6mL vs. 1.7mL vs. 1.8mL (6.3h [5.2-8.1] vs. 5.5h [4.0-6.9] vs. 6h [3.9-6.8], p=0.81). The longest time to +SLR observed for 1.6mL vs. 1.7mL vs. 1.8ml dose group was 8.3h vs. 11.0h vs. 15.4h. (Fig 1) The median [IQR] time to complete sensory block regression was significantly longer after spinal 9.6h [8.0-11.1] compared to epidural 7.0h [5.9-8.4] anesthesia (HR 0.46; 95% CI 0.34-0.62, p< 0.0001). There were no neurologic complications.

**Discussion:** Motor block after spinal anesthesia has a significantly longer median time to recovery compared to epidural anesthesia at our institution. As more than 50% of patients following spinal anesthesia continued to have significant motor block at 4h,

extending the threshold to 6h and combining it with other criteria may yield a more practical protocol with higher specificity for complications. <u>Figure 1_Neurological Monitoring.pdf</u>

# Conversion of labor analgesia for intrapartum cesarean delivery: dural puncture epidural vs combined spinal epidural vs epidural

Presenting Author: Kathryn Clark, MB BCh BAO Presenting Author's Institution: BC Women's Hospital and Health Centre Co-Authors: Anthony Chau, MD MMSc FRCPC - BC Women's Hospital and Health Centre Andrew Hanson, M.S. - Mayo Clinic Rochester Mark Rollins, MD - Mayo Clinic Rochester Luc Saulnier, BA (Hons.), MA - BC Women's Hospital and Health Centre Hans Sviggum, MD - Mayo Clinic Rochester

**Introduction**: The conversion of neuraxial labor analgesia to surgical anesthesia via an epidural catheter is frequently used for laboring women requiring a cesarean delivery (CD). The use of a combined spinal epidural (CSE) technique has been associated with fewer failure of conversion believed to be related to the ability to confirm epidural placement via return of cerebrospinal fluid;¹ however, this finding is not consistently reported.² The dural puncture epidural (DPE) technique may have an additional advantage over the CSE technique when performed using a larger gauge spinal needle allowing for translocation to occur that may improve the rate of conversion.³ We hypothesized that the DPE technique was associated with increased successful conversion rate of neuraxial analgesia to surgical anesthesia for CD compared to epidural and CSE.

**Methods:** This was a multicenter cohort study. Records were retrospectively searched from February 1, 2017 through May 31, 2021 (Institution A) and from September 1, 2021 through September 15, 2022 (Institution B) for all patients with neuraxial labor analgesia and subsequent CD. Patients were excluded if no local anesthetic was administered via the epidural catheter for or if they had an inadvertent dural puncture by an epidural needle. Failure of conversion was defined as requirement of either a new neuraxial block at time of CD or use of general anesthesia. The type of block, spinal needle gauge, and maternal demographics were collected. The primary outcome was the failure rate of conversion to surgical anesthesia by block type analyzed using a multivariable logistics regression model. Secondary outcomes included rates of failure of surgical conversion by spinal needle gauge and presence of dural puncture analyzed using Chi-square test.

**Results:** During the study period, 1479 (A=706, B=773) parturients met inclusion criteria. Labor neuraxial analgesia type distribution for A was 322 (45.6%) DPE, 255 (36.1%) epidural, 129 (18.3%) CSE and B was 57 (7.4%) DPE, 706 (91.3%) epidural, 10 (1.3%). The combined data showed no significant difference in neuraxial labor analgesia conversion failure by block type (p=0.48). However, there was evidence of a significant site by treatment interaction (p=0.03) and thus estimates were reported separately by site. Institution A had 12.7% (90) failed neuraxial conversion for surgical anesthesia, while B had fewer 6.5% (50) failed conversion. Moreover, CSE technique at institution B was associated with increased odds of failure.

**Discussion:** We did not find any significant difference in neuraxial labor analgesia conversion failure for CD between DPE and epidural groups. Given the significant site by treatment interaction, larger sample sizes at both sites are required to ascertain our findings and the absence of any clinically meaningful differences by block type. <u>dpe_table2_2023-01-31.pdf</u>

#### Does Epidural Technique for Cesarean Sections Impact Patient Satisfaction?

**Presenting Author:** Teshi Kaushik, MD **Presenting Author's Institution:** Emory University - Decatur, Georgia **Co-Authors:** Erica M. Johnson, MD - Emory University

#### Background

Dural-puncture epidurals (DPE) with 25/26g spinal needles have been proven to provide superior labor analgesia compared to traditional epidurals (EPI) with more rapid onset, better caudal spread, fewer unilateral blocks, and less block failure. The efficacy of DPE for cesarean sections (C-sections) has not been studied in the literature, neither are we aware of a study investigating patient satisfaction when comparing neuraxial techniques for surgery. We conducted a double-blind, randomized trial comparing DPE, combined-spinal epidurals (CSE), and EPI techniques for an elective repeat C-section. Methods

Sixty patients were enrolled and randomly assigned to the EPI, DPE, or CSE group. DPE and CSE were performed with a 26G Gertie Marx needle. Epidural and DPE groups received Lidocaine 2% with Epinephrine, Fentanyl 100mcg, and Morphine-PF 3mg in the epidural space. The CSE group received 12mg hyperbaric bupivacaine, 10 mcg of fentanyl, and 200 mcg morphine-PF intrathecally. Primary outcomes were numeric pain scores (NRS) (0-10) classified as zero pain, minimal pain (NRS 1-3), moderate pain (NRS 4-6), and severe pain (NRS 7-10) during the surgery and one hour post-operatively, and anxiety levels during the surgery. Secondary outcomes were nausea, pruritis, and cumulative use of vasopressors.

Results (Table 1)

The DPE group had the maximum number of patients with severe pain during the procedure (Table 1). One hour after the surgery 6/18 (33%) patients in the DPE group had severe pain scores compared to 2/16 (12%) in the CSE group and 2/16 (12%) in the EPI group. The DPE group had more patients (16%) that experienced significant anxiety intraoperatively as well as postoperatively when compared to the other groups. Pruritis was a complaint in 2/18 (16%) in the DPE and 2/16 (12%) in the CSE group. Nausea was present in two patients with CSE. The cumulative dose of vasopressor was higher in the CSE group.

#### Discussion

We hypothesized that the DPE would provide better pain relief than EPI for the Csection. However, DPE was associated with higher pain scores during C-sections and postoperatively when compared to EPI and CSE. CSE is a better technique for providing anesthesia for C-sections and improving patient satisfaction, but it is associated with hypotension, nausea, and pruritis. Epidurals may provide better control for C sections when the slow sympathetic blockade is needed compared to CSE. The limitation of our study is the sample size.

#### Table 1 DPE.pdf

#### Surgical Sensation During Caesarean Section: A Qualitative Analysis

**Presenting Author:** Taylor Mouliakis **Presenting Author's Institution:** Queen's University - London, Ontario **Co-Authors:** Annette Burfoot, BAH, MES, D.Phil - Queen's University Lindsey Patterson, MD, FRCPC - Queen's University Kailey Walker, n/a - Queen's University

**Background:** Caesarean section is a major abdominal surgery performed usually on a young and healthy population under neuraxial anesthesia with little to no sedation. This creates a distinct surgical experience where patients are aware of the surgical process, physical sensations, and their environment. This study aims to provide an in-depth descriptive assessment of subjective surgical experience during C-section under regional anesthesia, an area that has previously been largely unexplored. The information gained in this study will enhance our current understanding and allow us to better alleviate patient anxiety through informed counselling.

**Methods:** This qualitative descriptive study was conducted at a Canadian academic centre. Twenty patients participated in semi-structured interviews within a week of C-section using an interview guide developed for this study. Patient medical records were reviewed to collect demographic and surgical information. Thematic analysis was then conducted using an inductive approach to determine common themes.

**Results:** Nine themes were identified. Five themes were identified in the category of surgical sensation and four themes were identified in the category of perioperative education.

**Conclusions:** Patients commonly experienced pressure and movement sensations to varying degrees of intensity, and most did not experience pain. Environmental factors, including sounds and distraction by the newborn, affected perception of surgical sensation. Patients wish to receive preoperative counselling regarding potential surgical sensations as well as ongoing communication from their anesthesiologist. These results can be used to guide informed discussions with patients and direct further investigation in this area.

Mouliakis-Chart.pdf
Abstract #: FRI-RA- Room 2– Neuraxial anesthesia for cesarean delivery-09

Effect of intrathecal hyperbaric bupivacaine dose on the duration of urinary catheterization for patients who underwent cesarean delivery: a retrospective study

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**Introduction**: A meta-analysis of observational studies found that duration of urinary tract catheterization was associated with the risk of a catheter-associated urinary tract infection (CAUTI).1 The relationship between dose of intrathecal local anesthetic and the duration of urinary catheterization is unknown. We hypothesized that patients of similar height who received a higher dose of intrathecal hyperbaric bupivacaine (HB) would have a longer duration of urinary catheterization.

**Methods**: Our hospital's institutional review board waived informed consent for this study. Patients who had CD at our hospital from February 1, 2020 to January 30, 2021 who did not have a neuraxial labor analgesic and had a single injection spinal or combined spinal epidural anesthetic for CD were eligible for inclusion. We considered a HB intrathecal dose of 10.5 mg or less to be "low" and 12 mg or more to be "high". We performed propensity matching on eligible patients based on height and HB dose. Patients who had intrathecal catheters, cesarean hysterectomies, and did not have documentation of date and time that urethral catheterization was discontinued were excluded from the final analysis.

**Results**: Four hundred-one patients were eligible for propensity matching and 80 patients were matched in the low HB cohort and 80 patients were matched in the high HB cohort. One hundred fifty-four patients were included in the final analysis. Patients in the high HB cohort had a statistically significant longer duration of urinary catheterization compared to patients in the low HB cohort. Demographic and clinical data for the cohorts are presented in Table 1. No patient who was included in the final analysis required conversion to general anesthesia.

**Discussion**: We found that patients who had a higher dose of intrathecal HB had a statistically significant longer duration of urinary catheterization. The rate of CAUTI is low and it is likely that thousands or more patients would be necessary for a high intrathecal HB dose to be the primary contributor to a CAUTI. No patients in our study required conversion to general anesthesia and the rate of administration of systemic anesthetic adjuvant medication was identical between the cohorts. The Society for

Obstetric Anesthesia and Perinatal released a consensus statement that summarized evidence for enhanced recovery after cesarean delivery that includes the recommendation that urinary catheters be removed between six and twelve hours postpartum following CD.2 Future studies are needed to examine best practices for dosing intrathecal HB for CD.

Table 1.pdf

Abstract #: FRI-RA- Room 2– Neuraxial anesthesia for cesarean delivery-10

## Agreement between laterality of the epidural electrical stimulation test and color flow doppler used to confirm epidural catheter placement during labor analgesia: a prospective observational study

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Introduction: Epidural catheter malposition causes failure of epidural analgesia in labor. Epidural electrical stimulation test (EEST) or Tsui test is a well-established method for confirming epidural catheter placement. Previous studies show that 90% of obstetric patients with working epidurals have unilateral EEST motor responses (1) and the response remains unilateral despite increased pulse width stimulation (2). The laterality of the epidural catheter tip may be responsible for this unilateral response. Color flow doppler (CFD) is another epidural catheter placement confirmatory test (3). This study examined the correlation between EEST response laterality and CFD signal laterality. We hypothesized that EEST laterality would match CFD signal laterality. Methods: In this prospective observational study we recruited patients who had delivered under successful epidural analgesia, at a minimum of 2 hours after delivery, upon regression of epidural analgesia. We performed the EEST with stimuli of 1 Hz and 0.2 ms, with increasing current from 0-20 mA, to observe a motor (left, right or bilateral) response. We then performed the CFD ultrasound assessment using the paramedian oblique longitudinal view at the interspace of catheter insertion, injecting 1 mL aliguots of normal saline (NS). We first performed the CFD assessment on the contralateral side to the EEST motor response, and then repeated the assessment in the ipsilateral side. If the CFD initial result was unilateral, 3 mL NS would be injected and the assessment repeated.

**Results:** We recruited 25 patients, of which 22 completed the EEST and CFD and were included in the analysis. Three patients were excluded due to no motor response to EEST at 20 mA. None of the patients required catheter troubleshooting during labor. All patients had a unilateral EEST, with a median (range) current of 9 (4-20) mA. CFD was observed ipsilaterally to the EEST response in 18%, contralaterally in 36% and bilaterally in 46% of patients. In patients with a unilateral response to CFD (12/22, 55%), 3/22 (14%) patients eventually showed bilateral CFD when 3 mL NS was injected. **Conclusions:** Our results show that the EEST current and the volume of epidural solution injected for CFD assessment may travel in different paths within the epidural

space. Assuming all successful and working epidurals had bilateral spread, EEST and CFD accurately confirm the epidural catheter's presence but fail to predict bilateral spread (ESST 0%; CFD 59%). Further research is needed to determine if a volume of epidural solution larger than 3mL can increase the incidence of bilateral CFD detection.



Figure 1. Paramedian longitudinal oblique view of L2-L3 interspace with visualization of flow in the epidural space upon injection of 1 ml of normal saline using Color Doppler Mode.

AC: anterior complex; PC: posterior complex; ITS: intrathecal space

Abstract #: FRI-RA- Room 2– Neuraxial anesthesia for cesarean delivery-11

#### Characteristics of the Epidural Electrical Stimulation Test and Pressure Waveform to confirm epidural catheter placement in pregnant people with BMI ≥50 kg/m²

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**Introduction:** Neuraxial anesthesia is the technique of choice for obstetric patients, particularly for those with body mass index (BMI)  $\geq$ 50 kg/m², where complications related to airway manipulation are likely to be higher. Epidural electrical stimulation test (EEST) and pressure waveform (PW) have been used to confirm placement of epidural catheter. EEST has been well studied in obstetric patients [1-3]. However, the characteristics of EEST in patients with BMI $\geq$ 50 kg/m², particularly those receiving low thoracic epidural catheter placement, have not been studied. Similarly, there are only few studies on the use of PW in obstetric patients showing conflicting results [4, 5]. The objective of this study was to describe the characteristics of EEST and PW in patients with BMI $\geq$ 50 kg/m² undergoing epidural analgesia/anesthesia.

Methods: We studied pregnant patients with BMI≥50 kg/m² who had epidural catheter inserted at T12-L1. PW assessment was performed through the needle and subsequently through the epidural catheter. EEST was performed only through the catheter with stimuli of 0.2ms and 1 Hz, with current increasing from 0-20 mA. For clinical purposes, at least one positive test was required to proceed with the epidural loading dose. Results were expressed as mean ± SD (standard deviation), median (IQR) or as percentages for categorical variables.

**Results:** Eighteen patients were enrolled. Mean (SD) BMI was 57.7 (8.8) kg/m². EEST was positive in all patients and median (IQR) electric current was 5.5 (4,6.75) mA before test dose and 5 (4,7) mA after. Most patients had a motor response elicited on their thigh (50%) and left side (44.4%). PW was positive in 17/18 (94.4%) patients through the needle and in 15/18 (83.3%) patients through the catheter. Median (IQR) pressure through needle was 17 (12,35) mmHg and through catheter was 30 (21,32.5) mmHg. In

16/18 patients sensory block was symmetric and effective. Two cases where both tests were positive required catheter replacement after loading dose due to insufficient anesthesia.

**Conclusion:** Characteristics of EEST for pregnant women with BMI≥50 kg/m² are similar compared to non-obese (2). Although PW through the needle was positive in all patients but one, the PW through the catheter was only positive in 83.3% of patients. This may limit its clinical use if clinicians want to test the actual catheter. Our results also suggest that while both tests may confirm the presence of the catheter in the epidural space, they cannot predict the performance of the catheter.

<u>Characteristics of the Epidural Electrical Stimulation Test and Pressure Waveform to</u> <u>confirm epidural catheter placement in pregnant people with BMI 50 kgm2.pdf</u> Abstract #: FRI-RA- Room 2– Neuraxial anesthesia for cesarean delivery-12

Differential sensory block during labor epidural analgesia: a prospective observational study to investigate the relationship of lower and upper sensory block levels to cold, pinprick and light touch

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**Purpose:** Assessment of sensory block during labor epidural analgesia lacks standardization. Sensitivity to cold, pinprick and light touch are well described methods of assessment of sensory block at cesarean delivery (1), but literature in labor analgesia is scarce. A zone of differential block to cold has been recently documented during labor epidural analgesia, with an upper sensory block level (USBL) and a lower sensory block level (LSBL) likely indicating different densities of sensory block to cold (2,3). The goal of this study was to determine the relationship between USBL and LSBL to cold, pinprick and light touch in the context of labor analgesia with a programmed intermittent epidural bolus (PIEB) technique.

**Methods:** This was a prospective observational study. We enrolled laboring patients requesting epidural analgesia. An epidural catheter was placed at L2/L3 or L3/L4 assisted by ultrasound. A PIEB plus patient-controlled epidural analgesia (PCEA) regimen with bupivacaine 0.0625% and fentanyl 2mcg/ml was initiated 40 minutes after the loading dose with the following settings: PIEB 10mL, PIEB interval 40 min, PCEA 5 mL, lockout 10 min, maximum hourly 30 mL. The USBL and LSBL were assessed by cold, pinprick, and light touch at 140 minutes after the loading dose.

**Results:** We studied 30 patients. We observed two distinct levels of sensory block (USBL and LSBL) to cold and pinprick. The median (IQR) USBL and LSBL to cold were T7 (T7-T6) and T9 (T10-T8), respectively. The median (IQR) USBL and LSBL to pinprick was T8 (T10-T6) and T10 (T12-T10), respectively (Table). We found moderate agreement between USBL to cold and pinprick (kappa: 0.57) and between LSBL to cold and pinprick (kappa: 0.57) and between LSBL to cold and pinprick (Kappa: 0.52). We could not determine two levels of sensory block to light touch. The median (IQR) to light touch was T10 (L2-T8). There was no significant correlation between light touch and either USBL or LSBL to cold or pinprick. All patients scored 0 on the Bromage scale (0-3), and no patient exhibited Verbal Numeric Rating Scale for pain > 1/10 at the time of assessment.

**Conclusion:** We observed the presence of two levels of sensory block to ice and to pinprick (USBL and LSBL). In general, USBL and LSBL with the same stimulus is 2 segments apart. Sensory block to cold, both USBL and LSBL, is usually 1 segment

higher than its pinprick counterpart. Further studies are required to understand if one modality, cold or pinprick, is superior to the other in assessing sensory block during labor, as well as to understand the role of assessing USBL and LSBL. We suggest that light touch is unreliable as a modality of sensory block assessment during labor epidural analgesia.

Table SOAP abstract.pdf

#### Digitization of a labor and delivery unit hypertension treatment protocol is associated with faster time to treatment and reduced hypertensive episode duration

**Presenting Author:** Jennifer McAlister, PharmD **Presenting Author's Institution:** HCA Healthcare - Nashville, Tennessee **Co-Authors:** John Beard, MD - GE HealthCare Sue Cadwell, MSN, RN, NE-BC - HCA Healthcare

#### Introduction

Hypertensive disorders of pregnancy include gestational hypertension, preeclampsia, eclampsia, HELLP, and chronic hypertension in the pregnant patient. Accurate diagnosis of the hypertensive disorder and effective therapy are associated with improved maternal and fetal outcomes. This study evaluates the impact of workflow digitization on the diagnosis and treatment of maternal hypertension on a labor and delivery unit.

#### Methods

This retrospective, deidentified chart review study was exempt from IRB approval. One group of patient records was included in the "pre-Digital" group from July 1, 2020, to November 2, 2020. This group was managed with the hypertension standard of care including computerized physician order entry and a patient treatment protocol. The "Digital" group from November 3, 2020, to August 31, 2021, includes records of patients managed after the digitization of the hypertension care treatment protocol beginning on November 3, 2020. The digital interventions included a unit-based surveillance technology which identified patients who met criteria for hypertension, tracked therapy administration and repeat blood pressure readings, and notified care givers per a sequence of notifications and escalations.

#### Results

The pre-Digital group included 1327 admissions, 88 patients (7%) with hypertension order sets documented within 2 hours of admission, and 143 patients (11%) having at least one hypertensive episode. The Digital group included 3515 admissions, 3237 patients (92%) with hypertension order sets documented within 2 hours of admission, and 328 patients (9%) having at least one hypertensive episode. The mean monthly percentage of patients with blood pressure reassessed less than 30 minutes from an initial high blood pressure was 65% in the pre-Digital group versus 70% in the Digital group. The mean monthly time for an antihypertensive medication to be administered after the second high blood pressure (Figure 1) was 54.8 minutes in the pre-Digital group versus 29.9 minutes in the Digital group. The mean monthly duration of hypertensive episodes for patients given at least one medication was 153.9 minutes in the pre-Digital group versus 83.1 minutes in the Digital group.

#### Conclusion

The implementation of patient surveillance technology including the digitization of a maternal hypertension treatment protocol was associated with increased order set compliance, reduced time to obtain blood pressure measurements, faster administration of anti-hypertensive medication, and reduced duration of hypertensive episodes. The clinical significance and generalizability of these results requires additional study.



#### Predicting Morbidity and Need for Anesthesia Interventions in Parturients with Acquired and Congenital Heart Disease: Use of the Obstetric Comorbidity Index

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#### Background

The Obstetric Comorbidity Index (OB-CMI) is a clinically validated tool that can identify the risk for severe maternal morbidity (SMM) at delivery.¹ Cardiac disease in a parturient may compound risk for SMM, but conventional cardiac risk tools do not incorporate obstetric and other maternal factors. The objective of this study is to examine the relationship of OB-CMI with cardiac morbidity (congestive heart failure (CHF), sustained arrhythmia (AR), or intensive care unit (ICU) admission) and anesthesia interventions in parturients with cardiac disease. We hypothesize that a higher OB-CMI will be associated with cardiac morbidity and more anesthesia interventions.

#### Methods

A retrospective analysis of women with cardiac disease who delivered at our quaternary institution from Jan 2018-Dec 2022 was performed. Primary cardiac diagnosis, admission OB-CMI score (individual components and total), obstetric and anesthetic data were recorded. The primary outcome was peripartum morbidity (CHF, AR, ICU admission) in relation to OB-CMI. Secondary outcomes were escalations of usual anesthesia care (telemetry, arterial line, oxygen, central line, PA catheter, delivery in main OR, alternate neuraxial technique for CD). The association between OB-CMI score and categorical variables was examined using the Wilcoxon test. Multivariate analysis was performed using Least-squares-means by ANOVA. A generalized linear model examined the relationship between OB-CMI and continuous variables.

#### Results

Two hundred cases from January 2018 through December 2022 were identified. The median OB-CMI was 6.6 (range 3 – 21) with predominant comorbidities including congenital heart disease or valvular disease (151 patients, 75.5%), cardiac arrhythmia (76, 38%), asthma (53, 26.5%) and preeclampsia/hypertension (37, 18.5%). In addition, 13 (6.5%) patients had a history of CHF. Ten (5%) patients developed peripartum CHF requiring intervention (diuretics, ICU admission, oxygen administration) with a higher OB-CMI score than those without symptomatic CHF (Table). Seven (3.5%) patients developed peripartum AR, of whom 3 required medication or cardioversion; this

outcome was not associated with a higher OB-CMI score. On univariate analysis, OB-CMI was associated with multiple anesthesia interventions. Only arterial line placement was associated with higher OB-CMI score on multivariate analysis (Table; p = 0.04975).

#### Conclusions

Parturients with cardiac disease represent a heterogeneous population ranging from simple ASD to single ventricle physiology, and obstetric or maternal factors may compound baseline peri-delivery risk. Using the OB-CMI for risk stratification to capture cardiac, obstetric, and maternal risk factors may be clinically relevant for tailoring the anesthetic plan. These preliminary findings provide insight into risk for clinical deterioration in the peripartum period and need for anesthesia interventions. <u>Final Table. Comparison of OB-CMI score with Peripartum Complications & Anesthesia Interventions.pdf</u>

## Reliability Of Icd-10 Codes In Identifying Post-Cesarean Delivery Surgical Site Infections

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<u>Background</u>: Cesarean delivery (CD) is the most common surgical procedure within the United States. Approximately 1.3 million women have a CD annually, accounting for 32% of all live births. However, surgical site infections (SSI) after CD are associated with increased maternal morbidity and healthcare costs. The SSI rate post-CD varies between 3% to 15% depending on follow-up period and SSI definition¹. The Centers for Medicare and Medicaid Services (CMS) implemented financial penalties on healthcare organizations for hospital acquired infections including SSI. Administrative codes such as International Classification of Diseases (ICD) and Current Procedural Terminology (CPT) codes assigned during the hospital course, discharge, or follow up are used by CMS, other payors, and healthcare organizations like hospitals to identify SSI, compare performance to other healthcare organizations, and improve guality of care. The ICD-10 codes were adopted by all healthcare systems in the United States on October 1st, 2015. Previous studies have questioned the reliability of administrative codes as a surveillance tool and predictor of SSI². Furthermore, since the introduction of ICD-10 codes, no study has examined how well they perform in identifying SSI in the post-CD population. The aim of this study was to determine the reliability of using ICD-10 codes to identify SSI in post-CD patients.

<u>Methods:</u> This was a retrospective analysis of all cesarean deliveries performed at our institution from October 2015 to March 2022 and assigned ICD-10 codes for SSI after the date of surgery. Surgical site infection surveillance was performed for each patient with an assigned ICD-10 code using the Center for Disease Control (CDC)/National healthcare Safety Network NHSN) definitions.

<u>Results:</u> There were 5,006 CDs performed during the study period and 149 patients had one or more ICD-10 codes for SSI assigned after surgery. Using ICD-10 codes, SSI was detected for 2.9% of all CD (145/5006). The false positive rate was 2.8 % (4/145, 95% CI [0.8, 6.9]).

<u>Conclusion</u>: The findings of this study suggest that ICD-10 codes may be a reliable tool with a high sensitivity for SSI surveillance in CD patients.

#### Management of the Obstetric Patient with Class III Obesity

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#### Introduction

Obese pregnant patients are at higher risk for severe morbidity and mortality than their non-obese counterparts, with highest risk in patients with class III obesity (BMI > 40 kg/m²). Obese parturients are not only at risk for medical and obstetric (OB), but also for significant anesthesia-related morbidity and mortality.^{1,2} At our medical center, 7% of pregnant patients have class III obesity, or approximately 840 patients per year. The goal of this quality improvement project was to optimize management and care processes of pregnant persons with class III obesity by addressing 4 key areas: appropriate venous thromboembolism (VTE) prophylaxis, appropriate antibiotic dosing, frequent assessment of epidural catheter function, and completion of a pre-anesthesia consultation for those with BMI > 50 kg/m².

#### Analysis

Analyzing the past two fiscal year's data (8/31/20 and 8/31/21), 91% of patients had appropriate VTE prophylaxis ordered and administered and 28% of patients had appropriate dose of antibiotics ordered. In addition, only 37% of patients with BMI > 50 kg/m² received a pre-anesthesia consultation. In analyzing our evaluation or "rounding" cadence, class III obese patients are evaluated, on average, every 3.53 hours.

#### Interventions

This work depended heavily on electronic health record (EHR) and information technology interventions. OB interventions included a defaulted antibiotic dose based on weight in the order set and electronic order alerts for VTE dosing and administration in patients at risk. OB providers also underwent re-education regarding VTE prophylaxis. Anesthesiology interventions included establishing epidural rounds every 2 hours to evaluate epidural catheter function through automated reminders on the L&D grease board, educating OB practices on the importance of pre-anesthesia consultation to increase referrals, and creating an automated pre-anesthesia consult best practice alert (BPA) in the EHR for any patient that had a BMI  $\geq$  50.

#### **Results (Figure 1)**

In the 3-months since initiation of interventions, we have seen the following improvements: appropriate VTE prophylaxis improved to 93%, appropriate antibiotic dosing was achieved in all patients, epidural rounding improved from 3.53 hours to 2.64 hours, and pre-anesthesia consultation improved to 50%.

#### Conclusion

In summary, maternal morbidity and mortality is a major public health crisis and obesity plays a significant role in adverse outcomes. Optimizing the anesthetic care processes during the peripartum period for individuals with class III obesity can be achieved but will continue to be an area of opportunity for improved patient safety. Future goals of the project include evaluating the rounding data to detect earlier epidural catheter failure and potentially lowering rates of general anesthesia for emergent cesarean delivery in this at-risk population.

2023 Mgmt Obese OB Patient SOAP Table.pdf

## Improving Cesarean Hemorrhage Through the Use of a Protocolized Checklist; a Quality Improvement Initiative

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**Introduction:** The implementation of a checklist-based management protocol has shown a promising trend in improving maternal morbidity, team communication, and patient outcomes during post-partum hemorrhage (PPH).¹ The aim of this quality improvement (QI) study was to increase emergency checklist utilization from 0% to 90% for Stage 3 PPH ( >1500 ml) during cesarean delivery (CD) at a single academic institution. PPH checklist utilization was required for vaginal deliveries at our institution. This was a quality improvement study that measured PPH checklist utilization for all Stage 3 PPH in the operating room (OR) starting in September 2021.

**Methods:** Initial interventions included making the checklist available in all labor and delivery operating rooms, a mandatory educational video for new anesthesia residents, and nursing communication through a group huddle format. Checklist utilization was measured through survey responses by staff involved in the case. Quality improvement methodology was utilized to encourage PPH checklist utilization. Our team used this survey data to produce further PDSA cycles aimed at improving communication between OR staff, resident education, and checklist accessibility issues.

**Results:** After four months of data collection and 37 cases, overall PPH checklist utilization went from 0% to 70% with a 95% survey completion rate. Provider reported benefits of the PPH checklist included: verification of medication doses (35%) and team organization and efficiency (31%). The most common barrier noted for not using the checklist included: no one thought it was a hemorrhage until the QBL was calculated (30%), we felt comfortable enough that a checklist was not needed (30%), and the checklist was not immediately accessible (20%).

**Discussion**: At our institution 37 patients experienced a stage 3 PPH during CD, and 68% of those patients required transfusion. We effectively increased PPH checklist use from 0% to 70% through the use of QI methodologies. Future data collection will illuminate if checklist use results in a significant reduction in transfusion and improved morbidity.

Table 1: Rates of postpa	rtum hemo	rrhage at cesa	arean deliver	y and PPH ch	ecklist			
use by month								
	Sept	Oct	Nov	Dec	Overall			
Rate of stage 3 hemorrhage n (%)	9 (7%)	13 (11%)	5 (5%)	10 (8%)	37 (8%)			
Rate of checklist use n (%)	7 (78%)	10 (77%)	2 (40%)	7 (70%)	26 (70%)			
Survey response rate	100%	100%	80%	100%	95%			
Average QBL (mL)	2373	3129	1902	2238	2410			
Transfusion rate	7 (78%)	9 (69%)	2 (40%)	7 (70%)	25 (68%)			

#### Perspectives on the Creation and Implementation of a Maternal Cardiac Care Team and Pathway at a Tertiary Care Medical Center

**Presenting Author:** Michael Hart, MD **Presenting Author's Institution:** UNC Chapel Hill **Co-Authors:** Johanna Quist-Nelson, MD - UNC Chapel Hill Kristin Tully, PhD - UNC Chapel Hill

During the period from 1987-2015, cardiovascular disease as a cause for pregnancy related death rose from 7.2 per 100,000 live births to 17.2 per 100,000 live births in the United States. ¹ Efforts have been made through ACOG, SOAP, and the AHA to encourage multidisciplinary teams comprised of specialists from maternal-fetal medicine, cardiologists, anesthesiologists, and nursing to help determine and optimize coordinated care for this patient population. ^{2–4}

We conducted an IRB-approved study to understand creation, modification, and implementation of a clinical care pathway for parturients with cardiac disease at a tertiary care medical center in the southeastern US. Through semi-structured recorded interviews with nine multidisciplinary team members, we collected qualitative data of the pathway development process. Professionally transcribed data were inductively coded into categories and grouped into themes using research questions as a guiding framework.

The themes included opportunities to strengthen the system of care, key components of the pathway, facilitators and barriers to implementation, positive impacts of the pathway, and future directions. The cardiac-obstetric pathway was developed in a response to rising cases, with intentional collaboration to improve outpatient and inpatient coordination through earlier awareness of patients meeting criteria and documented care planning, with specialists identified for ongoing management of individual cases. The pathway united clinicians around making pregnancy successful and safer, not only minimizing maternal health risks. Clarity around vetted plans was critical among the pathway team for building on collective expertise and for those on shift, to reduce hesitancy and implement safe care without additional consults. Establishing a proactive approach of specialists offering their perspectives was viewed as positively shifting a culture of "speaking up." Barriers include unmet administrative needs and turnover, within a context of short staffing, high-workload, and lack of incentives for the monthly committee participation. Findings may inform ongoing strengthening of multidisciplinary and coordinated maternal cardiac care and the formation of other specialized care pathways for high risk parturients, including staffing and bed coordination considerations.

## Optimising Labour Analgesia: Introducing a Two-Tier Programmed Intermittent Epidural Bolus Approach.

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#### Introduction

Programmed Intermittent Epidural Bolus (PIEB) analgesia for labour has been shown in the literature to provide superior pain control and reduces the risk of motor weakness.¹ Furthermore, it appears to be evolving into the preferred method of epidural analgesia delivery in the US.² At our institution, we have used the same PIEB Standard Protocol since 2015. The aim of this project was to evaluate the impact of instituting a second Enhanced Protocol (EP).

#### Methods

The project was registered as a service evaluation. Data was collected during October 2022. All functioning epidurals requiring clinician intervention were included. Parturients with inadequate analgesia received a clinician bolus of 10-15mls of 0.1% l-bupivacaine + 2mcg/ml fentanyl, then were started on the EP. Primary outcome measured was number of clinician call-backs. This was subsequently compared with two previous service evaluations in 2016 and 2021.

#### Results

Complete data was collected on 85 parturients. Analgesia was initiated via epidural in 71 and via CSE in 14 parturients. A total of 13 parturients were started on the EP. 11 of those placed on the EP were primiparous and augmented on syntocinon. Evaluation of 65 callbacks from 221 labourers, combining 2022 audit data with two previous audits in 2016 and 2021, demonstrated a statistically significant reduction in the call-back rate from 33.5% to 23% following the introduction of the Enhanced Protocol. There was no significant change in rate of motor block, adverse events, or delivery method.

#### Conclusions

The PIEB protocol used at our unit has provided comparative high quality and safe analgesia for the majority of parturients. However, some have higher analgesic requirements and will benefit from increased epidural analgesia. We noted a higher proportion of primiparous and long duration augmented labourers required the EP. Methods to identify parturients who may require the Enhanced Protocol warrants further investigation.

#### Summary Table

Audit Year	Total n. (EPI/C SE)	SV D	Instrume ntal	LSC S	Call-back Rate	Motor Block	Adv. Events (BP or Brady)
2016 (Pre EP)	78 (60/18)	32 %	35%	33%	27/78 (33%)	1/78 (1.3%)	3/78 (3.8%)
2021 (Pre EP)	58 (41/17)	33 %	31%	36%	20/58 (34%)	2/58 (3.4%)	2/58 (3.4%)
2022 (Post EP)	85 (71/14)	31 %	35%	34%	18/85 (23%)	2/85 (2.3%)	2/85 (2.4%)
p-value		0.3 9	0.36	0.47	< 0.01 (0.007)	0.46	0.3

#### Adverse Neonatal Outcomes and Definitions of Hypotension after Elective Cesarean Delivery under Spinal Anesthesia in Morbid Obesity with or without Hypertensive Disorders of Pregnancy

**Presenting Author:** Jack Wang, n/a **Presenting Author's Institution:** The Ohio State University **Co-Authors:** 

#### **INTRODUCTION:**

Complications after spinal anesthesia (SAB) can lead to a drop in blood pressure (BP), potentially causing NICU admission¹. NICU incidence is higher in elective cesarean delivery (14.1%) (CD) than vaginal delivery (6.5%)², and highest in women with hypertensive disorder of pregnancy (25.6%) (HDP)³. Detecting maternal hypotension (MH) is essential for preventing NICU admission, however BP measurements on the arm may not reflect uterine perfusion pressure if the gravid uterus impedes flow. Research cites use of a calf BP cuff to counteract this issue⁴. This relationship between neonatal outcomes and hypotension has yet to be established and its etiology may even be multifactorial, but there is need to rule out relevance due to the definition of hypotension¹. We are investigating the relationship between adverse neonatal outcomes and BP between two sites after SAB in elective CD. Our null hypothesis is that poor neonatal outcomes are not associated with maternal hypotension. **METHODS:** 

# This is a prospective cohort study. The primary outcome is incidence of maternal hypotension (SBP $\leq$ 100mmHg at the arm, 80% of the preoperative BP at the left ankle) after SAB and fetal outcomes¹. The outcomes composited are Fetal heart rates, 1 min Apgar and 5 min Apgar scores, Airway support, and NICU admission (FAAAN). The study population is divided into HDP and Non-HDP groups.

#### **RESULTS:**

Data from the first 83 cases is reported and collection is ongoing. 28 out of 83 cases presented with HDP. The non-HDP group averaged  $31 \pm 5$  years old,  $38.9 \pm 0.9$  gestational weeks, BMI 42.3  $\pm$  7.1, and neonatal weight 3757  $\pm$  511 grams. The HDP group averaged  $31 \pm 6$  years old,  $37.8 \pm 1.4$  gestational weeks, BMI 44.7  $\pm$  9.4, and neonatal weight 3591  $\pm$  849 grams. There was no difference in delivery minutes after SAB between parturients with and without FAAAN, but higher incidences of FAAAN existed with both definitions of hypotension. There were higher incidences of NICU admission and FAAAN in the HDP group than the non-HDP group, no significant differences in incidence were found between the two definitions.

#### **DISCUSSION & CONCLUSIONS:**

Our initial data indicates adverse neonatal outcomes were associated with hypotension after SAB regardless of the use of BP measurements on arm or ankle. This association aligns with previous knowledge of the dangers of SAB and hypotension during CD related to poor neonatal outcomes. As neonatal outcomes were worse for parnutrients with HDP, it confirms the belief that a different definition of hypotension is needed, making us wonder what the definition should be and how much it could reduce adverse outcomes.

Wang, Table for Adverse Neonatal Outcomes and Definitions of Hypotension after Elective Cesarean Delivery under Spinal Anesthesia in Morbid Obesity with or without Hypertensive Disorders of Pregnancy.pdf

CompuFlo Device Assisted Epidural Complications **Presenting Author:** Sai Kamma, MS3 **Presenting Author's Institution:** UTMB **Co-Authors:** Henry Tran, MS3 - UTMB

Hiram Acevedo Bonilla, MD - UTMB Department of Anesthesiology Allison Mullins, n/a - UTMB Department of Anesthesiology Trent S. Weatherley, BSA - University of Texas Medical Branch at Galveston

**Intro:** Epidural anesthesia has been used for decades to provide analgesia for parturient patients, but placement relies on the subjective sensations and experience of the operator. The CompuFlo device is a potential solution providing real time objective feedback to identify the epidural space.¹ However, in one report, the CompuFlo device had a 10% (6/60) rate of failure to detect the epidural space.² One article concluded the device is useful to assist trainees in epidural placements.³ This abstract aims to examine the use of CompuFlo for labor epidural placement and if the incidence of complications are reduced when using the device.

#### Methods:

This study involved a review of data from 67 patients who received epidural anesthesia with the help of the CompuFlo device only at one hospital (Table 1). The IRB has approved the analysis of patient data. The complications that arose with/after epidural placement during labor were examined. These complications included the need for general anesthesia during C-section, replacement of the epidural, dural punctures, and postpartum complications.

#### **Results:**

Of the 67 patients, there were 0 dural punctures and one postpartum back pain. Of the 11 trainees (PGY-2) who used the device, there were 0 complications. Replacement of the epidural was necessary for 6% of cases (4/67 patients). C-section was performed on 15 patients with 3 requiring general anesthesia (20%).

#### **Conclusions:**

The findings of this retrospective analysis reveals postpartum complications from epidural placement were minimal with the use of the CompuFlo device. The results suggest that the CompuFlo system could be a valuable tool in managing difficult cases. With 0 complications amongst the trainees using the device, Compuflo may aid inexperienced trainees. The CompuFlo device may help reduce false loss of resistance and dural puncture. Further research should include a RCT comparing the incidence of complications between the LOR and CompuFlo-assisted techniques.

Table 1. Patient Chara	cteristics and Maternal O	utcomes			
Population (n)		67			
Maternal Age (years)	Mean	24.8			
	Standard Deviation	5.5			
Maternal BMI (kg/m^2)	Mean	34.3			
	Standard Deviation	8.4			
Epidural Performer	Faculty	9			
	Fellow	8			
	PGY-4	22			
	PGY-3	17			
	PGY-2	11			
Delivery Mode	Vaginal	52			
	Cesarean	15			
Complications	Postpartum Complications 1.5% (1/67)				
	Dural Puncture	0% (0/67)			
	Epidural Replacement	6.0% (4/67)			
	GA for Cesarean	20% (3/15)			

#### Cardiac diseases in pregnancy: so many types, so little time -- a case series

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**Presenting Author's Institution:** The University of Texas Health Science Center in Houston

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Cardiovascular disease is one of the leading causes of maternal morbidity and mortality in the US. American College of Obstetricians and Gynecologists (ACOG) approximates that there are 4.23 maternal deaths per 100,000 livebirths in the US attributed to cardiovascular disease^[1]. In this case series, we examined 28 cases between 2021-2022 at our primary teaching hospital, Memorial Hermann Hospital-Texas Medical Center, in which the parturient had a cardiovascular comorbidity. Of these cases, 5 patients had valvulopathies, 8 patients had arrhythmias, 6 patients had cardiomyopathies, 3 patients had pulmonary hypertension, 1 patient had congenital heart disease, 3 patients had aortic disease, 1 patient had vascular disease, and 2 patients had unclassified cardiovascular disorders (i.e., COVID patient on ECMO, pulmonary embolic event). Our goal is to outline anesthetic goals, standard of care, and guidelines for this patient population. Data analysis of our project is ongoing. Our discussion will focus on (1) overall anesthetic case management, (2) relevance of multidisciplinary and coordination with other teams, (3) innovative neuraxial processes (i.e., epidural placement one day prior before planned Cesarean delivery) in anticipation of heparinization after delivery for ECMO or bypass, and (3) partnership between obstetric and cardiovascular anesthesiology teams.

**Complex Care Coordination for Cardio-Obstetric Patients at a Tertiary Care Campus with Independent Obstetric and Cardiothoracic Surgical Hospitals** Presenting Author: Catherine Bergeron, MD Presenting Author's Institution: UPMC - Magee Womens Hospital - Pittsburgh, Pennsylvania **Co-Authors:** Kathryn Berlacher, MD, MS - University of Pittsburgh Arundhathi Jeyabalan, MD, MSCR - University of Pittsburgh Jacob Larkin, MD - University of Pittsburgh Grace Lim, MD, MS - University of Pittsburgh

#### Introduction

Cardiovascular disease (CVD) is the leading cause of maternal mortality in the United States and its prevalence is rising. Case reviews often cite failure to refer patients for risk-appropriate care as a major cause of preventable CVD-associated maternal death. Guidelines recommend a multidisciplinary team approach for pregnant patients with CVD. Collaboration between anesthesiologists, obstetricians, cardiologists, and other specialists is essential. However, no guidelines address the unique challenges that arise when obstetric and cardiovascular surgical services are in separate hospitals.

#### Description

All parturients with an existing or acquired CVD diagnosis were initially presented by the obstetrician in a monthly multidisciplinary team meeting consisting of maternal fetal medicine specialists, cardiologists specialized in adult congenital heart disease and women's health, cardiac and obstetric anesthesiologists, specialized nursing, intensivists, and neonatologists. Patients were also referred to anesthesiology for preoperative assessment and perioperative planning. Seven cardio-obstetric patients who had cesarean deliveries from 2019-2022 are the framework by which we devised and implemented this complex care coordination system. Of those, no maternal or fetal deaths occurred, and 5 patients underwent ECMO cannulation and implementation.

#### Discussion

Our institution, like many across the country, has separate tertiary care hospitals for obstetrics and cardiovascular surgery. We describe our multidisciplinary care team approach which provides risk-appropriate care. We operationalized a clear pathway to transfer care between our obstetric and cardiothoracic centers when necessary. A delivery plan is made for each patient, including a contingency plan in the case of earlier than anticipated labor or maternal decompensation. Plans for patients with WHO class III-IV CVD include transfer to our tertiary care facility where there is availability of cardiothoracic surgery and advanced mechanical support, and cardiothoracic intensive care services. Based on the logistical needs of these patients, we devised an operational pathway for our multidisciplinary team to facilitate the transfer of these patients more efficiently between hospitals (Fig 1).

#### Conclusion

Parturients with CVD should be cared for by a specialized multidisciplinary team. Those with WHO class III-IV CVD should ideally be cared for at a maternal level IV care center. Contingencies must be made depending on planned mode of delivery,

gestational age, and anticipated NICU needs. We present a detailed multidisciplinary team operational pathway to coordinate care for this complex patient population in a setting where high-risk obstetric and cardiothoracic services are in separate hospitals. Figure 1 Complex Care Coordination Bergeron.pdf

#### Abstract #: FRI-RA- Room 4– Teams, Communication & Education-01

#### Influence of Work Shift Type on Cesarean Delivery Decision-To-Incision-Times

Presenting Author: Hans Sviggum, MD Presenting Author's Institution: Mayo Clinic Rochester Co-Authors: Kaitie kading, RN - Mayo Clinic

#### Alyssa Wittmer, RN - MAYO CLINIC

**Objective:** This study aimed to determine if there was a difference in the decision-toincision times for emergent cesarean deliveries based on the time of day.

**Methods:** Women who had an emergent or urgent cesarean delivery at Mayo Clinic Rochester from January 1, 2020, to June 30, 2021, were retrospectively identified and underwent medical record review. Decision-to-incision and decision-to-delivery times were recorded and compared between "on-shifts", and "off-shifts". Secondarily, we compared the rate of general anesthesia between groups.

**Results:** A total of 471 patients were identified; after applying exclusion criteria, 445 patients were included. Most goal times were met regardless of shift times except for one category. A difference was identified in the time from decision-to-delivery for urgent cesareans between on and off-shifts (59% vs. 37%, p< 0.001); however, decision-to-incision times did not demonstrate a difference. For emergent cesareans, there was no difference in the percentage of patients who met the decision-to-incision or decision-to-delivery goal among all shifts. General anesthesia was used more frequently during off-shifts (55% vs. 28%, p=0.030).

**Conclusions:** There was no difference between the decision-to-incision times of emergent cesareans based on the time of day. Decision-to-delivery times were shorter for urgent cesareans during on-shift hours. Emergent cesareans were more likely to utilize general anesthesia during off-shifts. Decision-to-incision times are not significantly influenced by the time of day or day of the week, suggesting they are not impacted by unit staffing levels.

Table.pdf

#### Abstract #: FRI-RA- Room 4– Teams, Communication & Education-02

## Effect of a multidisciplinary clinic on staffing and outcomes for cesarean hysterectomy for placenta accreta spectrum

Presenting Author: Madison P. Noall
Presenting Author's Institution: University of Cincinnati College of Medicine - Cincinnati, Ohio
Co-Authors: Ira Hamilton, MD - University of Cincinnati
James Liu, MD - University of Cincinnati
Carri Warshak, MD - University of Cincinnati

<u>Background</u>: Placenta accreta spectrum (PAS) is associated with significant morbidity and mortality, often due to peripartum hemorrhage. The number of patients with PAS is increasing in recent years, and we sought to improve our management of these patients by becoming a Placenta Accreta Center of Excellence.

<u>Interventions</u>: We instituted a multidisciplinary PAS clinic in June 2020. The clinic includes representatives from gynecologic oncology, maternal fetal medicine, radiology, and obstetric anesthesia. The clinic aims to improve the care of patients with PAS through improved communication, documentation, and care coordination, including patient care plans. Other interventions included establishing clear criteria for the use of spinal anesthesia, email updates on PAS patients, the creation of an anesthesia clinical pathway, and institution of cell saver for cesarean hysterectomy.

<u>Methods</u>: Retrospective data were collected on patients who had cesarean hysterectomies for suspected PAS at our institution. Information collected included patient demographics, anesthesia types and staffing, and blood loss and transfusion data. Statistical comparisons were performed using student *t-test* and *Chi-square test* for continuous and categorical data, respectively.

<u>Results</u>: From May 2017 to October 2022, 43 patients required cesarean hysterectomy for suspected PAS (19 pre clinic and 24 post clinic). The number of cesarean hysterectomies increased from 2 in 2017 to 13 in 2022. Cases were staffed with OB experienced anesthesiologists more frequently post clinic (42% pre vs. 67% post clinic, p=0.11). Central line use decreased from 68% pre-clinic to 33% post clinic (p=0.02), while the number of peripheral IVs increased from an average of  $2.0 \pm 0.2$  to  $2.8 \pm 0.2$ (p=0.004). While the average estimated blood loss (EBL) and number of packed red blood cells (pRBCs) transfused pre and post clinic were not statistically different, when excluding outlying cases with EBL >10L (n=4), the average EBL decreased from 3,714  $\pm$  504 mL pre clinic to 2,380  $\pm$  305 mL post clinic (p=0.03), and average pRBCs transfused decreased from 4.7  $\pm$  1.12 units pre clinic to 2.8  $\pm$  0.6 units post-clinic (p=0.12). The use of spinal anesthesia increased from 32% to 42% following clinic, but this was not statistically significant (p=0.50). When spinal anesthesia was used instead of GA alone, EBL was lower when considering all cases (2896  $\pm$  728 mL vs 4340  $\pm$ 612 mL, p=0.145) and when excluding outlying cases with EBL >10L (2289  $\pm$  430 mL vs 3437 ± 388 mL, p=0.06).

<u>Conclusion</u>: The establishment of a multidisciplinary PAS clinic led to increased cases staffed by OB specialized anesthesiologists, decreased number of central lines, and increased number of peripheral IVs. There was also a significant decrease in EBL once excluding outliers of EBL >10L and a trend towards a significant decrease in average number of pRBCs. The establishment of a multidisciplinary clinic has led to improved patient outcomes.

SOAP Abstract Figure.pdf

#### Abstract #: FRI-RA- Room 4– Teams, Communication & Education-03

#### Multidisciplinary Transfusion Education Decreases Avoidable Peripartum Blood Transfusion: Retrospective Observational Study

Presenting Author: Maria Borrelli, DO Presenting Author's Institution: Beth Israel Deaconess Medical Center Co-Authors: Samantha Armstrong, BS - Beth Israel Deaconess Medical Center John J. Kowalczyk, MD - Beth Israel Deaconess Medical Center Yunping Li, MD - Beth Israel Deaconess Medical Center Bentley Rodrigue, MD - BIDMC Andrew Sprowell, MD - Beth Israel Deaconess Medical Center

#### Introduction:

Postpartum hemorrhage (PPH) is a leading cause of maternal mortality and morbidity worldwide¹. PPH incidence has increased leading to the need for blood transfusion. Blood product transfusion is not without significant risk. Women who received blood transfusions account for the greatest fraction of women with severe maternal morbidity in the US².

#### Methods:

We investigated all peripartum red blood cell transfusion over four years at a tertiary care center. This included a 3-year period baseline period (BASE), followed by a one-year post-impact period (POST). We assessed the incidence of avoidable transfusions and transfusion complications (Fig 1a). Pre- and post- transfusion criteria were created to assess decision management (DECISION) and volume administered (VOLUME) of each transfusion event (Fig 1b). A committee (comprised of physicians from OB anesthesia, OB, and transfusion medicine) investigated transfusion events to identify avoidable transfusions. The results of baseline led to focused lectures multidisciplinary staff, trainees, and nurses. Further, hemorrhage protocols were updated with gathered knowledge. Our primary outcome was a reduction in avoidable transfusions after multidisciplinary transfusion education.

#### Results:

A total of 530 patients received transfusions (294 BASE, 136 POST). After educational training, more transfusions had documentation of appropriate DECISION and VOLUME (80% POST v. 55% BASE; p< 0.001). Committee review assessed the remaining transfusion events. Fewer transfusions were avoidable based on pre-defined criteria (15% POST v 25% BASE; p=0.03). Of these, 9.5% were avoidable due to DECISION, which was similar between periods. But VOLUME improved (5.8% POST v. 15% BASE; p=0.006). During BASE, 38% of postpartum transfusions were given as 2Units without hematocrit check, while during POST this occurred only 15% of the time (p< 0.001). The transfusion complication rate was 3.7% BASE (n=11) and 1.5% POST; with half associated with inappropriate transfusion.

#### Conclusion:

Multidisciplinary transfusion education decreased clinically avoidable transfusions.

Compared to the three-year period prior to our educational intervention, we found statistically significant decreases in overall avoidable transfusions, decreased events for committee review, a lower complication rate, and decreased practice of giving units together without recheck.

(L&D Operating Room, PACU) • Post Transfusion Hct < 33%

Figure 1a:

+/- Active bleeding





Active bleeding

#### Abstract #: FRI-RA- Room 4– Teams, Communication & Education-04

## Then and Now: Assessing the Evolution of Our High-Risk Obstetric Anesthesia Clinic

Presenting Author: Stephen J. Ellwood, MD
Presenting Author's Institution: Brigham and Women's Hospital - Boston, Massachusetts
Co-Authors: Kate Frost, MD - Brigham and Women's Hospital
Shayna Levine, MD - Brigham and Women's Hospital
Ayumi Maeda, MD, MD - Brigham and Women's Hospital
Noor Raheel, MBChB, MPH - Brigham and Women's Hospital

#### Background:

To improve the care of high-risk parturients, many institutions have developed antenatal obstetric anesthesia clinics (OACs), allowing for consultation of high-risk patients, and ensuring adequate pre-delivery workup. Over the past three decades, the quantity of OACs has increased.¹ However, the number of patients seen and the prevalence of specific comorbidities observed are not well understood. ²⁻³ The purpose of this study was to characterize the changes in our OAC over time and to investigate the impact that anesthesia consultation has on antenatal management.

#### <u>Methods:</u>

After IRB exemption, we performed a retrospective chart-review based analysis on every pregnant woman seen in our high-risk OAC in 2010 and in 2022. We recorded demographic and obstetrical data, indication for consultation, and other comorbidities addressed. Patients were assigned to one of 11 high-risk consultation categories based on their primary presenting comorbidity. Antenatal changes in management were extracted from the consultation note and defined as requesting a consultation from another specialty, ordering any radiologic study/diagnostic test, or requesting additional outside images or records.

#### <u>Results:</u>

The number of consultations and the primary indication for referral are summarized by category in Table 1. Fifty-five patients who were referred for anesthesia consultation in 2022 were not seen due to early delivery, deferment by anesthesia, or transfer of care. The number of referrals increased by 58% from 2010 to 2022. In 2010, 99% of consultations were seen in person, while in 2022, 95% were phone consultations. The average gestational age at the time of consultation was 33 and 34 weeks, in 2010 and 2022, respectively. Descriptive analysis of the subcategories comparing 2010 to 2022 showed notable increases in congenital heart disease patients, suspected placenta accreta spectrum patients, and elevated BMI patients. The percentage of patients for whom antenatal management changed because of anesthesia consultation decreased from 10.7% in 2010 to 2.4% in 2022.

#### Conclusion:

The number of referrals to our OAC increased over the past decade with most patients now being evaluated by phone consultation. We report overutilization of our OAC for low-risk patients. Fewer patients required antenatal changes in management after anesthetic consultation, which may have been due to overutilization by low-risk patients and improved overall obstetrician directed management and workup. More stringent referral criteria and screening systems that help identify high-risk patients, who may benefit the most from antenatal obstetric anesthesia consultation, are needed to utilize limited resources more effectively. However, the OAC may also serve the purpose of promoting patient comfort and satisfaction in addition to improved outcomes and quality of care.

SOAP Final Table.pdf

#### Abstract #: FRI-RA- Room 4– Teams, Communication & Education-05

#### A Simple Mobile Application to Improve Labor and Delivery Floor Communication Presenting Author: David Preiss, MD PhD

**Presenting Author's Institution:** Department of Anesthesia, Brigham and Women's Hospital

**Co-Authors:** Volodymyr Bobyr, BSc - University of Notre Dame Michaela K. Farber, MD, MS - Brigham and Women's Hospital Department of Anesthesiology.

BACKGROUND: Delays in patient care on labor and delivery (L&D) can disrupt workflow and potentially result in adverse patient outcomes. Communication between nursing and anesthesia staff on L&D typically relies on paging the anesthesia team with no record keeping of these notifications, no way for closed loop communication, and no ability to triage important tasks.

METHODS: We designed a mobile application (app) to allow nurses to electronically request anesthesia-related tasks on a tablet at each L&D nursing work station or from individual mobile devices. The app was also viewable on a tablet in the L&D anesthesia team's workroom or from individual mobile devices and offered the ability to acknowledge task requests. The app tracked how long it took for tasks to get acknowledged and completed, in minutes. We prospectively tracked the number of anesthesia-related L&D tasks from nurses along with the unit team's response time throughout the day. The app was active daily from 7am through 10pm after which point all requests were sent via pager. We hypothesized that response times would correlate with the number of requests (e.g. as the number of requests increased, so would response times), and that response time would decrease with resident experience on the L&D floor during a month-long rotation. Data were collected from a large academic medical center from January 2021 to December 2022.

RESULTS: There were 29,116 tasks in total in the study period. Nursing task requests were non-urgent in nature and included a variety of tasks, including patient consultations, epidural placements, and pain evaluations, All urgent requests continued to be paged to the anesthesia team leader. Tasks that required more than 60 minutes were excluded from analysis. The mean response time was 20.8 minutes with a standard deviation of 15.1 minutes. Response times decreased with the number of requests. Tasks took less time to complete as a month progressed (Fig 1).

CONCLUSIONS: Clear and efficient communication can be facilitated with a mobile app for the L&D floor. We speculate that the improved response time throughout the month correlated with improving resident exposure and experience on the service and less time required for teaching or supervising. This study suggests that usage of a simple communications app between nursing and anesthesia staff can help optimize the provision of safe and efficient patient care on labor and delivery.


## Novel Usage of Simulation for Protocol Development: Impacted Fetal Head

**Presenting Author:** Phillip Callihan, MD, PhD **Presenting Author's Institution:** University of Virginia Health **Co-Authors:** Sunny Chiao, MD - University of Virginia Health System Ashley Garneau, MD - University of Virginia Jessica Sheeran, MD - University of Virginia Health Alicia Shifflett, R.N. - University of Virginia

Simulation-based education is associated with improved outcomes for obstetric emergencies such as shoulder dystocia.¹ Impacted fetal head (IFH) has a similar incidence as shoulder dystocia, occurring with 1.5% of cesareans and up to 25% of intrapartum cesareans. Complications of IFH including hysterotomy extensions, bladder injury, hemorrhage, infection, low Apgar scores, and injury to the fetus.² Despite similar incidence little is published on education and protocols for managing IFH.³ Our objective was to develop an interprofessional education/simulation program for IFH and it to aide the development a protocol for cesarean with suspected IFH.

We developed an education program using the acronym "PREPARED": Prepare the team (discuss risk for IFH); Review delivery plan (vaginal hand, fetal pillow, or reverse breech extraction); Explain to patient the extra time for delivery and treatment of newborn; insert Fetal Pillow; Adjust operating table and patient (modified lithotomy if potential vaginal hand); Relax the uterus (nitroglycerin preparation); Extend incisions; Deliver baby (review planned maneuvers).

Interprofessional education/simulation sessions included members of the entire team (obstetricians, obstetric anesthesiologists, and labor and delivery nurses) to create a shared mental model for management of these patients and to have all stakeholders involved in developing the protocol. In a one-hour session we reviewed IFH and its management using the acronym, followed by an in-situ simulation in the operating room using the protocol with a simulated patient preparing to undergo cesarean for arrest of dilation. This was followed by time for debriefing and insights from team members for protocol modifications. We held 5 sessions including a total of 31 participants.

We used input from the debriefing to modify the preoperative protocol. Additions suggested by participants included: posting the acronym on the wall of the OR for reference, reviewing key points during the check-in rather than waiting until time-out to ensure all supplies are in the room, having nurse communicate elapsed time from after hysterotomy until delivery of fetus, and discussing uterine relaxant and uterotonic plans. These changes were made before implantation of the protocol. The participants rated this experience highly.

Simulation is often used for staff training of finalized protocols. Our experience suggests that simulation may also be used for protocol modification during the development stage.

# Pre-Huddle Checklist: A Multidisciplinary Quality Improvement Project to Improve Communication and Efficiency

Presenting Author: James Conwell, DO
Presenting Author's Institution: University of Kentucky Department of Anesthesiology, Kentucky
Co-Authors: Walter Johnson, MD - University of Kentucky
Madison J. Phillips, DO - University of Kentucky
Ryker Saunders, MD - University of Kentucky

Introduction: Delays in the operating room (OR) increase costs, negatively impact patient experience, and delay future cases [1]. The labor and delivery (L&D) unit is an ever-changing clinical environment with complex patients, emergencies and evolving case schedules. The pre-operative huddle facilitates communication and patient safety [2], and at our institution, is done before all OR cases on L&D. First case delays are seen as a large issue at our institution's L&D unit, with an average delay of 43.6 minutes in 2022. As a quality improvement project, we implemented a multidisciplinary pre-huddle checklist with improvement in case delays.

In 2022, a team was formed to address case delays using a plan, study, do, act (PDSA) cycle. A survey was sent to L&D nursing staff, obstetricians, and anesthesiologists regarding OR delays at our institution. 60.9% of respondents stated that cases never or almost never start on time. The most cited reason for delay was communication about tasks needed to be completed prior to a huddle. A pre-huddle checklist for first start cases was developed in consultation with the nursing staff and obstetricians to improve formal communication.

The pre-huddle checklist contained the following items: anesthesia consent, obstetrician consent, labs ordered, iv placed, labs sent, labs resulted, case log opened on EPIC, and report given to the newborn nursery. The nurse assigned to the operating room was charged with checking when the items were complete, and once all items were complete, the nurse would call the huddle. On November 21, 2022, this process was implemented. First case start times from November 21-December 30, 2022, and all of 2022 were reviewed. In 2022, the average case delay was found to be 43.6 minutes with a median delay of 21 minutes. Following the implementation of the checklist, the average delay improved to 10.92 minutes, with a median delay of 7 minutes. Discussion: A dynamic L&D floor provides a unique challenge to nurses, obstetricians and anesthesiologists. The communication regarding tasks needed to huddle for a case was seen as a barrier for starting cases on time, and no one person was responsible for calling a huddle. By implementing a pre-huddle checklist, we worked with the L&D staff to change preoperative workflow, provide structured communication, and designated the OR nurse with the role of calling the huddle. We demonstrated that this multidisciplinary approach to quality improvement reduced the average first case delay from 43.6 minutes to 10.92 minutes.





Pre Checklist Post Checklist

# Determining minute-by-minute obstetric anesthesia activity and utilization: Proof of concept at a single large academic center

**Presenting Author:** Terry James Biel, MD MBA **Presenting Author's Institution:** University of Colorado Health - Denver, Colorado **Co-Authors:** Rachel Kacmar, MD - University of Colorado Health

INTRODUCTION: Optimal staffing for anesthesia services is an area of active investigation. Recent work found an increased incidence of surgical complications with increasing supervision ratios[Burns]. Another recent study used total annual Cesarean deliveries and labor epidurals compared to total annual staffing to generate aggregate indices of workload[Im]. However, an accompanying editorial highlighted challenges in using totals and averages, such as being unable to determine highs and lows in activity at various times[Ginosar]. We debut a novel approach to quantifying anesthesia activity on a minute-by-minute basis by processing one year of electronic anesthesia records at a single large academic center.

METHODS: Using electronic anesthesia record data, we estimated activities where an anesthesia provider is actively involved in the care of a patient, namely operating room cases, neuraxial procedures, and medication administration. Next, we unduplicated activity so the maximum amount of anesthesia activity for a single patient at any given time is one. Minute-by-minute concurrent anesthesia activity was then calculated by adding together the per-patient activity for each minute of each day.

DISCUSSION: A fine-grained dataset of average obstetric anesthesia activity level across the entire week demonstrates high variance across each day as well as between days of the week (Figure 1: Average concurrent anesthesia activity; brighter color denotes more concurrent activity). A similar analysis of anesthesia provider availability and the resulting minute-by-minute utilization of resources will be available for presentation at SOAP.

Such fine-grained data may identify periods where resources are under-utilized and periods where resources are "maxed out," i.e. additional demand could put patients atrisk due to lack of available resources. Accordingly, the information could be used to inform scheduling for operative cases, patient admissions, and provider staffing to best align supply and demand.

CONCLUSION: It is feasible to determine minute-by-minute obstetric anesthesia activity and resource utilization using electronic anesthesia records and provider scheduling databases. Future work may include expanding to multiple centers; comparing rates of patient safety events to resource utilization levels; applying these methods to other anesthesia service lines, such as non-operating room anesthesia; and simulating changes in demand versus resource levels to assist in resource planning and optimization.



# Interventions to reduce opioid use in the postpartum period: a qualitative study of nurses' perspectives on benefits and barriers

Presenting Author: Tazim Merchant, BA Presenting Author's Institution: Northwestern University Feinberg School of Medicine Co-Authors: Julia DiTosto, MS - University of Pennsylvania Perelman School of Medicine Maya Roytman, BS - Feinberg School of Medicine

Lynn Yee, MD, MPH - Northwestern University Feinberg School of Medicine

**Background**: Reproductive age women are the largest growing demographic affected by the opioid epidemic. Several interventions to reduce opioid use during the postpartum period have been proposed, but the perspectives of nurses on their feasibility and acceptability have not been well described. Postpartum nurses interface with patients most often and their perspectives are therefore essential to the success of an intervention. Our objective was to understand nurses' perspectives on benefits and barriers of interventions to reduce postpartum opioid use.

**Methods:** This is a qualitative analysis conducted at a single, tertiary, academic center between 9/2022 and 12/2022. Nurses who provide postpartum care were recruited to participate. Purposive sampling was performed to ensure a diverse participant population in terms of race/ethnicity and years of experience. Using a semi-structured interview guide informed by implementation science principles, a trained research assistant led in-depth participant interviews designed to facilitate an open-ended conversation regarding perceived benefits and barriers of interventions to reduce postpartum opioid use. Seven pre-specified interventions were addressed related to (1) pain management protocols and (2) enhanced clinician and patient education. Data were analyzed using the constant comparative method.

Results: A total of 21 nurses participated. Themes related to each prespecified intervention emerged (Table). Overall, participants perceived pain management interventions that allowed flexibility and individualization to patient preferences and circumstances more favorably. For example, benefits of non-pharmacologic interventions included improving individualized care, but participants perceived accessibility to be a barrier. Similarly, the inability of opioid discharge calculators to incorporate nuanced patient-specific context was noted as a barrier. The lack of flexibility posed by eliminating opioids from order sets was also seen as detrimental, imposing delays to patient pain control that resulted in loss of patient-clinician trust. The benefits and barriers related to education interventions were also described. Benefits of patient education interventions included promoting patient autonomy, while benefits of clinician education interventions included filling knowledge gaps. However, patient and clinician time constraints and retention of information were frequently cited barriers. **Conclusion:** Postpartum nurses viewed opioid reducing interventions that would promote flexibility, patient autonomy, and individualization to be particularly beneficial. However, key barriers, such as accessibility, delays to care, and patient and clinician

time constraints should be considered in the development of interventions to optimize postpartum opioid use and pain management. <u>SOAP RN interventions final PDF.pdf</u>

Evaluating obstetrical anesthesia grant proposal generated by artificial intelligence (chatGPT).

**Presenting Author:** Fernanda S. Oliveira, MD **Presenting Author's Institution:** University of Toronto - Toronto, Ontario **Co-Authors:** David B. Maclean, N/A, MD - University of Toronto Faraj Massouh, N/A, Md - University of Toronto

Introduction: AI (Artificial Intelligence) accomplishes the simulation of human intelligence in machines designed to act like humans. ChatGPT (GPT: Generative Pretrained Transformer) is a language model that applies learning techniques to generate human-like text.[1] It can be used for natural language processing tasks such as language translation, text summarization, and inquiry answering. Moreover, it may assist in creating medical content, summaries of research papers, articles, and presentations. It is also operative to retrieve information from medical literature quickly and efficiently. It is premature to determine the full potential of ChatGPT in Health Sciences in both academic and clinical settings. Objective: This study aimed to evaluate the format, [2] readability, [3], and content relevance [4] of an Obstetrical anesthesia grant proposal generated by AI. Methods: The following text was input in at www.chat.openAl.com: "Write a grant proposal to set up a collaborative research system among four university affiliated hospitals. The research topic is Obstetrical anesthesia." The generated text was scanned for plagiarism, grammar, spelling, punctuation, conciseness, and word choice (www.grammarly.com). Its readability was classified according five scales: Flesch Reading Ease, Gunning Fog Level, Flesch-Kincaid Grade Level, Dale-Chall Score, Fry Readability Grade Level. Four content experts graded the content relevance (1=weak, incomplete, or poor; 5=strong, complete, or excellent). The domains evaluated were significance, innovation, approach, environment, and feasibility. **Results:** The text was generated in approximately 5 seconds for free at the time of this submission. It counted 2969 characters (with spaces), 2 pages, 412 words, 29 sentences, 14.28 words per sentence, 6 characters per word, and 27% of complex words. There were no grammar, or spelling inaccuracies, and no plagiarism. To increase text conciseness, seven alterations were suggested. Table 1 represents the readability scores. The average grade among the assessors for the significance was 4, innovation 2.75, approach 2.75, environment 4.25. and feasibility 4.0. The overall content grade was 3.55 (out of 5). **Conclusions:** ChatGPT was able to quickly generate a two-pages grant proposal in Obstetrical Anesthesia that was accurate in terms of grammar and spelling and with no plagiarism indicators. The readability scores suggested it presented a high level of

complexity. There is room for human improvement, especially in the text's conciseness and content (innovation and approach particularly). According to this study, the Al generated text could be helpful as a starting point for a grant proposal. The next step in our project is to compare an Al-generated grant proposal to a human-created one. Table1.pdf

## Abstract #: FRI-RA- Room 4– Teams, Communication & Education-11 Factors Associated With Breastfeeding Success by Race: A Retrospective Study. Presenting Author: Lauren Sartor, MD

**Presenting Author's Institution:** Icahn School of Medicine at The Mount Sinai Hospital **Co-Authors:** Hung-Mo Lin, ScD - Yale School of Medicine

Yuxia Ouyang, Ph.D. - Icahn School of Medicine at The Mount Sinai Hospital Chantal Pyram-Vincent, MD M.P.H. FASA - Icahn School of Medicine at The Mount Sinai Hospital

David Wax, MD - Icahn School of Medicine at The Mount Sinai Hospital **Background:** 

Racial disparities exist in many aspects of maternal and neonatal care including breastfeeding (BF).^{1,2} Blacks have decreased rates of initiation and duration of BF as compared to Whites and other racial/ethnic groups.^{2,3} The purpose of this study is to assess factors associated with BF success by race with a specific focus on pre-birth feeding plan and time duration from birth until initial maternal-neonatal interaction. We specifically targeted these factors since they can possibly be modified by patient/nurse education and community outreach.

## Methods:

Following IRB approval, a database query of our electronic medical records was performed of all patients who had a vaginal delivery between September 2019 and March 2021. Mother's demographic information, pre-delivery intended feeding plan (exclusive BF, exclusive formula, or mixed), delivery and post-delivery maternalneonatal outcomes (times to first skin to skin contact and first feed, and whether the first feed was BF) were compared among the ultimate feeding technique (exclusive BF vs. exclusive formula vs. mixed). Parametric (Chi-square, Fisher's exact) or nonparametric (ANOVA, Wilcoxon rank sum, Kruskal Wallis) statistical methods were used as appropriate. The generalized estimating equations (GEE) method with logit link for logistic regression was fit to investigate the independent effect of each variable on exclusive BF. All tests were two-sided and p < 0.05 was considered statistically significant.

# **Results**:

There were 12,700 deliveries at a tertiary care hospital during the study period that met our inclusion criteria. Though most women intended to BF, black women intended to BF less frequently (61%) than the other racial groups (79%). We found a statistically significant difference by race in time to first feed, time to first skin to skin, type of fiarst feed (BF or formula), and ultimate feeding modality, with Black women BF less frequently than the other groups (Table). We also found that the strongest predictor of exclusive BF was when the first feeding encounter is BF followed by pre-delivery intended feeding plan.

# **Discussion:**

The main findings of this study is that the initial maternal-neonatal interaction, particularly if the first feeding event was BF, along with the pre-delivery intended feeding plan are the strongest predictors of exclusive BF. Our findings are notable because these parameters can be modified by patient and nursing education and changes to hospital practices.

SOAP Abstract Table 2023 BF.pdf

Female authorship over time as represented by the Gerard W. Ostheimer Lecture Series

**Presenting Author:** Yostina Soliman, BA **Presenting Author's Institution:** Albany Medical College - Pittsford, New York **Co-Authors:** Nan Guo, PhD - Stanford University

#### Introduction:

Gender differences in authorship are widespread across medical specialties (1,2,3). The Gerard W. Ostheimer Lecture presented at the Society for Obstetric Anesthesia and Perinatology Annual Meeting is a comprehensive review of pertinent literature in obstetric anesthesiology and related fields published in the preceding year. Our objective was to evaluate the proportion of female authorship, and its evolution over time, as represented by this important compilation from 2011 to 2019.

#### Methods:

We collated citations from the published Ostheimer Lecture series from 2011 to 2019 as a proxy for the lecture syllabus. The names of first and senior authors were cross-referenced with identifiable gender qualifiers to determine a binary assignment of male or female. Additional searches through social media, Google, LinkedIn, ResearchGate and/or institutions were performed to verify the assigned gender. Where available, pronouns were utilized. If gender of either the first or senior author could not be discerned, the article was excluded from analysis. The gender of each Ostheimer presenter from 2011 to 2019 was documented. The overall difference of first and senior author gender was examined by chi-square tests. Logistic regression was conducted with author gender of the Ostheimer presenter was conducted to examine if the gender of the presenter influenced the relationship between female authorship and year. Statistical analyses were performed using STATA 14.0 (College Station, TX).

## **Results:**

Of the 513 citations analyzed, 105 were excluded. Of the 408 included publications, 51.5% (210/408) of first authors were female and 40.0% (155/408) of senior authors were female. Of these, 22.3% (91/408) of citations had female first and senior authors and 67.2% (274/408) had female first or senior authors. The odds of a female first or senior author increased over the study period (OR 1.09, p=0.035). See Figure 1. Stratified analyses did not find a difference in the relationship between female authorship and year by the gender of the Ostheimer presenter.

## **Conclusion:**

Trends in our analysis show that female first authorship has been well represented in the articles selected for the annual Ostheimer Lecture, and female first or senior authorship has increased from 2011 to 2019. However, female senior authorship remains underrepresented in the study period, as is consistent with findings in other

medical literature. One limitation of this study is that it assumed binary gender assignments based on social norms of name identity. Although this was consistent with prior methodology, it is not reflective of a growing recognition of gender fluidity. Further studies are required to determine author representation from other under-represented groups.

Soliman Guo Stockert Figure 1_Percentage Female Authorship Over Time.pdf

# Prophylactic Phenylephrine Infusion and Respiratory Morbidity in Neonates After Elective Cesarean Delivery: An Impact Study.

Presenting Author: Kiran Shah, MD

**Presenting Author's Institution:** Washington University in St. Louis **Co-Authors:** Preet M. Mohinder Singh, MD - Washington University in. St. Louis Arvind Palanisamy, MBBS, MD, FRCA - Washington University in St. Louis

<u>Background:</u> Transient tachypnea of the newborn (TTN) is the most common cause of respiratory distress in term newborns¹. Although commonly self-limited, it is a condition that increases costs and is associated with respiratory issues in infancy and childhood². The likelihood of developing TTN is higher after cesarean delivery than after vaginal delivery¹. A recent study established an association between low systolic blood pressure (SBP) and mean arterial pressure (MAP) during spinal anesthesia for elective cesarean delivery and the development of TTN³. Our study tested the hypothesis that maintenance of maternal hemodynamics with prophylactic phenylephrine infusion will minimize neonatal respiratory morbidity after elective cesarean delivery.

<u>Methods</u>: This is a before-after impact study. In March 2019, a tertiary care academic institution instituted a policy to administer prophylactic phenylephrine infusion to prevent hypotension for all elective cesarean deliveries under neuraxial anesthesia. From patients who underwent elective cesarean delivery under neuraxial anesthesia, we collected intraoperative maternal hemodynamic data until delivery of the fetus, including area under the curve (AUC) for MAP < 65 mm Hg and SBP < 90 mm Hg, and neonatal respiratory outcomes for one year prior to and after the policy change.

<u>Results:</u> Overall, we analyzed data from 70 vs. 70 patients before and after institution of the policy. Comparison of neonatal respiratory outcomes before and after institution of phenylephrine infusion are presented in Table 1. Except for a very small statistically significant difference in neonatal pH and base excess, no other difference was demonstrated. When maternal hemodynamics were compared, only AUC for SBP < 90 mm Hg was significantly different (p=0.04).

<u>Discussion:</u> Our limited data show that institution of a prophylactic phenylephrine infusion did not have a clinically meaningful impact on neonatal respiratory morbidity. We observed that only AUC for SBP was significantly different after institution of the policy. This differs from a prior study³ that showed AUC for both maternal SBP and MAP to correlate with TTN. We posit that the aggressive crystalloid co-loading and the frequent use of vasopressor boluses prior to the institution of the policy might have resulted in lower incidence of hypotension at baseline. Our study is limited by the sample size and the drawbacks inherent to any retrospective study. However, it poses an important question for future research: does MAP contribute more than SBP to non-autoregulated placental blood flow, and if so, should efforts be targeted at maintenance of MAP?

Table 1: Maternal Hemodynamic AUC and Neonatal Outcomes

Outcome	Pre (n=70)	Post (n=70)	p-value
Maternal			
AUC MAP <65	947.55	549.96	0.096
mm Hg*min			
AUC SBP <90	758.90	290.47	0.043*
mm Hg*min			
Neonatal			
Respiratory	22	20	0.640
assistance in OR			
Respiratory	12	8	0.334
assistance outside OR			
NICU admission	0	2	0.154
Special care nursery	13	9	0.353
admission			
Median cord pH (IQR	7.25 (7.18-7.27)	7.26 (7.23-7.29)	0.011*
25%-75%)		(n=69) **	
Median base excess	-4.3 (-6.253.15)	-3.0 (-4.02.0)	0.000*
(IQR 25%-75%)		(n=69) **	

* Statistically significant ** No data for one neonate

# The Incidence of Prolonged Bradycardia Following Phenylephrine infusion for Cesarean Section: A Retrospective Analysis

Presenting Author: Seth Landa, MD, Director of Obstetric Anesthesia Presenting Author's Institution: St. Joseph's University Medical Center Co-Authors: Pankti Acharya, Student - Rowan University School of Osteopathic Medicine Rachel Chan, DO - St. Joseph's University Medical Center George Gadalla, MD - St. Joseph's University Medical Center James Schiffenhaus, MD, Cardiac Anesthesia - St. Joseph's University Medical Center Yonatan Bardash, MD Anesthesiology Resident, CA-3/PGY-4 St. Joseph's University Medical Center

Intro: Phenylephrine infusion has been accepted as a safe and effective means of preventing hypotension following spinal anesthesia for cesarean section (1). Our department adopted this technique as a standard of care in 2019. Shortly thereafter we became aware of an increased incidence of persistent postoperative maternal bradycardia alarming the PACU nurses and even leading to occasional cardiac consultation and admission to telemetry. Baroreceptor induced reflex bradycardia is a well-documented response to phenylephrine's vasoconstrictive and hypertensive effects. The duration of this response is less well documented. We sought to determine the incidence and duration of postoperative bradycardia before and after the adoption of a continuous phenylephrine infusion.

Methods: We compared data from 92 consecutive patients (group A) who had their elective c/section under spinal anesthesia without continuous phenylephrine infusion and an equal number (group B) who had it with. All patients received bupivacaine 1.6 ml with fentanyl 10µ and morphine 150µ. Hypotensive patients in group A were treated with 100µ phenylephrine boluses; group B received an infusion starting immediately after the spinal at 50 µ/min, titrated to keep the blood pressure near baseline (range 25 - 100 µ/min) and discontinued when no longer needed. Patients on rate controlling meds were excluded.

Results: There was no significant difference in HR upon arrival in PACU (group A=80.4, group B=79.4). In Group B patients,13% had a recorded HR < 55 BPM while in PACU compared to 4% of group A (Chi-square p=0.04). Seven group B patients had a lowest recorded HR  $\leq$ 49 with none in group A under 52. One patient was treated with glycopyrrolate for a HR of 42 and lethargy. In 8 patients bradycardia continued for at least 2 hours while in one patient it persisted for 48 hrs. One bradycardic patient had a concurrent MAP more than 20% above her baseline on admission to PACU; 2 patients had an accompanying drop in MAP 20% below baseline but neither was symptomatic or required treatment.

Discussion: Following discontinuation of a phenylephrine infusion, the observed effective half-life is 5 min while the elimination half-life is 2.5 hrs(2). 80% of the total dose is eliminated by 12 hrs. While patients commonly have low heart rates in response to the alpha-constrictive effects, in the majority of patients the effect has worn off by

arrival to PACU. We have shown that a significant subset of patients remains sensitive to the bradycardic effect long beyond the effective half-life. The bradycardia was mostly innocuous with only a single patient requiring treatment. More analysis needs to be done to determine if there are other factors predisposing to the bradycardia in this group of patients(e.g. age, total dose and duration of infusion).Providers caring for these patients need to be aware of the possibility of bradycardia and its benign nature.

# Minimizing Hypotension Following Spinal Anesthesia For Cesarean Section Using a Gradual Repositioning Technique

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#### Introduction

The incidence of hypotension among parturients receiving spinal anesthesia for C/S can be up to 71%1. Treatment includes intravenous fluids, vasopressor administration, and LUD. Hypoperfusion of the stomach leads to nausea and emesis. This can be minimized by maintaining a stable mean arterial pressure.

Upright positioning following spinal anesthesia with hyperbaric drug may decrease the incidence of hypotension^{2,3,}. We hypothesize that the use of a gradual recline technique may reduce the effect of a rapid sympathectomy and decrease the incidence of hypotension, nausea, and emesis without compromising block height.

## Methods

33 patients scheduled for elective C/S were randomly assigned to either control (immediate supine) or experimental (gradual recline) groups. Patients receiving therapy for chronic or gestational hypertension, those planned for CSE, and those undergoing urgent or emergent C/S were excluded. Spinal anesthesia was given (hyperbaric bupivacaine 0.75% 15mg, 130 mcg hydromorphone and fentanyl 10 mcg) after a 1L crystalloid preload. Control patients were started on a phenylephrine infusion at 0.5 mcg/kg/min immediately following spinal. A pilot study prior to this investigation suggested a phenylephrine infusion was not necessary for experimental patients. The primary outcome was hypotension in the twenty minutes following spinal. Secondary outcomes included vasopressor requirement, nausea and incidence of vomiting.

## Results

We found a statistically significant (p = 0.028) difference in systolic blood pressure (SBP) demonstrating SBPs lower in the experimental group at minutes 14 and 16. At these times SBPs were maintained at a mean of 100 mmHg compared with means of 115 and 117 mmHg in the control group. There was no significant difference in diastolic blood pressures.

We also found a statistically significant (p < 0.001) difference in total phenylephrine usage via infusion at 20 minutes between the two groups with the mean 83.7% lower in the experimental group. There was no statistically significant difference in phenylephrine or ephedrine boluses between either group. 80% of patients in the control group demonstrated vomiting compared with 20% of the experimental group; the preliminary data was underpowered to show statistical significance.

100% of participants achieved adequate block height by 10 minutes after spinal.

# Conclusions

Patients undergoing slow recline after spinal require similar amounts of phenylephrine via bolus as the control group to maintain normotension without an infusion. Slow recline still allows for appropriate block height within 10 minutes.

Based on preliminary data, a lower incidence of vomiting was observed in the experimental group; the statistical significance of this will be evaluated as study numbers increase.

# A Retrospective Comparison of Neonatal Acid-Base Status Before and After Discontinuing Routine Left Uterine Displacement for Elective Cesarean Delivery

**Presenting Author:** Keyanna Jackson, BA **Presenting Author's Institution:** Columbia University Vagelos College of Physicians and Surgeons - New York, New York **Co-Authors:** Richard Smiley, MD, PHD - Columbia University

**Background:** Maintenance of left lateral tilt for uterine displacement until delivery during cesarean section (CD) has been a decades-long recommendation, based on the premise that the supine position will result in aortocaval compression, maternal hypotension and fetal compromise.[1] The studies on which the practice is based were often nonrandomized, utilized a mix of anesthetic techniques, and were conducted in the setting of the avoidance of vasopressors. [1] More recent evidence suggests that even in 15 degrees of left tilt, there is minimal relief of aortocaval compression.[2] Furthermore, there is evidence that most practitioners never achieve 15 degrees of tilt anyway.[3,4]

Routine tilting was abandoned in our practice following a 2017 RCT showing that maternal supine position during elective CD with spinal anesthesia in healthy term women does not impair neonatal acid-base status compared to 15 degrees left tilt, when maternal SBP is maintained with a crystalloid coload and prophylactic phenylephrine (PE) infusion.[2]

We retrospectively gathered neonatal outcome data for two 12-month periods; one before and one after our clinical practice change. Our hypothesis was that there would be no difference in mean neonatal umbilical artery base excess in neonates delivered by elective cesarean section during the two periods. We considered a significant difference between groups to be 0.5 mmol/L.

**Methods:** Data for this retrospective cohort study was obtained by review of electronic health records. A random sample of ASA 2 or 3 parturients aged 18 to 55 yrs., undergoing elective, CD at term with spinal anesthesia, in 2014 (N=201, "Before" group) and 2017 (N=202, "After" group), was selected. Our routine practice during both periods included crystalloid coloading and prophylactic PE infusion targeted at maintaining baseline maternal SBP.

**Results:** There were no differences in umbilical artery or vein base excess or pH between "Before" and "After" groups (Table). There was also no significant difference between groups in the number of outliers with respect to neonatal umbilical artery base excess, pH, Apgar scores or need for resuscitation (Table).

**Conclusions:** Not tilting the surgical table by 15 degrees during term, elective cesarean delivery with spinal anesthesia did not impair neonatal acid-base status compared to a

historical cohort when maternal tilt was routine. Our data supports our shift in clinical practice and that routine tilt during cesarean delivery with neuraxial anesthesia may not be necessary.

FINAL Table Neonatal Outcomes.1.30.23.pdf

## Association between inpatient labetalol use during hospitalization for delivery and neonatal blood glucose and heart rate

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## **Background**

 $\beta$  blockers are first line medications in the management of hypertensive disorders of pregnancy¹. They are known to cross the placenta and previous observational studies have found associations between maternal outpatient  $\beta$  blocker and neonatal bradycardia and hypoglycemia^{2,3}. However, the impact of inpatient  $\beta$  blocker use is not well understood. We aimed to determine the association between labetalol versus hydralazine or nifedipine used for treatment of hypertensive disorders of pregnancy during delivery admission with neonatal blood glucose and heart rate. Methods

We performed a single center retrospective cohort study using data from a single institution between 2015 and 2022. The associations between inpatient labetalol versus nifedipine or hydralazine administration and infant blood glucose and heart rate (lowest measurement within 7 days post-delivery) were assessed using generalized estimating equations to account for multiple deliveries from the same patient. Unadjusted associations were estimated using the entire cohort. Subsequently, associations were estimated in a subset of patients matched on home  $\beta$  blocker use and on an exposure propensity score to account for confounding. The propensity score estimated the probability of labetalol exposure based on delivery year, mother's age, mother's body mass index, mother's race, gestational age at delivery, infant weight, type of hypertension, multiple gestation, asthma, chronic renal disease, diabetes, and epilepsy. Matching was conducted using a 2:1 ratio and a caliper of 0.25 of the propensity score. Covariate balance was assessed using standardized mean differences. Results

A total of 559 and 66 deliveries were identified with inpatient labetalol versus nifedipine/hydralazine administration, respectively. The crude differences comparing labetalol with nifedipine/hydralazine were -3.1 mg/dl (95% CI: -6.2, 0) for neonatal blood glucose and -2.4 bpm (95% CI: -5.1, 0.3) for neonatal heart rate. A total of 127 deliveries were matched to 64 deliveries with inpatient labetalol and nifedipine/hydralazine administration, respectively. After matching, the standardized differences between groups with respect to all assessed potential confounders were < 0.2. The adjusted differences in the matched cohorts were -5.8 mg/dl (95% CI: -9.5, -2.1) for neonatal blood glucose and -3.4 bpm (95% CI: -7.5, 0.7) for heart rate.

# **Conclusion**

We detected an association between the inpatient use of labetalol and decreased neonatal blood glucose levels and decreased neonatal heart rate, although the latter association was imprecisely estimated. Our findings suggest that close monitoring of glucose levels and heart rate in neonates of mothers receiving inpatient labetalol is warranted to avoid adverse neonatal outcomes.

SOAP2023Table1.pdf

# Inpatient Peripartum Labetalol is Associated with an Increased Risk of Fetal Hypoglycemia 1-hour Post-Delivery and Uterine Atony

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**Introduction:** Hypertensive disorders of pregnancy are common and are rising in prevalence particularly in developed nations. Treatment includes calcium channel or beta-blocking medications. The beta-blocker labetalol is a first-line therapy due to mixed alpha and beta effect, proven efficacy, and safety in pregnancy. Beta-blockers readily cross the placenta into fetal circulation, but previous studies showed mixed neonatal outcomes. Several studies based on long-term outpatient prescriptions suggested an increased incidence of bradycardia, hypoglycemia, and neonatal intensive-care unit (NICU) admissions. We sought to look at inpatient peripartum labetalol administration and neonatal outcomes.

**Methods:** We performed a retrospective, single-center cohort study at our tertiary academic hospital, a referral center for our healthcare network. We compared the rate of hypoglycemia 1-hour and 24-hours post-delivery, bradycardia, and NICU admissions in neonates based on exposure to labetalol in the peripartum. We also examined the rate of secondary uterotonics or antifibrinolytics following delivery. We calculated univariate odds ratio (OR) and binomial generalized models (GLM) to account for covariates. P< 0.05 was considered significant.

**Results:** We examined records for 26,058 parturients over 5 years (07/2016-06/2021). Partial data were available for component APGAR scores (22,155), NICU admissions (21,489), and hypoglycemia (1,100). 609 women were exposed to labetalol. In multivariate analyses, 1-hour hypoglycemia was significantly associated with labetalol administration (P=0.034, OR 2.36, 95%CI 1.07-5.32); no significant association was found with 24-hour hypoglycemia (P=0.84), bradycardia (P=0.76), or NICU admissions (P=0.93). Labetalol administration was associated with uterine atony (P< 0.001) and change in hematocrit from pre-delivery values (P< 0.001), even when accounting for magnesium exposure and administration of general anesthesia.

**Discussion:** Hypertensive disorders of pregnancy are rising in prevalence; while medications for management of elevated blood pressure in pregnancy exist, there is a paucity of data supporting individualized treatment for maternal and neonatal factors. We found an association between peripartum labetalol use and neonatal hypoglycemia, but not bradycardia or NICU admissions. We also found a link between labetalol and uterine atony. Our results highlight the difficulty in identifying whether neonatal outcomes are driven by medication administration, either in the peripartum or throughout pregnancy, or by the underlying vascular pathology and potential fetal

growth restriction. Combined with prior data, we suggest a preference for a different agent, such as nifedipine, when the risk of neonatal hypoglycemia is already elevated.

# Infant Apgar Scores After Labor Using Opioid Free Epidural Analgesia Compared to Opioid Epidural Analgesia

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# Introduction

In the U.S., opioid epidural labor analgesia (OLEA) is used in most births (1). Deaths from opioid overdose in women have increased by 400% from 1999-2010 and the incidence of neonatal opioid withdrawal syndrome has increased five-fold among infants covered by Medicaid in 46 States (2). In addition, epidural opioids adversely affect mothers and opioid use disorder (OUD) has been associated with poor maternal and neonatal outcomes in the U.S. (3). We therefore tested whether OFLEA improves infant outcomes by measuring Apgar scores two timepoints after labor. **Material and Methods** 

The two cohorts received epidural solutions of continuous 0.1% Ropivacaine + 250 mcg Fentanyl (OLEA) or 0.2% Ropivacaine (OFLEA). We began with 1423 patients. After removing patients with twin deliveries, duplicated in both groups, and those with extreme missing values, the total number of patients was 1346. After matching 1:1 on the mother's age, the final sample size was 618 patients. A non-parametric Wilcoxon two-sample test was used to assess infant Apgar scores 1 minute and 5 minutes after delivery.

# Results

Infant Apgar scores both 1 minute and 5 minutes after delivery were not statistically different between the OLEA and OFLEA groups. The Apgar score 1 minute after delivery in the OLEA group was  $7.896 \pm 1.29$  versus  $7.819 \pm 1.26$  in the OFLEA group (P=0.0892). The Apgar score 5 minutes after delivery in the OLEA group was  $8.760 \pm 1.16$  versus  $8.743 \pm 1.174$  in the OFLEA group (P=0.5784) (Table 1). We failed to reject the hypothesis that using OFLEA improves infant Apgar scores both 1 and 5 minutes after delivery in comparison with OLEA.

# Discussion

Our results suggest that OFLEA does not improve infant outcomes via Apgar scores after delivery compared to OLEA. While OLEA has been associated with an increased risk of adverse events during labor, the avoidance of opioid analgesia is a potential future avenue for obstetric anesthesia as healthcare re-examines its relationship with opioids.

The use of OFLEA may help avoid side effects such as withdrawal and overdose of the infant. Studies further investigating the potential differences between the two treatment options are necessary to determine the true impacts of OFLEA on infant outcomes. Infant Apgar Scores After Labor Using Opioid Free Epidural Analgesia Compared to Opioid Epidural Analgesia_Reddy.pdf

## Ropivacaine and fentanyl concentrations in umbilical cord blood and neonatal outcome after epidural analgesia administration using programmed intermittent bolus : a prospective observational study

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**Background**: The safety and concentrations of ropivacaine and fentanyl on neonates during continuous epidural labor analgesia or epidural anesthesia for cesarean deliveries have been reported(1-4). However, programmed intermittent epidural bolus (PIEB) and patient-controlled epidural analgesia (PCEA) have not yet been described. Therefore, we aimed to examine the drug concentration in the umbilical vein and neonatal outcome using PIEB and PCEA during labor analgesia.

**Methods**: Healthy parturient women with singleton pregnancy received combined spinal-epidural analgesia using PIEB (7 mL every 45 min) and PCEA (7 mL/bolus, lockout interval:15 min) with 0.08% ropivacaine and 2  $\mu$ g/mL fentanyl. Additional boluses were administered when necessary. Maternal and neonatal information and anesthesia records were collected. Umbilical venous blood was collected at the time of delivery, and the drug concentrations were measured. The neonatal assessment included measuring umbilical artery blood gas and the Apgar score.

**Results**: The umbilical vein concentrations of ropivacaine and fentanyl at delivery were measured in 50 patients. The median (range) ropivacaine and fentanyl epidural anesthesia doses were 64.2 mg (20.4–215.2) and 214  $\mu$ g (109–543), respectively. The ropivacaine and fentanyl doses per analgesia hour were 12.5 mg/h (7.7–22.3) and 38.8  $\mu$ g/h (23.8–122.8), respectively. Ropivacaine concentration was 76.8 ng/mL (13–182), whereas fentanyl concentrations were < 0.1 ng/mL in 11 cases, 0.1 ng/mL in 18 cases, 0.2 ng/mL in 18 cases, 0.3 ng/mL in one case, and 0.4 ng/mL in two cases. The umbilical artery blood pH was >7.2 in all cases. Four cases had low Apgar score < 7 at 1 min, and in all of them, Apgar score at 5 min recovered to 9. In these cases, ropivacaine concentrations ranged from 39.0 to 167.1 ng/ml and fentanyl concentrations ranged from < 0.1 to 0.4 ng/ml.

**Conclusions**: Our observational study, using PIEB and PCEA, showed that the drug concentrations in the umbilical vein were low after epidural labor analgesia, and the

effect of the anesthetic concentration in the umbilical cord venous blood did not affect neonatal well-being.

# The assessment of inpatient postpartum sleep following vaginal and cesarean delivery using actigraphy

Presenting Author: Alla Yarmosh, MD, MCR Presenting Author's Institution: Stanford University Co-Authors: Kazuo Ando, MD, PhD - Stanford University Mary Im, MD, MPH - El Camino Hospital James O'Carroll, MBBS, FRCA - Stanford University Perman Pandal, MBBS - Stanford University School of Medicine Danielle Panelli, MD - Stanford University

## Introduction

Poor sleep has a negative impact on maternal wellbeing. However, few studies have objectively assessed inpatient sleep following childbirth. Smartwatch actigraphy (wrist-based accelerometry) is a validated way to measure sleep/wake cycles. The primary aim of this study was to assess inpatient postpartum sleep following either spontaneous vaginal delivery (SVD) or scheduled cesarean delivery (CD) using actigraphy.

## Methods

Following institutional review board approval, eligible patients planning to deliver either by SVD or CD were screened, enrolled and consented. Each patient was instructed to wear an Actigraph GT9X Link smartwatch on their non-dominant wrist prior to delivery until time of hospital discharge. We also collected baseline demographic, obstetric, anesthetic and neonatal data. Data from patients who had had an intrapartum CD or incomplete actigraphy data were excluded. Following discharge, watch data were downloaded for analyses using Cole-Kripke and Tutor-Locke algorithms to derive sleep/wake pattern intervals and sleep period epochs (example provided in Figure 1). Statistical analyses were performed comparing differences between SVD and CD using Mann-Whitney U, with nonparametric data presented as median [IQR].

## Results

A total of 78 patients were recruited with 18 excluded from the analysis (9 intrapartum CD, 1 withdrawal and 8 insufficient actigraph data). The median [IQR] age for SVD vs CD was 34 [30–38] vs 36 [33–39] and median BMI was 26.2 [24.8–30.5] vs 29.4 [26.9–32.3] Kg/M² respectively, with no statistical differences between groups. There was also no difference in neonatal intensive care admissions, transfusion requirements, or breastfeeding at time of discharge between groups. Within the first twenty-four hours postpartum there were no differences in the median total sleep duration (94 [0–189] vs 111 [0–229] minutes; p=0.683) or time to onset of first sleep (600 [368–737] vs 885 [470–972] minutes; p=0.132) between SVD and CD respectively. A total of 7 SVD and 9 CD patients had no sleep recorded in the first twenty-four hours. The awakening durations were shorter in patients following SVD compared to CD (5 [2–7] vs 6.5 [4–14] minutes; p=0.022). In addition, the sleep fragmentation index (SFI), a measure of restlessness

during sleep, was lower in patients following SVD compared to CD (20.2% [6.0–30.2] vs 35.2% [26.1–46.4]; p=0.013).

#### Conclusion

This study demonstrates differences in SFI, and duration of awakenings during hospitalization following SVD and CD. Future studies are needed to determine the modifiable factors driving these differences and the impact of sleep metrics on outpatient postpartum recovery domains including psychological morbidity.



Sleep epochs during first 24 hours postpartum highlighted in pink

# **Development of A Chinese Version of Obstetric Quality of Recovery-10**

# Presenting Author: NA ZHAO, MD

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# BACKGROUND

Patient-reported outcome measures (PROMs) are important to measure postpartum recovery and inform enhanced recovery strategies. In recent years, the obstetric quality of recovery-10 (ObsQoR-10) scoring tool has been developed and validated in English and several other languages. We performed translation and preliminarily validation of the Chinese version of Obstetric Quality of Recovery-10 (ObsQoR-10-Chinese).

## **METHODS**

ObsQoR-10-Chinese was developed based on methodology recommended by the Mapi Research Group. After forward and backward translation steps, the ObsQoR-10-Chinese was developed. To further refine the Chinese version, a comprehension test was performed in parturients on day one following delivery at an urban academic teaching hospital offering tertiary-level care specialized in obstetrics and gynecology in Beijing, China.

# RESULTS

Forty parturients, 20 with cesarean deliveries and 20 vaginal deliveries, were invited to complete the ObsQoR-10-Chinese scoring tool. All parturients reported no difficulty in understanding all the items of the questionnaire. Median [interquartile range] ObsQoR-10-Chinese score (0-100; 0 worst recovery, 100 best recovery) for all participated parturients was 62 [49-77]. Those underwent urgent cesarean delivery, elective cesarean delivery and vaginal delivery were 53.5 [46.3-77.3], 58.5 [42.3-75.3], and 68 [51-77], respectively.

## DISCUSSION

Compared to other published study results, scores of "Ability to hold / feed baby" from our study population were very low (median score of 3 in our study and 9 in other studies). We speculate some of the Chinese cultural practices for postpartum women could be driving these findings. In China, parturients are not encouraged to hold their baby or lift any weights immediately after delivery, and especially during the first month postpartum. Many believe letting a new mother hold the baby could cause harm to their hand/arm or spine. Such practices originate from the old Chinese tradition known as the "sitting the month", when new mothers rest and are served by a caregiver for one month postpartum. Such practices also re-establish a socially accepted standard of autonomy for postpartum women in China, which is different from many other cultures.

### CONCLUSION

Our results show that ObsQoR-10-Chinese items may need to be modified due to different cultural and traditional practices. . Our preliminary study shows that simple translation of PROMs such as ObsQoR-10 without cultural modification and validation in the applied setting may not be adequate. Based on these findings, we intend to create a modified version according to our results and further validate ObsQoR-10-Chinese in a larger population.

# Spinal Hydromorphone versus Morphine for Post-Cesarean Delivery Analgesia: A Randomized Non-Inferiority Trial

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# Background:

Cesarean Delivery (CD) is the most common surgical procedure performed in North America¹

Intrathecal (IT) morphine is the standard for post-CD analgesia. Recently, adverse events, drug shortages² and a potential superiority in cases of opioid addiction³ prompted research into IT hydromorphone. These studies established the ED90 for both opioids for post-CD analgesia⁴ and failed to prove superiority of morphine over hydromorphone.⁵ Non-inferiority of IT hydromorphone has yet to be tested. Our study sought to investigate whether IT hydromorphone was non-inferior to IT morphine for post-CD analgesia.

# Methods:

In our single-center, blinded, randomized controlled trial, 126 patients presenting for elective CD received either IT morphine 150 mcg or IT hydromorphone 75 mcg as part of a spinal anesthetic technique. The primary outcome was the difference in the average Numeric Rating Scale (NRS) pain scores (on a scale from 0-10) for the first 24 hours after CD, with a pre-established non-inferiority limit of 1. Secondary outcomes included differences in quality of recovery as measured by the Obstetric Quality of Recovery score-11 (ObsQoR-11), 24-hour opioid consumption, NRS pain scores every 6 h, respiratory rate, oxygen saturation, time to first opioid request, number of treatments for nausea and pruritus, and APGAR scores.

# **Results:**

As the upper limit of the 95% CI did not exceed 1, IT hydromorphone was non-inferior to morphine (mean difference -0.46; 95% CI -1.0 to 0.1; p=0.12) No significant differences
were found for the majority of the secondary outcomes.

# **Conclusions:**

IT hydromorphone is non-inferior to IT morphine for post-CD analgesia. Both opioids provide effective analgesia and hydromorphone may be a suitable alternative to morphine.

# Identifying Patient-Centered Psychological and Social Support Needs After Traumtic Birth: A Qualitative Study

Presenting Author: Grace Lim, MD, MS Presenting Author's Institution: University of Pittsburgh - Pittsburgh, Pennsylvania Co-Authors: Patricia L. Dalby, MD - University of Pittsburgh Priya Gopalan, MD - University of Pittsburgh Emma Nowakowski, N/A, n/a - UPMC Magee-Women's Hospital Department of Anesthesiology and Obstetrics Neeta Shenai, MD - University of Pittsburgh Medical Center Thomas Troyan, n/a - UPMC Magee-Women's Hospital Department of Anesthesiology and Obstetrics

# Introduction:

Emergency deliveries increase maternal risk for postpartum depression (PPD) and posttraumatic stress disorder (PTSD).¹²³ Nearly one in three women describe their birth experience as traumatic,⁴ and PPD and PTSD rates (14% and 4%, respectively) are higher in these cohorts.¹⁴⁵ Patient-centered, post-birth support is limited in patients who identified as having had a traumatic birth. We conducted a qualitative study of women with traumatic birth experiences to identify patient-centered priorities to optimize postpartum medical and psychosocial support.

### Methods:

An IRB-approved prospective qualitative study design was chosen, with semi-structured interviews of women having emergency deliveries and self-identifying as experiencing traumatic birth in the previous year. Participants completed the Stanford Acute Stress Reaction Questionnaire and the PTSD Checklist. Semi-structured interviews included open-ended questions about labor and delivery events that improved or worsened their delivery experience, perceptions of mental, physical, and emotional support provided by staff, and patient attitudes about psychological referral after emergent deliveries.

### **Results:**

Eight women participated in all procedures. Three (37.5%) had a history of anxiety, depression, or PTSD prior to their birth experience. Most participants (6 of 8, 75%) had symptoms of anxiety, depression, or PTSD at the time of the interviews, with 50% of women meeting PTSD criteria. Themes that emerged from interviews as factorial in patients experiencing the birth as traumatic, included previous prenatal or peripartum medical concerns; birth experiences were affected by prenatal expectations and clinical staff communication style and quality during and after delivery (Table 1). Women almost unanimously pointed out a desire to be offered psychosocial services after birth trauma, but also noted they may not immediately accept the offered services.

# **Conclusion:**

Following a traumatic birth, women expect timely acknowledgement of the physical and mental toll of the experience by their obstetricians. Identified opportunities to enhance patient-centered care during emergencies include: 1.) Prenatal education on alternative birth plans; 2.) Improving patient-clinical staff communication during emergent events; 3.) Providing emotional support following emergent deliveries; 4.) Including mental health conversations in postpartum period, prior to hospital discharge; 5.) Providing psychiatric follow up for women with a history of traumatic prenatal or birth experiences or mental health disorders.

Psychosocial support after traumatic birth table.pdf

# An Environmental Scan of Regional Variances in Post-Cesarean PACU Care

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Obstetric patients undergoing cesarean section, whether under general or regional anesthesia, assume unique postpartum risks and complications during the recovery period. Specific monitoring and trained personnel after surgery are required in order to minimize these risks and appropriately manage complications. A study surveying all Michigan hospitals that provide obstetric care indicated the majority of obstetric post-anesthesia care units (PACUs) are staffed by labor and delivery (L&D) nurses with varying degrees of training for post-anesthesia care (1). This variation in care is likely due to lack of consensus among nursing, anesthesia, and surgical societies. The lack of consensus on staffing ratios or nursing qualifications required in the PACU also exists despite the Joint Commission requiring post-anesthesia care standards to be the same throughout an institution (2).

Our objective was to characterize and ultimately distill commonalities of obstetric PACU care employed at institutions designated as SOAP Centers of Excellence (COE). This study was an exploratory internet-based questionnaire, distributed between August 2022 and October 2022 to 80 institutions internationally. Anesthesiologists were asked to describe the number of births, epidural rates, and cesarean delivery rates at their institutions, as well as obstetric PACU location, amenities, staffing, and nursing qualifications.

Of the 80 surveys distributed, 21 centers completed the survey, across 14 US states. All of the responding COEs documented having a designated obstetric PACU where patients can recover following cesarean deliveries. While the majority of post-cesarean patients at these centers recovered in these obstetric PACUs (90.76%, SD 11.66), there was some variation in recovery location with labor and delivery rooms being the second most common site (4.29%, SD 6.77) and the adult surgical PACU being the least common location for post-cesarean recovery (0.67%, SD 2.25). The majority of obstetric PACUs are staffed solely by L&D nurses. However, these centers differed in nursing competencies for vasopressor administration, management of invasive monitors, fetal resuscitation, and airway management (Figure 1). There were also differences in monitoring capabilities in the obstetric PACUs and patient characteristics that required them to be recovered at a location with a higher level of care.

Our goal for this data is to guide the formation of a consensus statement on the necessary staff, equipment, and capabilities for optimal obstetric PACU care. Such a statement would help ensure patients who undergo cesarean sections, and thus require specialized postpartum and post-anesthesia care, have standardized and improved quality of care.

Figure 1.pdf

# A systematic review of patient-reported outcome measures in maternal postpartum post-traumatic stress disorder.

Presenting Author: James O'Carroll, MBBS, FRCA Presenting Author's Institution: Stanford University Co-Authors: Kazuo Ando, MD, PhD - Stanford University Holly A. Blake, N/A, BSc, MBBS, FRCA - Royal London Hospital, London. UK Brendan Carvalho, MBBCh, FRCA, MDCH - Stanford University School of Medicine, USA Adam Patrick, BM BCh, FRCA - Royal London Hospital, London. UK

# Introduction

Postpartum psychological health is an important part of postpartum recovery. Psychological trauma related to childbirth is common with up to 44% perceiving their birth experiences as traumatic and the prevalence of diagnosed postpartum posttraumatic stress disorder (PTSD) ranging from 4% to 19% in higher risk groups. Patient Reported Outcome Measures (PROMs) are important instruments in which patients can report their own health states. In this systematic review, we evaluate the psychometric measurement properties of existing PROMs used for maternal postpartum PTSD and provide recommendations regarding the best available measure(s).

#### Methods

The review was prospectively registered with PROSPERO. A search of 6 databases for validated PROMs of postpartum PTSD was conducted in July 2022. Studies were considered if they evaluated at least one psychometric measurement property of a PROM and a risk of bias assessment was performed to evaluate the methodology of each study. Psychometric measurement properties of each PROM were rated using the COSMIN criteria and a modified GRADE approach to assess the level of evidence. Recommendations were then made for the overall quality of each PROM.

### Results

The literature search found a total 4,438. Studies with 2,924 postpartum recovery studies screened, 130 papers full texts were reviewed, and 63 studies met the inclusion criteria. The studies evaluated 14 PROMs in 18 different languages between 2002 and 2022. The studies were conducted in 24 countries and involved a total 43,383 postpartum patients. Of the PROMs evaluated, only one assessed all 8 domains of content validity according to the DSM-5 criteria with none of the PROMs assessing all psychometric measurement properties outlined by COSMIN. Importantly, only Modified PTSD Symptom Scale Self-Report (MPSS-SR) and Posttraumatic Diagnostic Scale (PDS) were evaluated against the gold standard for criterion validity of structured clinical interview. Eight PROMs had sufficient content validity (≥4 out of 8 domains) and at least low level of evidence for internal consistency, therefore achieved Grade A recommendation (i.e. can be recommended for use in the postpartum population). See Fig. 1.

# Conclusion

Our study highlights the range of PROMs available to evaluate and screen for postpartum PTSD. Further studies are required to assess screening cut-offs against gold standard tools and cross-cultural validity in the postpartum population.

				PROM Obstetric		
	Content validity	Number of COSMIN		population specific?		
PROM	(No. of domains)	criteria assessed	Freely available?	Yes/ No	Language(s) used (n) studies	Recommendation
					Croatian (3); English (2); Hebrew (2); French	
					(1); German (1); Russian (1); Spanish (1) and	
City Birth Trauma Scale (CityBiTS)	8	5	Free to use under Creative Commons license	Yes	Turkish (1)	A
Harvard Trauma Questionnaire-16 (HTQ-16)	4	1	Not free to use. Available for order via email	No	Kiswahili (1)	В
Impact of Event Scale (IES)						
	2	4	Free to use. No registration required	No	Norwegian (6); English (2)	В
Impact of Event Scale- German (IES-G)	2	4	Not freely available.	Yes	German (1)	В
					Dutch (2); Persian (2); English (1); French	
Impact of Event Scale- Revised (IES-R)	4	4	Free to use. No registration required	No	(1); Italian (1) and Swedish (1)	A
Los Angeles Symptoms Checklist (LASc)	4	2	Free to use. Request from author	No	Italian (1)	A
Modified PTSD Symptom Scale Self-Report (MPSS-SR)	4	2	Free to use. Request from author	No	English/French (1)	В
Posttraumatic Stress Disorder Checklist for DSM-5					Greek (2); Persian (2); Dutch (1); English (1);	
(PCL-5)	4-5	5	Free to use. No registration required.	No	French (1) and not known (2)	A
Posttraumatic Diagnostic Scale (PDS)	5	6	Not freely available.	No	English (1); German (1) and Turkish (1)	А
Perinatal PTSD Questionnaire (PPQ)	4	4	Free to use. No registration required	Yes	Italian (3) and English (2)	A
					Spanish (2); Chichewa (1); Chinese (1);	
Perinatal PTSD Questionnaire- II (PPQ-II)	4	5	Free to use. No registration required	Yes	English (1); Italian (1) and Korean (1)	A
					Dutch (3); English (3) Hebrew (1) and	
PTSD Symptom Scale - Self-Report (PSS-SR)	3	5	Not freely available.	No	not known (1)	В
Self-rating inventory for PTSD (SRIP)	4	2	Not freely available.	No	Dutch (1)	В
					Dutch (3); French (1); German (1) and	
Traumatic Events Scale (TES)	5	5	Not freely available.	No	Swedish (1)	A

# Development and multicenter validation of the STanford Obstetric Recovery checklist (STORK)

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**Introduction:** Patient-reported outcome measures (PROMs) are the gold standard tools to measure postoperative recovery.1 Best PROMs are not postpartum specific and have limited content validity for assessing postpartum recovery.2 We aimed to develop and validate a new postpartum-specific global recovery PROM (STORK).

Methods: Having identified the need for a postpartum-specific PROM to measure outpatient postpartum recovery,2 a multidisciplinary Delphi consensus approach was used to select questions from existing PROMs, and supplement with additional questions as per PROMIS methodology. Final items required consensus with ≥70% agreement for inclusion. Following multi-institutional IRB approval, a clinical validation study was undertaken at 3 institutions. Patient demographic, obstetric variables, and survey instruments (ObsQoR-10, EuroQoL (EQ5D3L) and STORK) were completed as appropriate in hospital, and at 2, 6 and 12 weeks postpartum. Enrolment occurred < 36 h after any delivery mode and recruitment continued until 100 6-week responses were obtained at each institution. STORK was evaluated as follows: 1) validity a) correlation with global health visual analog scale (GHVAS: 0-100) and b) EuroQoL (EQ5D3L) PROM scores; and c) discriminant validity (mean difference in STORK scores with GHVAS < 70 vs ≥70; and by delivery mode); 2) reliability (Cronbach's alpha, inter-item correlation, test re-test reliability, split half reliability and floor and ceiling effects), 3) responsiveness of the new PROM (ability to detect differences over time) and 4) feasibility (response rate and missing data). Data are presented as mean [standard deviation (SD)], median [interguartile range (IQR)], and number (%). Correlations were determined using Spearman rank correlation coefficients (r). Internal consistency was measured with Cronbach's alpha, and split-half reliability was assessed using Spearman-Brown prophesy reliability estimate. Test-retest reliability was measured by intra-class correlation coefficient (ICC). P < .05 was accepted as statistically significant.

**Results:** 403 patients have currently been recruited across the 3 institutions with 224 having completed 6-week follow-up. We anticipate that a fully analyzed dataset will be available by the SOAP meeting. Current descriptive analyses of patient demographic and obstetric data, and recovery scores from 2 sites are outlined in Table 1. Validity, reliability, responsiveness, and clinical feasibility data will be determined as outlined as

above.

**Conclusion:** Validity, reliability, responsiveness, and clinical feasibility of this robustly developed new PROM will be presented. Key domains that drive poor global recovery e.g. mental health and/or sleep will be identified. Once validated, STORK has both clinical and research potential to evaluate and track the complex construct of outpatient postpartum recovery.

*PS Harman Tbale.pdf

# Relationship between sleep disturbances within 24 hours after cesarean delivery and postpartum depression: a retrospective cohort study

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Background: Postpartum depression affects 13-20% of postnatal women and is a leading cause of postpartum suicide and child abuse ⁽¹⁾. Therefore, it is crucial to identify risk factors and implement appropriate preventive measures. Several factors, including hormonal changes and maternal complications, are known to cause sleep disorders during the perinatal period, and associated with depressive symptoms ⁽²⁾. However, the relationship between sleep disturbance immediately following childbirth and the onset of postpartum depression remains unclear. Therefore, this study aimed to investigate the hypothesis that sleep disturbances within the first day after cesarean delivery were related to scores of the Edinburgh Postnatal Depression Scale (EPDS), a tool for screening postpartum depression, one month after delivery.

Method: The study was approved by the institutional research ethics committee and data was extracted from the medical records of patients who underwent elective cesarean delivery under neuraxial anesthesia during the study period. Patients were asked about the presence of sleep disturbances on the day after surgery. EPDS scores were recorded at the one-month postpartum check-up. In statistical analysis, postpartum EPDS scores were compared between the poor postoperative sleep group and the good postoperative sleep group. Other factors, such as maternal background, intraoperative, neonatal, and postoperative information, were also compared between the two groups. In addition, potential confounding factors were adjusted by propensity score matching.

Results: 257 cases(55 in the poor sleep group, 202 in the good sleep group) were analyzed. The postnatal EPDS score was significantly higher in the poor sleep group compared to the good sleep group ( $6.6\pm5.21$  vs  $4.0\pm3.87$ , p< 0.001). The poor sleep group had lower BMI ( $24.6\pm3.23$  vs  $26.0\pm4.67$ , p=0.033), higher psychiatric morbidity (12.7% vs 4.5%, p=0.024), and higher maximum NRS at 24 hours after surgery ( $5.5\pm4.67$  vs  $4.8\pm1.79$ , p=0.019), and a higher rate of postoperative opioid use (32.7%vs 14.4%, p=0.002). Furthermore, in the propensity score matching analysis for parity, age, BMI, psychiatric disorders, and postoperative NRS, the postpartum EPDS score was still significantly higher in the poor sleep group ( $6.6\pm5.23$  vs  $4.1\pm3.80$ , p=0.001). Conclusion: This study's results provided strong correlation between sleep disturbance within the first day after cesarean delivery and the EPDS score one month after childbirth. Sleep disturbance on the day of delivery may be a potential risk factor for the development of postpartum depression.

### Inflammatory biomarkers in the plasma and cerebrospinal fluid of patients with persistent pain and postpartum depression after elective cesarean delivery: an exploratory study

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Background: Severe acute pain after cesarean delivery increases the risk of persistent pain and postpartum depression (PPD).[1-4] Both conditions contribute to maternal morbidity and mortality, yet early risk stratification remains challenging.

Neuroinflammation has emerged as a key mechanism of persistent pain and depression in non-obstetric populations.[5] However, the role of neuroinflammation, and the relationship between plasma and cerebrospinal fluid (CSF) cytokine levels in postpartum pain and depression is unclear. Thus, here we compared plasma and CSF cytokine levels between patients who developed (versus those who did not develop) persistent post-partum pain and/or PPD.

Methods: Term patients with singleton pregnancies undergoing elective cesarean delivery under neuraxial anesthesia were recruited. Baseline demographic, obstetric and Edinburgh Postnatal Depression Scale (EPDS) information were collected. Plasma was collected preoperatively and 48 hours postoperatively; 10 ml of CSF was collected prior to spinal anesthetic placement. EPDS and pain scores were obtained at 6-weeks and 3 months after delivery. Twelve candidate analytes: CRP, TGFb1, IFNg, TNF-a, IL-1b, IL-6, IL-8, IL-10, IL-12p70, IL-13, IL-18, and IL-21 were selected based on published literature demonstrating their association with major depression and/or chronic pain in non-obstetric populations.[6, 7] Multiplex analyses using MSD custom UPLEX assay (MesoScale, Rockville, MD) were performed. The difference in cytokine levels among patients with vs without persistent pain and/or PPD was analyzed using two-sided Mann-Whitney tests. Since this was an exploratory study, multiple comparison correction was not performed.

Results: Eighty subjects were enrolled, and 63 patients completed the study; 23 (36.5%) experienced the primary outcome at three months. Preoperative plasma TGFb1 concentration was higher in patients who developed post-partum persistent pain and/or PPD vs those who did not (median [Q1, Q3]: 2879 [2241, 5494] vs. 2292 [1676, 2960]

pg/mL, P = 0.043). CSF IL-1b concentration was higher in patients who developed postpartum persistent pain and/or PPD vs those who did not (median [Q1, Q3]: 0.36 [0.29, 0.39] vs. 0.30 [0.25, 0.35] pg/mL, P=0.033).

Conclusions: We observed differential plasma and CSF cytokine levels in patients who developed persistent pain and/or PPD compared to those who did not. We demonstrated the feasibility of collecting plasma and CSF samples at cesarean delivery which could be implemented for future studies.

Table 1.pdf

# Association of Anesthetic Technique for Cesarean Delivery with the Incidence of Depression or Postpartum Depression Diagnosed at the Postpartum Visit: A Retrospective Single Center Study

**Presenting Author:** Elaine G. Avshman, BS **Presenting Author's Institution:** Texas A&M School of Medicine - Austin, Texas **Co-Authors:** Jessica Ehrig, MD - Baylor Scott & White Medical Center Temple Kendall Hammonds, MPH - Baylor Scott & White Medical Temple Emily Sharpe, MD - Mayo Clinic Rochester Hadley Young, MD - Baylor Scott & White Medical Center Temple

**Introduction:** In a large retrospective study, Guglielminotti et al reported that patients who received general anesthesia (GA) for cesarean delivery (CD) had a higher risk of severe postpartum depression (PPD).¹ The effect of inadequate anesthesia for CD on PPD has not been examined. Administration of systemic adjuvant anesthetic agents such as intravenous fentanyl or inhaled nitrous oxide can serve as a surrogate marker for inadequate anesthesia during CD. We hypothesized regional anesthesia with adjuvants or general anesthesia would be associated with an increased risk of PPD diagnosed during the postpartum visit.

**Methods:** Our hospital's institutional review board waived informed consent for our study. We manually inspected the electronic medical record for patients who had CD from July 1, 2019 to June 30, 2021. Patients were included for analysis if a postpartum visit within 60 days of delivery was documented. The anesthetic techniques were stratified into GA, regional anesthesia (RA) with systemic anesthetic adjuvant medication, and RA only. A study investigator recorded the anesthetic technique, whether the patient had a history of depression or PPD, and whether the patient was diagnosed with depression or PPD at their postpartum visit. PPD was diagnosed based on the Edinburgh Postnatal Depression Scale (EPDS).

**Results:** 1,612 CD were performed during the study period and 1,116 patients had a documented postpartum visit. Data on anesthetic technique, history of depression and PPD, and incidence of depression and PPD diagnosed at the postpartum visit are presented in Table 1. A logistic regression that controlled for history of depression or PPD determined the odds ratio of being diagnosed with depression or PPD for patients who had GA for CD was 0.943 (95% CI 0.511, 1.740; p=0.852) compared to patients who RA only and 1.091 (95% CI 0.652, 1.826; p=0.852) for patients who received RA with systemic anesthetic adjuvant medication compared to patients who received RA only. The odds ratio of a diagnosis of depression or PPD at the postpartum visit for patients who had a history of depression or PPD was 3.694 (95% CI 2.471, 5.524; p< 0.001).

**Discussion:** Anesthetic technique for CD was not associated with the incidence of depression or PPD diagnosed at the postpartum visit when we controlled for a history of

depression or PPD. A history of depression or PPD had a strong association with the incidence of diagnosis of depression or PPD at the postpartum visit. Limitations of our study include approximately 70% of our patients had a documented postpartum visit and that we were underpowered to detect an association between anesthetic technique and depression or PPD diagnosed at the postpartum visit if it existed.

Table 1 - KH.pdf

# Psychological outcomes associated with severe placenta accreta spectrum disorder with cesarean hysterectomy: a retrospective survey study

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**Introduction:** Placenta accreta spectrum disorder (PAS) can result in life-threatening peripartum hemorrhage, which may have psychological sequelae for mothers. Management of severe PAS typically involves immediate hysterectomy following cesarean delivery; however, delayed hysterectomy is an alternative treatment for patients at higher surgical risk.¹ Postpartum depression (PPD) and posttraumatic stress disorder (PTSD) are likely more common in patients with severe PAS;² however, little is known about whether immediate versus delayed hysterectomy affects these outcomes. This pilot study sought to determine the rates of PPD and PTSD in a cohort of patients with prior hysterectomy for severe PAS as well as to compare these rates in patients undergoing immediate versus delayed hysterectomy.

**Methods:** Patients with placenta increta or percreta (severe PAS) who underwent cesarean delivery and either immediate or delayed hysterectomy between January 2012 and May 2022 were identified by query of the institutional PAS database. Patients deceased or with missing contact information were excluded. Included patients were contacted by telephone and, after providing electronic consent, completed a brief survey via phone interview or emailed hyperlink. The survey involved retrospective reporting of symptoms related to PPD via the Edinburgh Postnatal Depression Scale (EPDS) and PTSD via the PTSD Checklist-5 (PCL-5). Univariate comparisons between immediate and delayed hysterectomy were performed using Mann Whitney and Fisher's Exact tests, as appropriate. A p-value of 0.05 was considered significant.

**Results**: Out of 47 patients considered for inclusion, 20 patients (43%) were successfully contacted and agreed to participate (12 immediate hysterectomy and 8 delayed hysterectomy). There were no significant differences in baseline characteristics between the groups (Table 1). Overall, 50% of patients (n=10) met the EPDS threshold for PPD (score  $\geq$ 10) and 35% of patients (n=7) met the PCL-5 threshold for PTSD (score  $\geq$ 31). Patients who underwent a delayed hysterectomy were more likely to retrospectively report symptoms of PTSD than those who underwent an immediate hysterectomy (75% vs. 8%, p< 0.01). Median PCL-5 scores were also higher in those with a delayed hysterectomy (51 [IQR 16,61]) vs. 11 [IQR 2,21], p=0.01). Rates of PPD and median EPDS scores were not significantly different between the two groups (Table 1).

**Discussion**: This survey study demonstrates higher rates of PPD and PTSD in patients with severe PAS compared to those reported in patients with uncomplicated cesarean

delivery.^{3,4} It also suggests that delayed hysterectomy may be associated with a greater risk of postpartum PTSD. Larger, prospective studies are needed to confirm these findings and determine appropriate standardized interventions for the postpartum care of these patients.

PAS Psych SOAP Table.pdf

# Quality of Recovery in Parturients with Obesity: A Prospective Observational Cohort Study

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#### Quality of Recovery in Parturients with Obesity: A Prospective Observational Cohort Study

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**Introduction:** The incidence of obesity during pregnancy is increasing in North America¹. In patients with obesity, the post-operative period is characterized by an increased and prolonged inflammatory response, making it an independent risk factor for acute pain². Nevertheless, providers tend to prescribe less opioids to these patients, which may inappropriately undertreat their pain.³ The Obstetric Quality of Recovery Score-10 (ObsQoR-10) is a validated measure of patient reported outcome after caesarean delivery (CD), providing a global assessment of postpartum recovery⁴. The objective of this study is to assess the effect of obesity on the quality of recovery after elective caesarean delivery.

**Methods:** Patients presenting for elective CD are invited to participate in this prospective cohort study. They are divided into two groups: Control (BMI< 30) and High BMI (BMI >40 kg/m²). Since September 2021, 130 patients were recruited (sample size 140, 70 per group, anticipated completion March 2023). All participants receive standardized intraoperative and postoperative care including spinal anesthesia with intrathecal morphine and multimodal analgesia. Twenty-four hours after surgery, patients complete the ObsQoR-10 questionnaire, and data are collected for secondary outcomes. The primary outcomes include difference in the ObsQoR-10 scores between groups. Secondary outcomes include difference in pain scores, total opioid consumption, incidence of adverse events, time to first mobilization, length of hospital stay, breastfeeding at 24h and readmission rates.

**Results:** Interim results for 87 patients revealed that our sample's ObsQoR-10 scores were 80.56 vs 81.64, 24h opioid consumption was 4.78 mg vs 5.92 mg, and mean NRS pain scores at 24 hours were 2.06 vs 1.76 for the Control group versus the High BMI group, respectively. Final results will be presented at the meeting.

**Discussion:** Our preliminary results suggest no difference in the quality of recovery, 24h opioid consumption and pain scores at 24hrs between groups. Inferential analysis at data completion will evaluate differences in side effect profile and other secondary outcomes.

# Psychological wellness and its relationship with Cesarean delivery quality of recovery and peritraumatic events: a prospective observational study

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**Introduction:** Psychological wellness is comprised of six aspects: physical, intellectual, spiritual, social, emotional, and psychological health. Psychological wellness is positively correlated with metrics related to non-obstetric surgical recovery (1). Social wellness is negatively correlated with traumatic reactions to non-operative birth events (2). However, the connection between psychological wellness, quality of recovery, and birthing distress is unclear in Cesarean delivery (CD) patients (3). The aim of this study was to assess if psychological wellness is positively related to obstetric quality of recovery and negatively related to immediate traumatic reactions to CD. **Methods:** Following ethics approval and informed consent, patients aged >18 whom underwent elective or urgent CD completed paper-based questionnaires 24h after CD. These questionnaires were the Perceived Wellness Scale (PWS) for psychological wellness, the Obstetric Quality of Recovery (Obs-QoR-11) a global assessment of

recovery, and the Peritraumatic Distress Inventory (PDI) for post-traumatic stress reactions to CD (4). The primary outcome was the Spearman bivariate correlation between the PWS and the Obs-QoR-11. The secondary outcomes were the Spearman correlation between PWS and PDI and between Obs-QoR-11 and PDI. Spearman correlations were deemed significant if they were below a Bonferroni correction threshold of p<.016.

**Results:** To date 110/220 patients have completed the study. There was no significant correlation between PWS and Obs-QoR-11 (r= .16, p= .103). However, there was a significant negative correlation between PWS and PDI (r= -.23, p= .015) and there was a significant negative correlation between Obs-QoR-11 and PDI (r= -.30, p= .002). **Discussion:** In the obstetric population, we found no correlation between psychological wellness and obstetric quality of recovery, suggesting that these are unrelated constructs and should be measured independently. By contrast, separate significant correlations between PWS and Obs-QoR-11 scores with PDI scores suggest that both measures, when low, may signal a greater risk of peritraumatic distress.

# Preliminary findings from a post cesarean delivery pain core outcome set development study.

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*Background:* Poorly managed post cesarean delivery pain (PCDP) is associated with maternal morbidity and impacts the ability to care for a newborn. Effectiveness studies for PCDP measure a variety of outcomes not necessarily patient-centered, limiting comparisons and strength of recommendations. The overall aim of this study is to produce a core outcome set for acute PCDP, developed through literature review and qualitative interviews with patients.

*Methods:* Scoping review was performed from 7 database searches to identify outcomes reported in randomised controlled trials (RCTs) of effectiveness studies for PCDP from May 2016 to 2021. Focus group interviews were conducted with diverse postpartum participants from a local Operative Birth Patient and Public Involvement Group in January 2023 to guide the qualitative study.

*Results:* Scoping review: 101 studies were identified collectively reporting 375 inpatient and 17 outpatient outcomes. The most reported outcome domains for inpatient studies were: 1) analgesia (n=242/375, 64.5%), with analgesic consumption 108/375, 28.8% the most frequent analgesia outcomes; and 2) pain intensity (n=120/375, 32%), reported as the visual analogue scale (68/120, 59%) and the numerical reporting scale (37/120, 25%).

Focus group discussions with patients (n=10): acute PCDP was reported as a "huge" problem, with little information received about pain severity and persistence. For experience and impact, main themes were: 1) psychological health (anxiety, depression, distress), including impact on decisions on future pregnancy and childbirth; 2) impact on care of the newborn, and 3) association of pain severity and lack of midwife support. By comparision, scoping review of inpatient studies revealed only 7/375, 1.9% outcomes related to psychological health and 4/375, 1.1% outcomes related to care of the newborn.

*Conclusion:* Outcomes utilised in PCDP trials vary widely, and focus on pain intensity and analgesic-use. A shift towards patient-centered, functionality-focussed assessments could improve postpartum pain evaluation and treatment approaches, and even provide a strategy to reduce opioid use through goal-targeted pain relief.

Standardisation in outcomes is needed to promote research efficiency and aid future meta-analyses to identify optimal PCDP management.

Longitudinal study evaluating postpartum recovery after scheduled cesarean delivery

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INTRODUCTION: Childbirth can have a substantial impact on a woman's health-related quality of life. Recovery after cesarean delivery is a complex process with multiple components including physical, psychological and social domains. Measuring postpartum recovery can be achieved with patient-centered outcomes.(1,2) Our study aimed to describe short-term and intermediate recovery following scheduled cesarean delivery utilizing a validated inpatient (ObsQoR-10) and outpatient recovery measure (5-level 5-dimensional EuroQol questionnaire; EQ-5D).

METHODS: After institutional review board approval, this single center, prospective longitudinal study enrolled healthy women scheduled for cesarean delivery. Women were excluded from the study if gestational age less was < 32 weeks, neonatal demise, neonatal intensive care unit admission, inability to read or understand written English, and if general anesthesia was used. Women completed baseline surveys prior to delivery and then at 24 and 48 hours after delivery. After discharge women completed surveys at 1 week, 3 weeks, 6 weeks, and 3 months postpartum, including OBsQoR-10 (inpatient only), EQ-5D, and activities of daily living.

RESULTS: We enrolled 66 parturients into the study and 2 were withdrawn after not completing the 24- or 48-hour surveys. Response rates were 94%, 83%, 81%, and 75% at 1, 3, 6, and 12 weeks. Mean±SD ObsQoR10 scores were 75±15 at 24 hours, 85±10 at 48 hours, and 81±28 one week after. Mean ± SD global health assessment in participants was 78±16 at baseline, 64±17 at 24 hours, 69±15 at 48 hours, 88±11 at 3 weeks, 88±15 at 6 weeks, and 90±12 at 3 months postpartum. The EQ-5D composite scores improved at 6 weeks and 3 months over baseline with usual activities and pain/discomfort showing significant improvement over time (Table). Resumption of activities of daily living had not returned to baseline at 6 weeks postpartum. DISCUSSION: Our study outlines longitudinal recovery characteristics both inpatient and at home for up to 3 months following scheduled cesarean delivery. Our results outline means and variance of three validated recovery measures and highlight differences over time and measurement instruments. Future research is required to determine if inpatient recovery measures predict poor long-term recovery and outcomes.

Sharpe_SOAP Abstract Recovery Table.pdf

### Trends of Racial/Ethnic Differences in Protocolized Postpartum Hemorrhage Checklist Use in Cesarean Deliveries

Presenting Author: Brittany Cureton Presenting Author's Institution: University of North Carolina at Chapel Hill School of Medicine, North Carolina Co-Authors: Katherine Bruce, MPH - UNC Chapel Hill Benjamin Cobb, MD - UNC Chapel Hill Courtney R. Hood, MD - University of North Carolina

**Introduction:** Evidence has shown that the utilization of a checklist-based management protocol can improve maternal morbidity, team communication, and overall patient outcomes during post-partum hemorrhage (PPH).¹ Little is known about whether there are different practice patterns in checklist-based management of PPH in relation to a patient's race or ethnicity. Our objective was to assess rates of PPH checklist use in cesarean deliveries with stage 3 hemorrhage by the patient's race and/or ethnicity. This is a prospective quality improvement study with the aim to increase emergency checklist utilization from 0% to 90% for Stage 3 PPH ( >1500 ml) during cesarean delivery (CD) at a single academic institution.

**Methods:** Checklist utilization was measured through surveys sent to various staff involved in the case. Patient's race was identified by self-report in the electronic health record (EHR). Patients with no race identified in the EHR or groups less than five were analyzed as one group identified as other.

**Results:** During monthly assessment of data, trends in racial disparities for PPH checklist use were illuminated. After four months and 37 cases of stage 3 PPH, checklist utilization was 70% for Black patients, 78% for Hispanic patients, 50% for those who identified as other, and 75% for white patients. Though these differences are not statistically significant, this trend is concerning given the national maternal morbidity and mortality racial disparities.

**Discussion:** Black patients and patients who were identified as other had the lowest rates of PPH checklist use in the OR for CD, despite the highest rates of red blood cell transfusion and quantitative blood loss compared to White patients. These trends highlight the importance of investigating racial disparities in PPH management and the need for intervention to improve health equity. Future quality improvement directions include using these data to create specific interventions and initiatives aimed at improving checklist utilization amongst all patients.

Table 1: Postpartum hemorrhage checklist use during cesarean delivery           by race and ethnicity						
Race	(n)% Checklist Use	(n)% Transfuse Rate				
Black	(7) 70%	(7) 70%				
Hispanic	(7) 78%	(8) 89%				
Other	(3) 50%	(4) 67%				
White	(9) 75%	(6) 50%				
Overall	(26) 70%	(25) 68%				

#### Racial and Ethnic Disparities in Epidural Usage and Cesarean Delivery Rates

#### Presenting Author: Wade Coomer, BS

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**Co-Authors:** Andrea Ruggiero, MS - Department of Anesthesia, Long Island Jewish Medical Center

#### Introduction

Healthcare disparities between racial and ethnic groups exist across many domains including the field of obstetrics. Previous studies have demonstrated racial differences in the use of epidural analgesia as well as cesarean delivery rates.^{1,2} The current study sought to investigate whether these trends seen on a national level also exist at our tertiary hospital that serves a racially and ethnically diverse population of patients. **Methods** 

We conducted a retrospective chart cohort study of all women who gave birth at Long Island Jewish Medical Center between January 1, 2020 and December 31, 2021. Demographic, mode of delivery, and anesthetic information were extracted from medical records. Racial and ethnic group identification was self-reported. Chi-squared analyses were conducted to determine independence of variables.

#### Results

This study included 13,106 records consisting of 33.15% White, 22.16% Asian or Pacific Islander, 21.50% Black, 20.09% Multiracial, 1.89% unknown race, and 1.21% American Indian or Alaskan native women. The overall rate of cesarean delivery was 17.86%, which differed amongst racial groups (p< 0.001). Black (23.46%), Multiracial (18.99%), Asian or Pacific Islander (17.73%), and women of unknown (19.76%) ethnicity had a higher rate of cesarean delivery compared to White women (13.72%). Furthermore, 12.58% American Indian or Alaskan native parturients had a cesarean delivery. 74.64% of women in the entire cohort received epidural analgesia. There was a significant difference in the rates of epidural analgesia based on racial/ethnic group (p< 0.001). White women (79.60%) were more likely to receive epidural analgesia compared to all other racial/ethnic groups studied (unknown ethnicity (73.79%) vs Asian or Pacific Islander (73.52%) vs Multiracial (72.31%) vs American Indian or Alaskan native (71.07%) vs Black (70.58%)).

### Discussion

Similar racial and ethnic disparities in obstetric anesthesia that have been reported on a national scale were also seen in the present study. Most non-White race/ethnic categories except for American Indian or Alaskan native showed higher rates of cesarean delivery. Furthermore, Black, Asian or Pacific Islander, Multiracial, and women of unknown ethnicity were less likely to receive epidural analgesia compared to White women, evidencing continued inequities in healthcare. These differences may potentially be explained by several factors including higher rates of comorbidities, disparate access to antenatal care, lack of trust in the health system, and clinician bias

among others. However, further research is necessary to elucidate these potential confounders such as prospective studies utilizing the obstetric comorbidity index. <u>Epidural Usage_Coomer et al..pdf</u>

# Racial Disparities in Maternal and Neonatal Outcomes in the COVID-19 Positive Parturient

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#### Introduction

An association in both maternal and neonatal adverse outcomes in parturients testing COVID-19 positive during pregnancy has been shown by previous studies, including one from our group.¹ There are known racial and ethnic disparities in the delivery of healthcare.^{2,3} Given these disparities, under-represented populations may be disproportionately affected by the adverse outcomes previously demonstrated. This study is an extension of our earlier study in that adverse outcomes seen in the COVID-19 positive parturient were stratified and studied according to race.

#### Methods

The current study is a retrospective chart review of all women who delivered at a Northwell Health facility between March 1, 2020 and June 31, 2021. The study population consisted of all women who tested positive for COVID-19 during pregnancy. This population was divided into the following racial groups: White, Black, Asian, Other (including Multiracial and American Indian), and Unknown. Outcomes investigated included the rates of cesarean delivery and pre-eclampsia, APGAR scores less than 7, and breastfeeding success. Chi-squared analyses or Fischer's Exact tests were performed based on sample size eligibility using Microsoft Excel to determine whether the outcomes of interest differed between races in the COVID-19 positive population.

### Results

Black women had a higher rate of cesarean delivery (38% vs. 28%, p< 0.001), preeclampsia (12% vs. 3%, p< 0.001), APGAR scores less than 7 at 1 minute (9% vs. 4%, p< 0.001) and 5 minutes (4% vs. 2%, p< 0.001), and lower breastfeeding rate (21% vs. 28%, p< 0.001) compared to white women. It was also found that Asian women are more likely to have cesarean deliveries compared to white women (37% vs. 28%, p< 0.001).

### Conclusion

Results suggest that the adverse outcomes shown in parturients with COVID-19 and their neonates impact racially under-represented populations to a greater extent than their white counterparts. Causes of the increased incidence of adverse outcomes in under-represented populations warrants further investigation but include implicit/explicit bias and lack of resources amongst the minority groups.

	White (n=853)	Black (n=303)	Asian (n=227)	Other (n=690)	Unknown (n=70)	p value
Cesarean Section, n(%)	237 (28%)	116 (38%)	83 (37%)	243 (35%)	25 (36%)	p < 0.001
Pre-eclampsia, n(%)	26 (3%)	36 (12%)	12 (5%)	33 (5%)	4 (6%)	p < 0.001
APGAR 1 min <7, n(%)	32 (4%)	28 (9%)	11 (5%)	22 (3%)	4 (6%)	p < 0.001
APGAR 5 min <7, n(%)	15 (2%)	12 (4%)	1 (0%)	6 (1%)	2 (3%)	p < 0.001
Breastfeeding Success, n(%)	237 (28%)	65 (21%)	40 (18%)	109 (16%)	9 (13%)	p < 0.001

Table 2: Maternal and Neonatal Outcomes, stratified by race

# Patient Perspectives on Emergency Research Informed Consent for Patients with Opioid Use Disorder Requiring Emergency Cesarean Delivery

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### Intro:

Maternal opioid use disorder (OUD) affects 6.5 of every 1000 births in the US.¹ Cesarean deliveries account for 32% of annual births, with emergent cesareans accounting for 18% of annual births.² Pregnant women with OUD undergoing emergent cesarean have the highest risk for morbidity and poor outcomes related to opioid exposure but are under-represented in research due to practical barriers for enrollment. This study aimed to glean patient perspectives on consent procedures for research on pain management during emergency cesarean among pregnant women with OUD. **Methods**:

The design was a semi-structured focus group to evaluate acceptability of emergency consent procedures for research in a cohort of women with OUD who were pregnant or recently pregnant and experienced emergency deliveries. Community leaders engaged in peer recovery programs and other maternal-neonatal safety programs, dispersed information about the study to enroll participants. Discussions examined patient perspectives of pain management in the postpartum period, acceptability of consenting procedures for emergent cesarean research, and barriers to research consent during emergencies. Principles of exception from informed consent were reviewed and patients answered questions regarding acceptability of these procedures in emergency cesarean settings.

### Results:

Six women (5 patients, 1 community leader) and one anesthesiologist participated. Participants were non-Hispanic white females ranging 29-41 years of age. Themes regarding patient beliefs toward emergent consent and pain research included: 1) Fear and stigmatization surrounding OUD restricts patient engagement in prenatal care; 2) A need to feel heard and to trust clinicians; 3) Education on pain research during the perinatal and postnatal periods are highly desired; 4) Consent during emergency deliveries can be conducted but modifications to the consent process must be made; 5) Women would consent to use FDA approved methods, but not experimental ones. Areas to improve research consent processes in emergencies were identified: 1) Patients with OUD perceive pain management options are limited and research would be valuable; 2) Addressing barriers in patient-clinician relationships are essential; 3) Informed consent for research should preferentially be obtained before the emergency; 4) Treatments or devices lacking FDA approval would be a perceived barrier to research participation; 5) Use of infographics and obtaining verbal consent for research rather than written consent would be acceptable during an emergency.

#### Conclusions:

Pregnant people with OUD desire engagement with research, prefer information about studies during prenatal visits, and are open to research opportunities in emergencies. Specific actions to improve engagement for research in emergency settings were identified.

Table 1 Altamirano.pdf

# Effect of an educational video on racial disparities in neuraxial labor analgesia: an impact study

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Kendall Hammonds, MPH - Baylor Scott & White Medical Temple Feyce M. Peralta, MD, M.S. - Northwestern University Feinberg School of Medicine

**Introduction:** Racial disparities in neuraxial labor analgesia have been previously reported.¹ We hypothesized that an educational video would decrease racial disparities in neuraxial labor analgesia at our hospital.

**Methods:** We conducted an interventional study from January 1, 2021 to April 30, 2021 and January 1, 2022 to April 30, 2022. After institutional review board approval, we distributed flyers to a prenatal clinic at our hospital that had QR codes linked to an English and Spanish version of a three-minute educational video we created on labor epidural analgesia. Pre and Post-video implementation data were collected for women admitted for attempted vaginal delivery; ³ 37 weeks of gestational age; and, Black or African American, Hispanic, and White or Caucasian (reference race).

**Results:** In the pre-implementation phase, 79, 134, and 287 patients identified as Black or African American, Hispanic, and White or Caucasian, respectively, and 70 (94.6%), 117 (87.3%), 251 (87.5%) of these patients received neuraxial labor analgesia, respectively. During post-implementation phase, 76, 148, and 294 patients identified as Black or African American, Hispanic, and White or Caucasian, respectively, and 62 (81.6%), 124 (83.8%), 273 (92.9%) of these patients received neuraxial labor analgesia, respectively. There was not a statistically significant difference in labor epidural utilization rates before and after implementation for Black or African American patients (p=0.218) and Hispanic patients (p=0.401) but White or Caucasian patients did have a statistically significant increase (p=0.029). Compared to the reference race, the odds ratio of a Black or African American patient receiving neuraxial labor analgesia were 1.116 (95% CI 0.513, 2.426; p=0.783) and 0.341 (95% CI 0.164, 0.707; p=0.004) before and after the implementation of the educational video, respectively. Compared to the reference race, the odds ratio of a Hispanic patient receiving neuraxial labor analgesia were 0.987 (95% CI 0.533, 1.830; p=0.967) and 0.397 (95% CI 0.213, 0.741; p=0.004) before and during the implementation of the educational video, respectively. Three hundred thirty-six (76.7%) patients in the post-implementation cohort were sent surveys about the educational video via e-mail and 41 (12.2%) survey recipients indicated unawareness of the video. Demographic and clinical data for all patients are presented in Table 1.

**Discussion:** Racial disparities in neuraxial labor analgesia appeared to worsen after the implementation of our educational video. There was a statistically significant increase in labor epidural utilization for White or Caucasian patients in the post-implementation cohort and this partially explains the increase in racial disparities. A

limitation of this study is that there are likely unmeasured variables that contributed to racial disparities. Table 1.pdf

# Effect of the COVID pandemic on racial disparities in anesthetic outcomes for cesarean deliveries: a retrospective single-center study

Presenting Author: Jack Zeitz, B.S.

**Presenting Author's Institution:** Texas A&M Health Science Center College of Medicine

**Co-Authors:** Jessica Ehrig, MD - Baylor Scott & White Medical Center Temple Courtney Shaver, M.S. - Baylor Scott & White Research Institute

**Introduction**: Butwick and colleagues¹ demonstrated that patients of underrepresented racial groups who underwent cesarean delivery (CD) were more likely to receive general anesthesia (GA) compared to their white counterparts. We hypothesized that any existing racial disparities in anesthetic technique for CD among Black or African American and Hispanic patients at our hospital would have been exacerbated by the COVID-19 pandemic.

**Methods:** Our hospital's institutional review board waived informed consent for this study. We searched our electronic medical record for patients who had CD at our hospital between January 1, 2017 and December 31, 2021. We collected data on race, whether the CD was scheduled or unscheduled, and the anesthetic outcome. The anesthetic outcomes were categorized as general anesthesia, regional anesthesia (RA) with systemic adjuvant medication, and RA only. We defined the COVID-19 pandemic as the period from March 16, 2020 through December 31, 2021. We performed a logistic regression with the variables of race, whether the CD was scheduled, and whether the CD was performed before or during the COVID-19 pandemic to determine if these variables predicted a worse anesthetic outcome. The logistic regression was restricted to Black or African American, Hispanic, and White or Caucasian patients. The White or Caucasian race was considered the reference race.

**Results**: 3800 patients had CD during the study period and 685 (18.0%), 1111 (29.2%), and 1795 (47.2%) self-identified as Black or African American, Hispanic, and White or Caucasian, respectively. For the Black or African American cohort, 105 (15.3%), 163 (23.8%), and 417 (60.9%) patients had GA, RA with systemic adjuvant medication, and RA only, respectively. For Hispanic patients, 128 (11.5%), 228 (20.5%), and 755 (68.0%) patients had GA, RA with systemic adjuvant medication, and RA only, respectively. For the White or Caucasian cohort, 230 (12.8%), 304 (16.9%), and 1261 (70.3%) patients had GA, RA with systemic adjuvant medication, and RA only, respectively. A multivariate logistic regression model is presented in Table 1.

**Discussion**: Black or African American patients had a statistically significant disparity in CD anesthetic outcome prior to the COVID pandemic when controlling for whether the CD was scheduled. This disparity dissipated during the pandemic Our study also found that no disparities in CD anesthetic outcome existed for Hispanic patients, a finding that Butwick et al found.1 Limitations of our study were that data was collected at only

one institution and that only data on race, whether the CD was scheduled, date, and anesthetic outcome were collected. <u>Table 1.pdf</u>

# Obstetric anesthesiologists' perceived facilitators and barriers to providing informed consent for patients with limited English proficiency

Presenting Author: Won Lee, MD, ScM

**Presenting Author's Institution:** University of California San Francisco **Co-Authors:** Alicia Fernandez, MD - University of California San Francisco

### Background:

Providing linguistically concordant care is paramount to ensure equitable care for patients with language barriers. Clinicians should use professional interpreter for informed consent process. However, in labor and delivery suites, anesthesiologists often first encounter patients during emergencies or active labor with significant pain and distraction, making it difficult for consent discussion. When there is a language discordancy between the patient and the provider, the process of obtaining an informed consent can become more complex. In this study, we explore perceived facilitators and barriers to provide adequate informed consent to patients with language barriers for obstetric anesthesiologists during the labor and the delivery. Method:

This is a sequential explanatory mixed method study evaluating perceived facilitators and barriers to providing informed consents for patients with limited English proficiency (LEP) by obstetric anesthesiologists in the United States. The survey focused on the issues of availability and utilization of interpreter service, confidence of providing informed consents in urgent/emergent obstetric situations and reasons for not always using the interpreter service.

# Result:

So far, 22 anesthesiologists responded to the survey. 36.4% of participants report speaking another language besides English. Spanish (95.5%), Chinese (45.5%) and Arabic (54.6%) were most common non-English language spoken by patients. Very few reported complete satisfaction with interpreter service, citing quality, additional time burden and difficulty accessing the service, and availability of language as reasons for dissatisfaction. Only 68.2% of respondents stated that they always use interpreter to consent patients for labor epidural and anesthesia for cesarean delivery. Study participants generally felt less comfortable providing equitable consents to patients with language barrier, especially if patients were in severe pain and in emergency cases. Those who were less than fully satisfied with interpreter service were less likely to feel confident about providing epidural informed consents for LEP patients in severe pain (P = 0.03).

# Discussion:

Professional interpreters improve patient satisfaction, quality of care, many outcomes and patient safety. Identifying and eliminating barriers to using professional interpretation can facilitate improved linguistic equitable care in obstetric anesthesia. Figure 1. Confidence of providing informed consent for patients with limited English proficiency, compared to when providing consent for English proficient patients



5-point Likert scale. Green represents confidence in equitable informed consent for patients with limited English proficiency. Red represents lack of confidence.
#### Abstract #: FRI-RA- Room 7– Racial & Ethnic Disparities/Ethics-08

# Socioeconomic deprivation, ethnicity and postpartum outcomes following cesarean delivery: A prospective, multicenter cohort study.

Presenting Author: James O'Carroll, MBBS, FRCA Presenting Author's Institution: Stanford University Co-Authors: Brendan Carvalho, MBBCh, FRCA, MDCH - Stanford University School of Medicine, USA Nan Guo, PhD - Stanford University Liana Zucco, MBBS FRCA MHQS - Guy's and St Thomas' NHS Foundation Trust Introduction

Disparity of maternal outcomes in different socioeconomic and racial-ethnic groups are well recognized. We explored the relationships between ethnicity, socioeconomic status and postpartum recovery following childbirth in the hospitals in the United Kingdom.

#### Methods

This study was performed through the planned analysis of prospectively collected data from the ObsQoR study. ObsQoR is a multicentre study of postpartum recovery in patients undergoing anesthetic intervention during the peripartum period. Eligible, consenting patients having cesarean deliveries were recruited, with baseline demographic, maternal, obstetric, anesthetic, and neonatal data recorded. We used the Index of Multiple Deprivation (IMD) as a measure of socioeconomic status which provides an area-level measure of deprivation derived from 7 domains based on residential postal codes. In addition, we collected patient centric outcomes during the inpatient and outpatient period. The outcome data are reported as median [IQR] range and analysed to assess statistical differences between the reported ethnic groups using Kruskal-Wallis and multiple pairwise comparison with Dunn test. We performed a linear regression analysis for adjusted and unadjusted models to understand the effects of possible confounders, with Bonferroni correction.

#### Results

A total of 1000 patients were included in the analyses. There were statistically no differences in the demographics of age, BMI, ASA status, parity, gestational age, or past medical history other than Diabetes Mellitus and Sickle cell disease between the ethnic groups. Differences were seen between the groups related to deprivation with significantly more Asian, Black and Mixed ethnicities seen in the more deprived quintiles. The inpatient and outpatient quality of recovery metrics are reported in table 1a and 1b. White patients had statistically significant shorter lengths of stay than Asian and Black patients (35 [27.6-55.6] hrs vs 44.3 [31.0-70.5] p=0.021, and 48.9 [32.9-74.8] p=0.009 respectively. White patients also reported lower pain scores at both day 1 and day 30. At 30 days, there were no statistical differences seen in readmission rates or complications. In adjusted models, at day 1 Asian patients had significantly more pain (b= 0.79 (0.30, 1.28); p=0.002 and Black patients reported higher global health visual analogue scale (GH VAS) scores

(b=7.02 (2.05, 11.99); p=0.006). At 30 days, Asian patients reported significantly worse pain scores (b=0.65 (0.29, 1.02); p=< 0.001).

#### Conclusion

This national study demonstrates differences in recovery related to ethnicity status even when correcting for socioeconomic group. This demonstrates national disparities seen in UK obstetric patients. Further work is required to understand the underlying reasons, causation and how to reduce the disparity.

	Asian (Bangladeshi, Chinese, Indian, Pakistani, other Asian)	Black Black African, Black Caribbean, Other Black)	Mixed/ Multiple ethnic groups (White & Asian White & Black African White & Black Caribbean Other Mixed)	White (White Gypsy/ Irish traveller White Irish, Other White)	Other (Arab Other)	p
Pain (0-10)	n=114	n=63	n=28	n=761	n= 24	0.024
Median	5	5	5	4	4.5	
IQR	3-6	2-6	1.5-6	2-6	2.5-6	
Range	0-10	0-10	0-9	0-10	0-10	
ObsQoR-10	n= 111	n= 65	n= 28	n= 759	n= 23	0.009
Median	68	74	67.5	73	60	
IQR	53-80	60-87	60.5-84.5	61-84	52-80	
Range	26-99	4-100	42-96	17-100	31-98	
GH VAS (0-100)	n=115	n=65	n=28	n=768	n=23	0.030
Median	60	70	60	65	60	
IQR	50-75	55-85	52.5-80	50-80	50-85	
Range	10-100	3-100	20-100	0-100	20-100	

Table 1b Outpatient of	uality of recover	ry metrics (n=803)				
	Asian	Black	Mixed	White	Other	р
Pain (0-10)	n=96	n=49	n=21	n=576	n=18	< 0.001
Median	1	0	0	0	1.5	
IQR	0-3	0-3	0-0	0-1	0-2	
Range	0-10	0-6	0-4	0-10	0-7	
EQ-5D-5l (5-25)	n=100	n=52	n=22	n=607	n=21	0.004
Median	7	6	6	6	7	
IQR	6-9	5-7.5	5-7	5-8	6-9	
Range	5-21	5-16	5-13	5-19	5-13	
GH VAS (0-100)	n=100	n=52	n=22	n=608	n=21	0.039
Median	80	80	80	80	80	
IQR	65-85	70-95	75-90	70-90	60-90	
Range	15-100	35-100	40-100	0-100	45-100	

### Abstract #: FRI-RA- Room 7– Racial & Ethnic Disparities/Ethics-09

# Implicit bias, structural racism, and obstetric anesthesia outcomes: a scoping review of the literature (2000-2023)

**Presenting Author:** Fiamma Van Biema, MA Phil **Presenting Author's Institution:** Columbia **Co-Authors:** 

#### Background

Racial inequities in the U.S. are a healthcare emergency with alarming differences in maternal mortality rates based on race reported by the CDC.¹ Evidence of disparities in obstetric anesthesia outcomes is mounting and adding to the pervasive pattern of racial disparities in women's health care and obstetric racism. Possible actionable factors include structural racism and implicit bias. We undertook a scoping review to evaluate the volume and content of obstetric anesthesia research related to racial inequities, with a focus on implicit bias and structural racism.

#### Methods

We conducted a literature search (PubMed) with selected keywords (listed under Table) on publications from the United States. reporting on racial inequities related to 6 obstetric anesthesia outcomes: 1) labor pain, anticipated/actual neuraxial analgesia use, 2) management of neuraxial anesthesia complications, 3) failure of epidural for cesarean delivery, 4) general anesthesia for cesarean delivery, 5) ERAS, postpartum pain, and opioids, 6) satisfaction with birth experience.

We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and a total of 540 articles were generated (excluding duplicates). The search was repeated 5 times (last 1/12/2023). Review articles, editorials, and letters were not included.

We identified 8 possible dimensions of racial inequities: patients' beliefs/preferences; misconceptions; perceived pressure (persuasion); language barriers; patient-providers racial and ethnic concordance; structural/obstetric racism; providers' implicit bias, and providers' misconceptions.

### Results

Our search resulted in 32 original studies (retrospective N=15; prospective observational N=1; RCT N=1; qualitative/survey N=12; mixed methods N=1; interventional N=1; cross-sectional N=1) evaluating 8 dimensions of racial inequities and reporting on at least 1 of the 6 obstetric anesthesia outcomes between 2000 and 1/2023. The main findings and complete reference list are presented in Table 1. Both *implicit bias* (10/32 studies) and *structural* or *obstetric racism* (7/32 studies) were mentioned in the discussion but never assessed.

#### Discussion

Our scoping review identified the volume and content of obstetric anesthesia research related to racial inequities and noted the increase in publications in the last year (7/32

studies in 2022 with 4 of these on post-cesarean pain management). Our goal was to determine whether dimensions of racial inequities that contribute to obstetric anesthesia outcomes were studied. We found that, while implicit bias and structural racism appear at the forefront of discussions regarding health (in)equity, they were often mentioned but not studied. Further efforts should be made to determine the right methodology to evaluate implicit bias and structural racism in clinical trials and subsequently address these factors to reduce maternal morbidity and mortality.

SOAP Scoping Review Table Jan 2023.pdf

### Abstract #: FRI-RA- Room 7– Racial & Ethnic Disparities/Ethics-10

# Mind the Gap: A Novel Method for Evaluating Global Academic Agency in Obstetric Anesthesiology

**Presenting Author:** Anjan K. Saha, MD, Ph.D. **Presenting Author's Institution:** Columbia University - Ann Arbor, Michigan **Co-Authors:** 

#### Introduction

The 2015 Lancet Commission on Global Surgery (LCoGS) report identified information management and research as integral components to National Surgical, Obstetric, and Anesthesia Plans (NSOAPs)¹. Recent bibliometric analyses on low- and middle-income countries (LMICs) provide insight into the integration of information systems and research infrastructure into LMIC health systems^{2,3}. Though publication volume from institutions in LMICs has increased over time, the rise has been driven primarily by non-LMICs influencing research agendas, resulting in authorship dilution^{2,3}. Authorship dilution presents a significant barrier to developing methods designed to track development in accordance with LCoGS recommendations and is a major concern when global health research articles are published without an author affiliated with a local institution. We hypothesized that authorship affiliation can serve as a surrogate for academic agency in obstetric anesthesiology.

#### Methods

A Filtration Index (FI) was created to evaluate publication volume when at least one author is affiliated with an institution located in the country. Article counts per nation per search term and Human Development Index (HDI) data were aggregated from the E-Utilities NCBI Entrez API and the United Nations Development Programme portal^{4,5}. Article counts were generated with and without an affiliation filter and limited to publications up until 2015 for the search term "obstetric anesthesiology." A density plot was produced to display the distribution of FIs in the dataset. All analyses were conducted using R within the R-Studio integrated development environment.

#### Results

FI data were stratified by HDI tier and presented as violin plots with embedded box plots (Figure). The median FIs were 0.333 (0.177 - 0.567), 1.00 (0.500 - 1.00), 1.00 (0.667 - 1.00), and 0.750 (0.500 - 1.00) for very high, high, medium, and low HDI nations, respectively (Figure). The median FI for very high HDI nations was significantly lower than all other tiers. FI distributions were heavily skewed towards one in low, middle, and high HDI tiers.

#### Conclusions

Our analysis shows that the global distribution of publications within the field of obstetric anesthesiology exhibit marked overrepresentation from articles that are published without an author affiliated with a local institution. This observation is more prominent within low, middle, and high HDI nations as compared to very high HDI nations. Methods designed

to longitudinally track academic agency, such as computation of national FIs, will be essential to optimizing integration of information systems and research into NSOAPs internationally, in line with LCoGS recommendations. <u>Mind the Gap Figure.pdf</u>

### Abstract #: FRI-RA- Room 7– Racial & Ethnic Disparities/Ethics-11

# Racial and ethnic concordance between the patient and anesthesia team and patients' satisfaction with pain management during cesarean delivery

Presenting Author: Jose Sanchez, B.S. Presenting Author's Institution: Columbia University, New York Co-Authors: Kelsey Goldman, Student - Tenafly High School Jean R. Guglielminotti, MD, PhD - Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons Rohan Prabhu, MD, MPH - Columbia University

#### Introduction

Patient-provider racial and ethnic concordance, defined as the patient and provider sharing racial and ethnic identity, has been associated with improved patient satisfaction and health outcomes.¹ Pain during cesarean delivery (CD) is associated with dissatisfaction and traumatic birth experiences. We designed this study to evaluate the association of patient-provider concordance with patient satisfaction with intraoperative pain management.

#### <u>Methods</u>

Between May-Sept 2022, English-speaking patients with neuraxial anesthesia for CD were enrolled. Within 48 hours of delivery, participants responded to a survey. The outcome measure was the satisfaction rate assessed using the survey question: "Overall, how satisfied are you with the anesthesia care during the C-section as it relates to pain management?". Satisfaction was defined when patients answered " very satisfied". Participants were also asked: "If you have another C-section, would you want the same anesthesia team?". The 2 exposures of interest were racial and ethnic concordance and self-reported pain during surgery. Patients' self-reported race and ethnicity were extracted from EMR and recorded for anesthesia providers – attending (33.3% non-white) + resident or fellow or CRNA (64.3% non-white). Concordance between the patient and the anesthesia team (up to 3 providers) was categorized into 3 groups: full concordance, partial concordance, and discordance. Risk factors for satisfaction were identified using a multivariable logistic regression model.

#### <u>Results</u>

Overall, 78% of patients reported being "very satisfied" with anesthesia care, and 88% "would want the same anesthesia team in future C-section" (Table 1). Patients' selfreported ethnicity and race were 62% non-White and 36% Hispanic. Concordance was low (full: 4.5%, partial: 29.0%) and not associated with satisfaction or wanting the same team. Risk factors for not being "very satisfied" were self-reported pain, IV medication, having 3 anesthesia team members (versus 2), conversion to general anesthesia, intrapartum epidural with 2 or more top-ups during labor, anxiety, and pregnancy resulting from IVF (Table 2).

#### Discussion

We report for the 1st time on the racial and ethnic concordance between the anesthesia team and patients in a large academic center with great diversity. We did not expect to

find a low concordance (1:3 cases), which combined with the high satisfaction, explains our inability to identify an association between concordance and satisfaction.

Contrary to a large body of evidence but consistent with our finding, a recent study reported no association between patient-provider concordance and opioid prescription after cesarean delivery.²

We confirm that pain, IV medications, intrapartum epidural, and anxiety are associated with not being "*very satisfied*." We also identified IVF pregnancy as a risk factor that should be further evaluated.

Table Concordance - Jan 28.pdf

#### Abstract #: FRI-GM-01

#### The ED90 of Hyperbaric Bupivacaine for Cesarean Delivery in Super Obese Patients: An Up-Down Sequential Allocation Dose-Response Study

Presenting Author: Liliane Ernst, MD Presenting Author's Institution: Duke University Medical Center Co-Authors: Matthew Fuller, MS - Duke University Medical Center Riley Landreth, DO - UNC Trung Q. Pham, MD - Saint Francis Hospital Tulsa Samantha Rubright, MD - University of Utah Hon Sen (Paul) Tan, Consultant Anaesthesiologist - KK Women's and Children's Hospital Introduction:

The prevalence of obesity in pregnancy is increasing and is associated with increased need for cesarean delivery. Previous studies investigating dosing of intrathecal bupivacaine did not suggest the need for dose reductions in parturients with obesity [1, 2]. Those studies, however, did not specifically include parturients with super obesity who might be at increased risk for high blocks with standard dosing [3]. The optimum dose of spinal hyperbaric bupivacaine for cesarean delivery in super obese patients is unknown. We performed this single center prospective double-blinded study to determine the dose of intrathecal hyperbaric bupivacaine that provides effective anesthesia for cesarean delivery in 90% of super obese patients (ED90) using an updown sequential allocation method with a biased-coin design.

#### Methods:

We enrolled women with a BMI greater than or equal to 50 kg/m² scheduled for elective cesarean delivery. A combined spinal epidural technique was performed in the sitting position using a predetermined dose of hyperbaric bupivacaine mixed with fentanyl 15 mcg and morphine 150 mcg. The initial intrathecal dose was 9.75 mg of 0.75% hyperbaric bupivacaine. Doses for subsequent subjects were adjusted in increments of 0.75 mg up to 12 mg based on the outcome of the prior subject using the Narayana rule, a modification of the biased coin up–down sequential allocation technique. A bilateral block to T6 within 10 minutes was considered a successful induction for the start of surgery. The primary outcome was the success of the block for the operation. A dose was considered a success if a T6 block was achieved within 10 minutes of spinal injection and if there was no requirement for intraoperative analgesic supplementation within 90 minutes of the spinal dose. Logistic regression was used to estimate the ED90.

#### **Results:**

42 patients were included in the analysis [median [IQR] BMI 55.5 [52.3, 59.2] kg/m², gestational age 39 [37.2, 39.1] weeks, and duration of the procedure 86 [66, 121] minutes]. The maximum block height was T3 [T2, T4] and this was achieved in 5 [4, 6] minutes. One patient received 9.75 mg bupivacaine, 3 patients received 10.5 mg, 27 patients received 11.25 mg, and 11 patients received 12 mg. All doses provided successful induction. The primary outcome of successful block for the operation

occurred in 0/1 (0%) of the 9.75 mg doses, 2/3 (67%) of the 10.5 mg doses, 21/27 (78%) of the 11.25 mg doses, and 11/11 (100%) of the 12 mg doses. The estimated ED90 (95% confidence interval) was 11.56 (11.16, 11.99) mg.

### Conclusion:

We estimated the ED90 of intrathecal hyperbaric bupivacaine for cesarean delivery in super obese parturients to be 11.56 mg in combination with fentanyl 15 mcg and morphine 150 mcg. This study provides an evidenced based dose for intrathecal hyperbaric bupivacaine in this patient population.

Ernst ED90 of Hyperbaric Bupivacaine For Cesarean Delivery in Super Obese Patients.pdf

#### Abstract #: FRI-GM-02

# Comparison of an automated, electronic-medical-record-based postpartum hemorrhage prediction model to currently published risk stratification tools

Presenting Author: Amber Wesoloski, n/a

**Presenting Author's Institution:** Vanderbilt University School of Medicine - Nashville, Tennessee

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Lisa Zuckerwise, MD - Vanderbilt University Medical Center

**Introduction:** Postpartum hemorrhage (PPH) is a major cause of maternal morbidity and mortality, and prediction may decrease preventable adverse events. Multiple national organizations have published risk assessment tools which categorize patients as low, medium, or high risk of PPH;¹ however, risk prediction models may provide greater discrimination and improve predictive ability.² We compared the performance of a new PPH prediction model to available risk assessment tools published by the California Maternal Quality Care Collaborative (CMQCC), the Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN), and the American College of Obstetricians and Gynecologists (ACOG).

**Methods:** We identified patients who delivered at Vanderbilt University Medical Center between January 1, 2018 and April 30, 2022. Included patients were split 80/20 by date of delivery into derivation and validation sets, respectively. Postpartum hemorrhage was defined as blood loss  $\geq$ 1,000 ml with transfusion of  $\geq$ 1 unit of packed red blood cells during the delivery encounter. Patient risk of PPH was estimated using a logistic regression model, with the following variables included (in order of importance): delivery type, prior PPH, hematocrit, placenta accreta spectrum disorder, general anesthesia, multiple gestation, placenta previa, induced labor, augmented labor, maternal weight, white blood cell count, estimated fetal size for gestational age, labor length >20 hours, admission pulse, premature rupture of membranes, calcium level, nifedipine administration, hypertensive disorder of pregnancy, terbutaline administration, platelet count, and placental abruption. CMQCC, AWHONN, and ACOG tools were applied to assign a risk level to patients based on presence or absence of published risk factors. Performance of the model and risk tools was compared using area under the receiver operating curve (AUC) with a 95% CI.

**Results:** Overall, 21,108 subjects were divided into derivation (n=16,862) and validation (n=4,246) sets. PPH occurred in 298 patients in the cohort (235 derivation cohort, 63 validation cohort). The AUC was 0.81 (0.78-0.84) for the PPH prediction model, and performance was consistent during validation (AUC 0.80 [0.72-0.84]). This was superior

to the risk tools published by CMQCC (AUC 0.67 [0.64-0.69]), AWHONN (AUC 0.61 [0.59-0.62]), and ACOG (AUC 0.68 [0.66-0.70]) (Figure 1).

**Conclusion:** Our logistic regression model provided enhanced discrimination for PPH compared to currently published category-based scoring system tools from national organizations. Future research is needed to further refine PPH prediction models and to study their practical application in clinical practice and impact on provider actions and patient outcomes.



#### Abstract #: FRI-GM-03

# Higher Fibrinogen Concentrate Doses Required in Pregnant Patients: A Novel In Vivo Pharmacokinetic Study in Parturients with Hypofibrinogenemia.

Presenting Author: Adnan Al-maaitah, MD

**Presenting Author's Institution:** Beth Israel Deaconess Medical Center - Malden, Massachusetts

**Co-Authors:** Kenneth Bauer, MD - Beth Israel Deaconess Medical Center Phil E. Hess, MD - Beth Israel Deaconess Medical Center Yunping Li, MD - Beth Israel Deaconess Medical Center Brett Young, MD - Beth Israel Deaconess Medical Center

**INTRODUCTION:** The pharmacokinetic study that underly the dosage equation for fibrinogen concentrate was performed in 14 nonpregnant patients with hypofibrinogenemia.¹ Fibrinogen < 200 mg/dl has been identified as a leading predictor of postpartum hemorrhage (PPH) progressing to severe PPH requiring transfusion, and early administration of fibrinogen concentrate has been shown to decrease end-organ dysfunction and death.^{2,3} The physiological changes in pregnancy, including a larger volume of distribution, may warrant modification to this formula. We retrospectively analyzed women with severe hypofibrinogenemia in labor to assess the dose response to fibrinogen concentrate in pregnancy.

**METHOD:** In this retrospective observational study, we reviewed the charts of all women with severe hypofibrinogenemia who delivered at our institution from 2017 to 2022. All pregnant patients in the third trimester who received fibrinogen concentrate for delivery were eligible. Patients were required to have both a pre-dose Measured Fibrinogen Level (MFL) and post-dose MFL. The manufacturer-recommended equation for fibrinogen replacement is fibrinogen dose = ((Goal Fibrinogen Level – Measured Fibrinogen Level)/1.7) x weight in Kg. The 1.7 value is the Dose Response (DR) in mg/dl per mg/kg from the prior pharmacokinetic study.¹ The primary goal was to compare the actual Fibrinogen Change (aFC) compared to the predicted Fibrinogen Change (pFC) using the manufacturer's dose recommendations. We also assessed the DR for fibrinogen in the pregnant population, success of doses to achieve our Goal Fibrinogen Level (GFL), DR of repeated doses, and safety.

**RESULTS:** A total of thirteen doses of fibrinogen concentrate were given over five deliveries for patients diagnosed with hypofibrinogenemia. All patients were laboring without vaginal bleeding. The aFC was  $35.0 (\pm 31.6) \text{ md/dl}$  versus the pFC of 97.7  $(\pm 49.0) (p < 0.0001)$  (Fig. 1). The Calculated DR was 0.52 [0.31-0.88]. No doses in our cohort achieved the GFL using the manufacturer's dosing recommendations. Repeated doses DR of 0.43 [0.29-0.50] represents a decreased compared to the initial dose DR of 0.90 [0.67-0.90] (p=0.004). No patient in our cohort experienced PPH or other infusion-related adverse effects.

**CONCLUSION:** Our analysis shows that the dose of fibrinogen concentrate should be increased by two- to three-fold in the pregnant population. The actual Fibrinogen Change and the Calculated Dose Response for fibrinogen concentrate in our pregnant population was significantly lower than predicted by the manufacturer's dose

recommendations. This change is larger than can be accounted for by the increase in plasma volume alone. Given the uniquely important role of fibrinogen in postpartum hemorrhage, additional multicenter studies should be performed in pregnant patients with hypofibrinogenemia to confirm this result.



#### Abstract #: FRI-GM-04

### Personalized Risk Prediction of Preeclampsia Using Polygenic Risk Scores

**Presenting Author:** Sagar Patel, MD **Presenting Author's Institution:** Brigham & Women's Hospital **Co-Authors:** Braden Eberhard, n/a - Brigham & Women's Hospital Kathryn J. Gray, n/a - Brigham & Women's Hospital Matthew Maher, n/a - Brigham & Women's Hospital John Rigoni, n/a - Brigham & Women's Hospital

#### Introduction

Preeclampsia is a leading cause of maternal and neonatal morbidity and mortality and affects 2-8% of all pregnancies¹. While clinical factors such as a past history of the disease are used for predicting risk, those fail to identify up to 60% of the patients who develop preeclampsia¹. As preeclampsia has polygenic heritability, we investigated if polygenic risk scores (PRS), which can identify individuals at genetic risk for disease, would be associated with preeclampsia risk.

#### Methods

We used a cohort of pregnant patients who delivered between 05/2015 – 05/2022 in which clinical and linked genotyping data were available. We created PRS for preeclampsia (PE PRS), systolic blood pressure (SBP PRS), and diastolic blood pressure (DBP PRS), using summary statistics from two large genome-wide association studies (GWAS) of patients from European genetic ancestry^{2,3}. We investigated the correlation between the different PRS and their association with preeclampsia using linear regression models adjusted by the first 10 principal components of ancestry to account for population structure.

#### Results

Of the N=1,136 individuals (71% self-reported as White and 29% as non-White), N=87 had preeclampsia; N=95 had chronic and gestational hypertension; and N=943 were normotensive. The comparison of each PRS in the three groups is shown in Fig 1 A,C,E. Patients with preeclampsia had higher PE PRS compared to the normotensive, P=0.01. We performed sensitivity analyses as the PRS originate from individuals of European ancestry, Fig 1 B, D, F. In White patients, SBP PRS in preeclamptic and non-preeclamptic hypertensive patients and DBP PRS in non-preeclamptic hypertensive patients were higher compared to the normotensive individuals, P< 0.05. We created linear regression models adjusted for genetic ancestry for each PRS individually and a combined model of both PE PRS and SBP PRS (SBP PRS and DBP PRS are co-linear; thus, only SBP PRS was included). All models had similar performance with an area under the curve of 0.63, 95% confidence interval 0.50-0.76.

### Conclusion

PRS can identify patients at higher risk of preeclampsia, and PRS developed using GWAS from European ancestry have modest predictive power in our multi-ethnic cohort. The lack of large GWAS in diverse populations is a known limitation of the field, and we plan to repeat our analyses when such results become available. PRS for preeclampsia can be advantageous to predict the personalized risk for disease in nulliparous women and in early pregnancy when little other information is available, thus allowing for prevention or early intervention to improve maternal and neonatal outcomes.

Final PRS Figure.pdf

#### Abstract #: FRI-GM-05

# OTIP – An Innovative Obstetric Triage Implementation Package to Reduce Delay and to Improve the Quality of Care at Referral Hospitals in Ghana

Presenting Author: Elizabeth Colburn, B.A. Presenting Author's Institution: Kybele, Inc. - Montgomery, Alabama Co-Authors: Martin Boamah, Rev. Dr. - Ghana Health Service Fiona C. Bryce, n/a - Kybele, Inc. Erin Pfeiffer, MPH - Kybele, Inc. Cecilia Tetteh, Midwife - University of Ghana

#### **Background**

Institutional delivery is recommended to reduce maternal and neonatal morbidity and mortality. However, hospitals in low-resource countries commonly operate on a first-come, first-served basis, resulting in laboring women waiting hours before assessment by healthcare providers. This waiting period—the "third delay"—escalates obstetric complications and contributes to mortality. High volume referral hospitals are particularly prone to the negative effects of delay as they receive a disproportionately large number of complicated pregnancies. Global efforts must target the timeliness and quality of care in referral hospitals in order to reduce maternal and newborn deaths. Timely assessment and treatment is known to improve outcomes, yet few documented obstetric triage systems exist in low-resource countries.

#### **Methods**

Kybele and the Ghana Health Service developed the Obstetric Triage Implementation Package (OTIP) to promote equitable, timely and quality care for vulnerable women and their babies. The establishment of a Ghanaian Technical Advisory Group (TAG) ensured local ownership and integration into the health system. A toolkit introduced an interactive training content, implementation manual, guidelines to equip a triage space, treatment protocols, a simulation game to role-play common case scenarios, and monitoring tools.

From January 2019 to March 2022, OTIP was introduced in 6 referral hospitals cascading training 2 facilities at a time. TAG established a national training team and prioritized target hospitals, each identifying Clinical Champions for training. Champions received a two-day intensive course on triage concepts and quality improvement and then co-led local training and implementation. Data was collected at baseline, 3-, 6- and 12-month post-implementation intervals to assess timeliness of care, documentation thoroughness, and accuracy of risk assessment. Changes in timeliness of care were analyzed with Chi-Square.

#### <u>Results</u>

The introduction of OTIP resulted in training 494 frontline healthcare workers in 6 Ghanaian hospitals, serving over 46,000 pregnant women. Waiting time significantly decreased. At baseline, only 6% (22/400) of women were evaluated within 10 minutes of arrival, the internationally recommended standard. This improved to 83% (343/415) 3 months, 80% (352/438) 6 months, and 85% (367/431) 12 months following implementation (p< .001). Thoroughness of documentation improved from 68% to 84% and risk status was correctly assigned in 85% (401/472) of patients. Midwives reported that OTIP improved workflow and communication with doctors.

#### **Conclusion**

National scale-up of OTIP in Ghana is being funded due to its initial success. OTIP has also expanded into Liberia led by Ghana's National Triage Trainers. OTIP is evidencebased, tested, and context-adaptable and is led and sustained by local frontline healthcare providers. The model is applicable to high-volume hospitals in resourceconstrained settings worldwide.

SOAP 2023 OTIP.pdf



### Method: Dose Response



Fibrinogen Concentrate dose (mg/kg) ¹
$\frac{Target \ level \ -measured \ level \ (\frac{mg}{dl})}{\raiset{constraint} (\frac{mg}{dl} per \frac{mg}{kg})}$

#### Results

A total of 14 doses of Fibrinogen Concentrate were given across 5 deliveries.

Dem	ographics	Delivery Characteristics			
Age (years)	32 (28-34)	# of deliveries presenting with	0		
Weight (kg)	68 (64-70)	Mean Initial Fibrinogen levels (mg/dl)	60		
Body mass index (kg/m ² )	26 (24-27)	# of Fibrinogen Concentrate doses per delivery	3 (2-5)		
Gestational	39.0 (38.0-40.2)	Mean Fibrinogen Concentrate dose (mg)	3,955		
Gravida	2 (2-3)	Mean Total Fibrinogen Concentrate dose per delivery (mg)	11,075		
Parity	0 (0-1)	# of deliveries complicated with PPH	0		
Gestational Age (weeks) Gravida Parity	26 (24-27) 39.0 (38.0-40.2) 2 (2-3) 0 (0-1)	# of Fibrinogen Concentrate doses per delivery Mean Fibrinogen Concentrate dose (mg) Mean Total Fibrinogen Concentrate dose per delivery (mg) # of deliveries complicated with PPH	3 (2-5) 3,955 11,075 0		

### Results: Response to Fibrinogen Concentrate



actual Fibrinogen Change (aFC): 35.0 (±31.6) mg/dl predicted Fibrinogen Change (pFC): 97.7 (±49.0) mg/dl p<0.0001

No doses achieved the Target Fibrinogen Level (0/14)

### **Results: Calculated Dose Response**



#### Discussion

#### Limitations

- Small sample size
- Study performed on patients with congenital hypofibrinogenemia
- Study performed on patients in labor

#### Conclusions

- The Calculated Dose Response in term laboring patients < the Dose Response in general population
- Fibrinogen Concentrate dose in term laboring patients = 2-3 X Fibrinogen
   Concentrate dose in general population

### Acknowledgments



Higher Fibrinogen Concentrate Doses Required in Pregnant Patients: A Novel In Vivo Pharmacokinetic Study in Parturients with Hypofibrinogenemia



A Al-Maaitah, B Young, K Bauer, Y Li, PE Hess, JJ Kowalczyk

Personalized Risk Prediction of Preeclampsia Using **Polygenic Risk Scores** 

Sagar Patel MD, Braden Eberhard, John Rigoni, Matthew Maher, Kathryn Gray MD PhD, Vesela Kovacheva MD PhD



Brigham and Women's Hospital







#### PE PRS is higher in the preeclamptic compared to normotensive parturients



The PRS from European ancestry GWAS did not transfer well in our multi-ethnic cohort







- Ghana has made significant progress in improving access to care Regional referral hospitals face unique challenges
- First come, first serve approach used for admission
- Guidelines recommend that patients be assessed within 10 min of hospital arrival
- There is limited data on obstetric triage in low resource settings
- Baseline study at Greater Accra Regional Hospital to determine waiting time Sept-Nov 2012, n=926 patients
- Average waiting time 83 ± 141 min Maximum 1 day, 2.5 hrs

P

Ghana Maternal Health Survey, 2017 Goodman BMC Pregnancy Childbirth, 2017 Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN), 2013



Background Triage training course with hands-on simulation 90% 80% 62 midwives trained over 8 sessions Jan 2013-Sept 2014 70% 60% Toolkit developed to guide midwives 50% Triage assessment form 40% Risk acuity form 30% Color-coded wristbands
Triage protocol book 20% 10% • Results: reductions in waiting time 0% • Awarded transition-to-scale grant (SL@B) TIP

120 135 150 60 75 90 105 Fime elapsed since arrival se 2 —Phase 3 —Phase 4 —Phase 5 Flovd. Midwiferv 2018 Goodman, BMJ Global Health 2018











#### Enrollment Sensory level: q 2 min for 10 min Successful g 2 min for 10 Successful Suc

**Methods** 

**Duke** Anesthesiology







#### Comparison of an automated, electronic-medical-record-based postpartum hemorrhage prediction model to currently published risk stratification tools

Wesoloski A, Domenico H, Polic A, Zuckerwise L, Byrne D, Ende HB

- Postpartum hemorrhage (PPH) is a major and often *preventable* cause of maternal morbidity and mortality
- Current tools stratify patients as low, medium, or high risk
- Risk prediction models have potential for better predictive ability
- Aim: to compare performance of 4 PPH prediction tools

VANDERBILT



P-value

< .001

< 001

< .001

< .001

< .001





VANDERBILT 💱 UNIVERSITY

### **TOOL COMPARISON**

Risk Factors	CMQCC	AWHONN	ACOG	VUMC Model
ADMISSION RISK FACTORS				
Multiple gestation	х	х	х	х
Large leiomyomas	х	х	х	
Prior PPH	х	х	х	х
Prior Cesarean delivery or uterine surgery	х	х	х	
>4 prior births	х	х	х	
Chorioamnionitis	х	х		
Induction of labor		х		х
1 ^{el} degree relative with PPH		*		
Active Bleeding	X	X	x	
Fetal demise		х		
Polyhydramnios		х		
Macrosomia			х	х
Obesity			х	х
Placenta previa	х	х	х	х
Placenta accreta spectrum	х	х	х	х
Hematocrit < 30	х	х	х	х
Thrombocytopenia	х	х	х	x
Known coagulopathy	х	х	х	
Hypertensive disorder of pregnancy				х

### **TOOL COMPARISON**

Risk Factors	СМОС	foc	AWHO	ANA N	IN ACAG	VUMC Model
POSTPARTUM RISK FACTORS						
Vacuum- or forceps-assisted birth		х	~	х		~
Cesarean delivery	~	х	~	х	~	x
Grate anastheination	х		x		х	x ^x
Retained rate or difficult	х	х	х	х	х	
extraction Magnesium sulfate treatment Genital tract trauma Suspected abruption	X		×	x	X	x
Carcium Lever cia				×		x
White blood cell count				×		x
Use of nifedipine						х
Use of terbutaline						х
Maternal pulse rate						х
Premature rupture of membranes						x



0.25 0.50 0.75 False Positive Rate (1-Specificity)

VANDERBILT WUNIVERSITY

**RESULTS** 

#### 21,108 deliveries 298 PPH events

ctive Tool	AUC (95% CI)
C Model	0.81 (0.78-0.84)
CC Tool	0.67 (0.59-0.62)
ONN Tool	0.61 (0.59-0.62)
G Tool	0.68 (0.66-0.70)

### DISCUSSION

#### Limitations

- · Retrospective data collection
- Single-center
- Missing data
- · Analysis of quantitative vs. categorical data
  - · RCT planned for 2023
    - Impact on Patient Outcomes

Future Research

Further refine PPH prediction

Geographic Validation

Prospective Performance

models



0.61-0.68

#### VANDERBILT WUNIVERSITY MEDICAL CENTER

### to current tools (AUC of 0.81)

Our model showed better

Findings

Current category-based PPH risk

discrimination, with AUC ranging

discrimination for PPH compared

tools showed varying





#### Abstract #: FRI-Oral Presentations 1-01

# Transient receptor potential vanilloid-4 channel antagonists as a promising novel tocolytic agent: a translational study

Presenting Author: Daiana Fornes, PhD Presenting Author's Institution: Stanford University, California Co-Authors: Cristina Alvira, MD - Stanford University Jessica R. Ansari, MD - Stanford University School of Medicine Leziga T. Obiyo, MD, MPH - University of Chicago Lihua Ying, PhD - Stanford University

#### Introduction.

Premature birth is the primary worldwide cause of morbidity and mortality in newborns¹. Currently, there are no effective strategies to prevent or treat preterm labor¹. Our studies in a murine model have revealed the transient receptor potential vanilloid-4 (TRPV4) channel as a potential novel target that modulates myometrial contractility². GSK2798745 is the first TRPV4 antagonist to progress to clinical trials in heart failure patients, and no significant safety issues were observed^{3,4}.

In this study, we aim to evaluate whether **TRPV4 channel blockade decreases uterine** contractility in the pregnant human myometrium.

#### Methods.

After obtaining informed consent, uterine biopsies were obtained from non-laboring pregnant women, 30-40 years old, >37 weeks of gestation, undergoing first-time cesarean section. Tissue was enzymatically dispersed, and human myometrial smooth muscle cells (hmSMC) were isolated (n=10). hmSMC contractility was studied using collagen gel contraction assays, and the percentage of well area cover by collagen was used as outcome measure. hmSMC were loaded with the Ca²⁺-sensitive fluorophore (fura-2) to study cytosolic calcium concentration ([Ca²⁺]_i), and exposed to oxytocin (1 µM) in the presence or absence of 3 distinct TRPV4 antagonists: HC047067 (HC) (1 µM), RN9893 (RN) (500 nM), or GSK2728745 (GSK45, first TRPV4 antagonist to progress to clinical trials) (1 nM).

#### Results.

In the collagen contraction gel assay, contractility of untreated hmSMC (control) decreased in diameter a 42±7% compared to baseline (collagen gel without hmSMC) (p< 0.01 vs. baseline). Oxytocin decreased gel diameter to  $27\pm5\%$  (p< 0.05 vs. control). HC pre-treatment blocked oxytocin-induced contraction  $45\pm11\%$  (p< 0.01 vs. oxytocin) back to control levels (*FIGURE 1a*). To determine [Ca²⁺]_i, hmSMC were treated with oxytocin in the presence or absence of 3 TRPV4 antagonists. Oxytocin rapidly increased [Ca²⁺]_i after stimulation (p< 0.0001 vs baseline). Pre-treatment with TRPV4 antagonists attenuated oxytocin-induced [Ca²⁺]_i increase; HC 74% decrease in  $\Delta$  Fura Ratio (p< 0.0001 vs oxytocin), RN 81% decrease (p< 0.05 vs oxytocin), and GSK45 75% decrease (p< 0.05 vs oxytocin) (*FIGURE 1b*).

#### Conclusion.

TRPV4 blockade attenuates OXY-induced myometrial contractility and cytosolic calcium concentration. This suggests that TRPV4 antagonists may be a promising target for the prevention or treatment of preterm labor, especially GSK2728745, which is already progressing in clinical trials with heart failure patients.

Daiana Figure 1.pdf

Abstract #: FRI-Oral Presentations 1-02

Magnetic resonance imaging findings and clinical aspects of eclampsia : a prospective study.

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Objective: Our objective was to investigate neuroimaging findings in women with eclampsia and to describe the epidemiological, clinical, and management aspects of this condition.

Study design : A four-year, prospective, analytical, monocentric study on cases of eclampsia in an university hospital. All patients had systematically magnetic resonance imaging (MRI). All women were treated with local protocol of management of eclampsia. Results : We included 52 cases of eclampsia, mean gestational age at diagnosis was 32 weeks. Eclampsia was clearly more frequent in autumn (51.9%) and postpartum eclampsia represented 30.7% of cases. Headache was the most common presenting symptom (58.8%) followed by visual disturbances (18.8%), and epigastric pain (13.5%). Severe hypertension was present in 22 patients (42.3%).

The most common complications were: HELLP syndrome in 30.8% of cases, placenta abruption (13.5%), acute kidney injury and post partum hemorrhage (both in 5.7% of patients). One mother died (1.9%). All patients received antihypertensives medication and magnesium sulphate (100% of cases). Cesarean section rate was 61.6%, indicated mainly for eclampsia. Among eclamptic parturients, 23% had performed c-section under spinal anesthesia after stabilization of their condition and confirmation of a platlet count above 70000/ml. No specific complications of locoregional anesthesia were observed in those particular conditions.

All 52 patients in our series underwent brain MRI, 78.8% of them had Posterior reversible encephalopathy syndrome (PRES), suggesting a vasogenic mechanism of edema secondary to arterial hypertension and blood brain-barrier alteration.

The classical occipital location of cerebral edema in PRES, wasn't the main in our series, since the parietal location was the most frequent (57%), followed by the frontal (48%) and the occipital region (38.5%). MRI performed 3 months after eclampsia in 10 patients was normal in all cases, confirming the reversible aspect of cerebral edema.

Conclusion : The evidence from our report supports that PRES is the main primary injury in patients with eclampsia [1]. Maternal prognosis in such cases, is essentially based on

early detection and adequate treatment of severe forms (magnesium sulfate, blood pressure control and delivery). Given the high frequency of differential diagnoses and the risk of severe neurological complications, brain imaging should be performed systematically in case of eclampsia [2]. Finally, neuraxial anesthesia is a reasonable anesthetic option for cesarean delivery in eclampsia, in case of stabilized conscious patient without coagulation disorder. Moreover, early neuraxial anesthesia is required in patients with pre-eclampsia, to avoid general anesthesia in emergency [3].

#### Abstract #: FRI-Oral Presentations 1-03

#### The 2014 Medicaid expansion and eclampsia.

Presenting Author: Jean R. Guglielminotti, MD, PhD
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Co-Authors: Ruth Landau, MD - Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons
Guohua Li, MD, DrPH - Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons

**Background:** Eclampsia is both an indicator of severe maternal morbidity and a preventable condition (1). Patient education on and early diagnosis of pregnancy-associated hypertensive disorders and prodromal symptoms of eclampsia, early initiation of anti-hypertensive or magnesium therapy, and timely delivery are actionable interventions to prevent the occurrence of an eclamptic seizure (2, 3). The 2014 ACA Medicaid expansion has given states the option to expand Medicaid coverage to non-elderly adults with incomes up to 138% of the Federal Poverty Level. Its implementation has led to a significant reduction in insurance discontinuity during the perinatal period, earlier initiation of prenatal care, and increased number of prenatal visits (4). One may therefore hypothesize that the better quality of prenatal care associated with the Medicaid expansion has resulted in a reduced incidence of eclampsia.

**Methods:** Birth certificate data from January 2010 to December 2018 in 16 states that expanded Medicaid in January 2014 and in 13 states that did not expand Medicaid during the study period were analyzed. The outcome was eclampsia, the intervention was implementation of the Medicaid expansion, and the exposure was state expansion status. Using the interrupted time series method (5), we compared the temporal trends in eclampsia incidence pre- and post-intervention in expansion versus non-expansion states. The analysis was adjusted for 32 patient, hospital county, and hospital state characteristics.

**Results:** Of the 21,570,021 birth certificates analyzed, 53% were in expansion states, 56% were in the post-intervention period, and the overall incidence of eclampsia was 0.2%. The incidence of eclampsia decreased during the pre-intervention period and increased during the post-intervention period in the non-expansion states whereas a reverse pattern was observed in the expansion states (**Figure**). A statistically significant difference was observed between expansion and non-expansion states in temporal trends between the pre- and post-intervention periods, with an overall 1.5% decrease (95% CI: 1.3, 1.8) in eclampsia incidence in expansion states compared with non-expansion states. Results were consistent in subgroups analyses according to maternal race and ethnicity (White, Black, Hispanic, or Other), education level (less than high school or high school and higher), and delivery mode (vaginal or cesarean birth). **Conclusions**: Implementation of the Medicaid expansion in 2014 was associated with a small but statistically significant decrease in the incidence of eclampsia.

02bis FIGURE ACA AND ECLAMPSIA.pdf

#### Abstract #: FRI-Oral Presentations 1-04

## Validation of early uterine tone assessment as a predictor of major postpartum hemorrhage in 1004 cesarean deliveries: a prospective observational study

Presenting Author: Jessica R. Ansari, MD

**Presenting Author's Institution:** Stanford University School of Medicine - Pacifica, California

**Co-Authors:** Brendan Carvalho, MBBCh, FRCA, MDCH - Stanford University School of Medicine, USA

Deirdre Lyell, MD - Stanford University James Xie, MD - Stanford University

#### Introduction:

Uterine atony causes most postpartum hemorrhage (**PPH**), and up to 50% of cases have no risk factors¹. Reliable early clinical indicators of PPH could expedite clinical care and mitigate harm. We implemented a validated uterine tone (**UT**) scoring system² with serial assessments after fetal delivery for all cesarean deliveries (**CDs**) at our institution. We analyzed the relationship of the UT score to hemorrhage outcomes and interventions.

#### Methods:

Beginning February 2022, during all CDs, anesthesiologists were prompted by the electronic health record to record UT scores at 2, 7, and 12 min after fetal delivery to facilitate interdisciplinary communication. Obstetricians palpated the uterine fundus and reported a 0-10 score (0=profound atony and 10=perfect tone) at each timepoint. A physician reviewed charts for outcomes including quantitative blood loss (**QBL**), blood transfusions, non-atonic causes of blood loss, uterotonic administration, and surgical interventions for atony. Relationship between the UT score and major PPH (QBL >=1500mL, primary outcome), PPH (QBL >=1000mL), and transfusion were analyzed using Poisson regression and area under the receiver operating characteristic (**AUROC**) curves. Relationship between the UT score and QBL were analyzed by linear regression.

#### **Results:**

Of 1004 consecutive CDs (472 scheduled, 532 non-scheduled), anesthesiologists recorded 2-, 7-, and 12-min UT scores for 87%, 97% and 98% of cases, respectively. Major PPH, PPH, and transfusion complicated 12%, 35%, and 7% of deliveries. Non-atonic bleeding, mostly from hysterotomy extension, complicated 31% of all deliveries. The 12-min UT score predicted major PPH with excellent discrimination: AUROC 0.81 in all patients and AUROC 0.94 after exclusion of cases with non-atonic bleeding. A 12-min UT score of  $\leq 6$  (18% of all cases) had a positive predictive value for major PPH 46%, PPH 77%, and transfusion 25%. Conversely, a 12-min UT score of  $\geq 8$  (63% of all cases) had negative predictive value for major PPH 96%, PPH 79%, and transfusion 97%. **Figure 1** displays the relationship between 12-min UT scores and clinical
outcomes. Predicted QBL based on a 12-min UT score are: 10=559, 6=1200, 4=1750, and 2=2600mL (p< 0.0001).

The 2- and 7-minute scores had lower discrimination for major PPH (AUROC 0.71 and 0.75, respectively), but correlated strongly to clinical management with additional oxytocin boluses and second line uterotonics (p < 0.0001).

# **Conclusion:**

Standardized 0-10 UT scoring is a simple intervention to implement that strongly predicts clinical outcomes including PPH, QBL and transfusion. Low UT scores have the potential to expedite appropriate interventions and improve outcomes. The 12-min UT score is a strong predictor of major PPH, and scores ≤6 should trigger interventions such as additional IV placement, blood crossmatch, and tranexamic acid administration. Future work will explore implementation at other institutions.

Ansari SOAP tone scores figure 1.30.pdf

# Abstract #: FRI-Oral Presentations 1-05

# Maintenance infusion of oxytocin following elective cesarean deliveries: a dose-finding study

Presenting Author: William Turner, MSc, MD

**Presenting Author's Institution:** Mount Sinai Hospital, Toronto, ON, Canada **Co-Authors:** Jose A. C.A. Carvalho, MD PhD - Department of Anesthesiology and Pain Medicine, Mount Sinai Hospital, University of Toronto

Kristi Downey, MSc - Department of Anesthesiology and Pain Medicine, Mount Sinai Hospital, University of Toronto

Jackie Thomas, MSc, MD - Mount Sinai Hospital, Toronto, ON, Canada Linda Boonstra, MSc, MD - Mount Sinai Hospital, Toronto, ON, Canada Xiang Y Ye, MSc - University of Toronto

*Background:* Prophylactic oxytocin has been shown to reduce the risk of postpartum hemorrhage (PPH) by up to 40% [1]. Given its short half-life, oxytocin is typically given as an intravenous bolus to initiate adequate uterine contraction and subsequently as an infusion to maintain sustained effect on the uterine tone. Clinical practice guidelines suggest a very wide range of maintenance infusion rates, hence further clarification is needed. The purpose of our study was to determine the minimum effective dose of oxytocin maintenance infusion required to maintain adequate uterine tone in 90% of patients (ED₉₀) after administration of the initial bolus at elective cesarean deliveries (CD). We hypothesized that the ED₉₀ would be lower than that found in previous studies [2,3] without an initial bolus (< 16 IU/h).

*Methods:* This was a prospective, double-blind, dose finding study with biased coin updown sequential allocation design targeting ED₉₀ in women undergoing elective CDs under spinal anesthesia. Immediately after delivery, 1 IU oxytocin bolus was administered, followed by maintenance infusion. The infusion rate for the first patient was 2 IU/h, while for subsequent patients, it was increased or decreased by 2 IU/h as determined by the response of the previous patient. If the dose failed, the following patient would have the dose increased by 2 IU/h. If the dose was a success, the dose for the next patient would be decreased by 2 IU/h with a probability of 1/9, otherwise it would remain unchanged. The obstetrician assessed the uterine tone by palpation every 10 min, beginning 5 min after the start of oxytocin infusion until the end of the CD and rated as satisfactory or unsatisfactory. The primary outcome was a satisfactory uterine tone from 5 min after the start of the infusion until discharge from Post Anesthesia Care Unit (PACU). The secondary outcomes were blood loss, need for additional uterotonics and side effects.

*Results:* Data were analyzed for 40 patients. The ED₉₀ of oxytocin maintenance infusion was 3.6 IU/h (95% CI 3.2–4.1 IU/h) based on the truncated Dixon and Mood's estimator and 4.5 IU/h (95% CI 3.3–5.5 IU/h) based on the isotonic regression estimator (Fig). The uterine tone was unsatisfactory in 7 patients (17.5%), who received additional uterotonics. The median (IQR) calculated blood loss was 861 (553-1181). Fifteen patients developed hypotension post-delivery and required vasopressors. *Conclusion:* This study shows that the ED₉₀ of oxytocin maintenance infusion for patients undergoing elective CD after an initial oxytocin bolus of 1 IU is fourfold lower than that required in those without an initial bolus. We recommend a maintenance

infusion rate of 4.5 IU/h following an oxytocin bolus of 1 IU for adequate uterine tone in women undergoing elective CDs.





# Abstract #: FRI-Oral Presentations 1-06

# Transient receptor potential vanilloid-4 (TRPV4) receptor agonists induce contraction in human uterine smooth muscle cells: a translational approach to assessing a novel uterotonic agent

Presenting Author: Leziga T. Obiyo, MD, MPH Presenting Author's Institution: University of Chicago - Chicago, Illinois Co-Authors: David Cornfield, MD - Stanford University Daiana Fornes, PhD - Stanford University Lihua Ying, PhD - Stanford University

**Introduction:** Uterine atony is responsible for ~75% of postpartum hemorrhage (PPH) cases and has driven increasing PPH rates over the past decades^{1,2}. Carboprost and methylergonovine, the only FDA-approved second-line uterotonics, are limited by poor efficacy, adverse side effects, and medical contraindications. Despite the global burden of morbidity from uterine atony, no new uterotonic medications have been approved by the FDA since the 1970s. New data in the past several years point to a potential role for transient receptor potential vanilloid-4 (TRPV4) channels in promoting uterine contraction. In murine models, TRPV4 expression at the cell membrane increases with gestation, and channel activation increases contractility³. We sought to investigate the effects of TRPV4 agonism on contractility of term human uterine tissue samples, to test the overall hypothesis that TRPV4 activation causes uterine contraction and thereby might represent a novel therapeutic target to address uterine atony.

**Methods:** After informed consent, full-thickness uterine biopsies were obtained from the midline of the superior edge of the hysterotomy after placental delivery from ten term, nonlaboring cesarean delivery patients. Human uterine smooth muscle cells were isolated and grown in primary issue culture. Microflorimetry studies using a calcium-sensitive dye were performed to measure cytosolic calcium ([Ca²⁺]i) in response to oxytocin, TRPV4 agonist GSK1016790A (GSK), and TRPV4 antagonist HC067047 (HC). Collagen gel contraction assays were also performed to determine uterine smooth muscle cell contractility in response to GSK.

**Results**: In all 10 patients, treatment of uterine smooth muscle cells with the GSK compound increased  $[Ca^{2+}]i$  (p< 0.001, Figure 1a, 1b). This response was present even in samples 3, 4, and 8 in which the smooth muscle cells had minimal response to oxytocin. Blockade of TRPV4 with the HC compound attenuated GSK-mediated increases in  $[Ca^{2+}]i$ . In the collagen gel assay, GSK caused uterine smooth muscle cell contraction (p< 0.05) that blocked the HC compound.

**Conclusions**: In human uterine smooth muscle cells, TRPV4 channel activation increased [Ca²⁺]i and contraction. Thus, TRPV4 channel activation causes uterine smooth muscle cell contractility. These observations point to a potential role for TRPV4 activation in addressing treating uterine atony, the root cause of most PPH.

Uterine Atony Figure.pdf



Jessica Ansari, James Xie, Deirdre Lyell, Brendan Carvalho, Brian Bateman





bility and agreement of a 0 to 10

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Research question: How do uterine tone scores on this scale relate to clinical outcomes of hemorrhage and transfusion?

Methods: Electronic health record prompts in anesthesia documentation to record an obstetrician uterine tone score at 2, 5, and 12 minutes after fetal delivery for every cesarean delivery. Physician chart review to determine relationship between scores and hemorrhage outcomes. Primary outcome= major hemorrhage (QBL>1500mL).



Hypothesis 1: Uterine tone scores on a 0-10 scale will demonstrate a strong relationship to postpartum hemorrhage outcomes. Hypothesis 2: We will identify simple cut-point scores that can be used in clinical decision making.

Results: Uterine tone scores display a strong relationship to hemorrhage outcomes. The 12-minute tone score displays nearly perfect discrimination for atonic PPH.



**Results:** A score of 6 or lower by the 7- or 12-minute timepoints has high positive predictive value for major hemorrhage and transfusion. Conversely, an 8 or higher at any time has high

Scores of 6 or lower and positive predictive value for Scores of **8 or higher** and **negative predictive value** for hemorrhage outcomes hemorrhage outcomes Hemorrha (QBL>100 590 (58%) 45% 18% 11% 224 (22%) 79% 95% 96% 295 (29%) 59% 27% 14% 468 (46%) 80% 96% 96% 179 (18%) 77% 46% 25% 641 (63%) 79% 96% 97%

A uterine tone scores on a 0-10 scale is a strong early predictor of major postpartum hemorrhage in this a prospective observational study of over 1000 cesarean deliveries







## Maintenance infusion of oxytocin following elective cesarean deliveries: a dose-finding study

Linda Boonstra, Jose CA Carvalho, William Turner, Kristi Downey, Xiang Y Ye, Jackie Thomas, Mrinalini Balki Department of Anesthesiology & Pain Medicine, Department of Obstetrics & Gynaecology Mount Sinai Hospital, University of Toronto, Toronto, Canada





# Introduction

- Post partum hemorrhage (PPH) is a major cause of maternal death worldwide
- · The WHO recommends the use of oxytocin immediately following the delivery of the placenta
- Oxytocin is typically given as a bolus followed by an infusion
- Previous dose-finding studies^{1,2} have determined oxytocin infusion rates of at least 16 IU/h without an initial oxytocin bolus
  - 1. George et al. Can J Anesth. 2010;57:578-82. 2. Lavoie et al. Anesth Analg. 2015;121:159-64.
- A dose-finding study for oxytocin maintenance is warranted due to:
   variability in oxytocin dosing strategies
  - limited evidence on the optimal infusion dosing regimen after an initial bolus^{3,4} lack of clear recommendations from international guidelines

3. Duffield et a. Anesth Analg. 2017;124:857-62. 4. Qian et al. BMC Pregnancy Childbirth. 2019;20:6.

Research question: What is the minimum dose of oxytocin infusion required to maintain adequate uterine tone in 90% (ED₉₀) of patients after administration of a 1 IU-bolus dose of oxytocin at elective cesarean deliveries (CD) under spinal anesthesia?

Hypothesis: We hypothesized that the ED₉₀ would be lower than that found in previous studies, where oxytocin infusion was administered without an initial bolus.

# Methods

- Population: patients with a singleton pregnancy, >37 weeks GA, ASA physical status II or III, scheduled for an elective CD under spinal anesthesia
- Exclusion criteria
  - · allergy or hypersensitivity to oxytocin
  - body mass index ≥ 40 kg/m²
  - · history of hypertension and / or severe cardiac disease
  - conditions predisposing to uterine atony and PPH
- Anesthetic technique
  - routine monitoring
  - left uterine displacement
  - co-loading with lactated Ringer's 10 mL/kg (max 1 L) followed by an infusion 125 ml/h
  - · spinal anesthesia with bupivacaine/fentanyl/morphine
  - Norepinephrine boluses of 6 mcg aiming at systolic BP 100% baseline

# Methods (cont'd)

- Oxytocin 1 IU bolus after cord clamping, injected over 10 seconds
- Oxytocin infusion at a standardized rate of 125 ml/h, started immediately after bolus dose + Studied doses of oxytocin maintenance: 2, 4, 6, 8, 10, 12, 14 and 16 IU/h
- Biased coin up-down sequential allocation design
  - 1st patient received 2 IU/h. Thereafter, dose determined by the response of the previous patient
  - · failure: dose increased by 2 IU/h success: dose decreased by 2 IU/h with a probability of 1/9, otherwise same dose (floor dose 2 IU/h; ceiling dose 16 IU/h)
- Uterine tone assessed at 5 and 10 min after injection of oxytocin bolus, then q 10 min
- satisfactory vs. unsatisfactory (standardized assessment by obstetrician)

Unsatisfactory uterine tone —> usual management with additional uterotonics

• Primary outcome: satisfactory uterine tone from 5 minutes after initial bolus until discharge from recovery room

Data analysis: ED90 (95% CI): isotonic regression and truncated Dixon and Mood method

Results

### • 40 patients recruited



- · 33 patients initial success: 7 received additional uterotonics (6 intraoperatively; 1 PACU)
- No transfusion of blood products or surgical intervention was needed
   15 patients required vasopressors due to hypotension post-delivery

# ED90 of oxytocin maintenance infusion following initial 1 IU bolus at elective cesarean delivery



Oxytocin infusion rate	Oxytocin amount in 1L Lactated Ringer's
2 IU/h	16 IU
4 IU/h	32 IU
6 IU/h	48 IU
8 IU/h	64 IU
10 IU/h	80 IU
12 IU/h	96 IU
14 IU/h	112 IU
16 IU/h	128 IU



Transient receptor potential vanilloid-4 (TRPV-4) agonists induce contraction in human uterine smooth muscle cells:

a translational approach to assessing a novel uterotonic agent





Leziga T. Obiyo MD, MPH*, Daiana Flores PhD, Lihua Ying PhD, David N. Cornfield MD, Jessica Ansari MD



Uterine atony is estimated to cause 70-80% of postpartum hemorrhage (PPH)^{1,2}

Despite global burden of morbidity, no new uterotonics have been FDA-approved since carboprost in 1979

- Oxytocin
- Methylergonovine
- Carboprost

Emerging data suggests role for transient receptor potential vanilloid (TRPV-4) channels promoting uterine contraction

 1. PMID: 21567319

 2. PMID: 25103301



The transient receptor potential vanilloid 4 channel modulates uterine tone during pregnancy Lihus Ying,¹ Margaux Beard,² Deirder Lytel,¹ Xiaoyuan Han⁴ Lindas Shortliffe,⁴ Cristiana Iself Hutsel⁶, Cristian Marc¹ Moria Via Cornfield^{4,24}

TRPV-4 channels increase through gestation in mice and agonisms induces contractions

PRETERM LABOR

**Research question**: What are the effects of TRPV-4 activation in human uterine smooth muscle cells?

Hypothesis: TRPV-4 agonism will cause uterine contraction



ol Rev. 2016;96(3):911-973







Leziga T. Obiyo, MD, MPH

စ Medicine @lezaodo

Stanford MEDICINE

Asoap 2023 MEETING SOAP

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Transient receptor potential vanilloid-4 channel antagonists as a promising novel tocolytic agent: a translational study

Daiana Fornes, PhD, Lihua Ying, PhD, Jessica Ansari, MD, Leziga T. Obiyo, MD, Cristina M. Alvira, MD and David N. Cornfield, MD



PRETERM LABOR The transient receptor potential vanilloid 4 channel modulates uterine tone during pregnancy

2 S ....

Lihua Ying,¹ Margaux Becard,² Deirdre Lyell,³ Xiaoyuan Han,⁴ Linda Sh Cristiana Josef Husted ⁵ Cristina M. Alvira.^{1,6}% David N. Cornfield^{1,6,7}*[†]

Background

•TRPV4 channel expression and membrane localization increase during pregnancy

•TRPV4 channel activity modulates uterine contractility

•Pharmacologic blockade of TRPV4 delays parturition in murine models of preterm labor

Given that TRPV4 channel has the potential to modulate contractility in a murine model, it is a promising target for novel therapeutic strategies to prevent preterm labor in humans



Study Question 2: Does TRPV4 channel blockade modulate Oxytocin-induced contractility in human mSMC from non-laboring pregnant patients?



TRPV4 antagonists attenuates the Oxytocin-induced contraction

#### Conclusion

Results

TRPV4 channel blockade plays a key role in Oxytocin induced myometrium contractility

Given that TRPV4 channel has the potential to modulate contractility, it may represent a promising target for the development of therapeutic strategies to prevent preterm labor



al study



Daiana Fornes, PhD, Lihua Ying, PhD, Jessica Ansari, MD, Leziga T. Obiyo, MD, Cristina M. Alvira, MD and David N. Cornfield, MD



"TRPV4 blockade attenuates Oxytocin-induced myometrial contractility and cytosolic calcium concentration.

otential vanilloid-4 channel antagonists as a promising novel tocolytic agent:

This suggests that TRPV4 antagonists may be a promising target for the prevention or treatment of preterm labor, especially GSK2728745, which is already progressing in clinical trials with heart failure patients"











Building stronger care systems and teams: Pursuing personalized maternal care #SOAPAM2023

# The 2014 Medicaid expansion and eclampsia

Jean Guglielminotti, Ruth Landau, Guohua Li

Columbia University Department of Anesthesiology COLUMBIA

## **Eclampsia**

MEETING

# Significant contributor to severe maternal morbidity and mortality

- 6th rank among the 17 conditions used by the CDC to define severe maternal morbidity (2019)

Hypertensive disorders of pregnancy: 7th cause of maternal mortality (2017-2019)

- Up to 70% of eclamptic seizures preventable through preconception and prenatal care
  - Patient education on and early diagnosis of hypertensive disorders of pregnancy
  - Early initiation of anti-hypertensive or magnesium therapy
- Timely delivery

The 2014 Medicaid expansion under the Patient Protection and Affordable Care Act

- Expansion of Medicaid coverage to non-elderly adults with incomes up to 138% Federal Poverty Level
- 39 states and the District of Columbia (February 2023)
- ↑ Preconception and prenatal care access and utilization

#### **Hypothesis**

Medicaid expansion is associated with reduced incidence of eclampsia in states that expanded Medicaid



## **Methods**

- Study sample: Birth certificate data for 28 states and DC (2010-2018)
  - 15 states and DC that expanded Medicaid in January 2014
- 13 states that did not expand Medicaid

Outcome: Diagnosis of eclampsia

- Check box in the birth certificate

- Intervention: Medicaid expansion
  - Pre-intervention period (January 2010-December 2013; 4 years) - Post-intervention period (January 2014-December 2018; 4 years)
- Exposure: State expansion status
  - Expansion (CA, CO, DC, DE, IL, IA, KY, MD, NV, NM, NY, ND, OH, OR, VT, WA) - Non-expansion (FL, GA, ID, KS, MO, NE, OK, SC, SD, TN, TX, UT, WY)
- Analysis: Interrupted time series method, adjusted for patients and hospital characteristics - Within group analysis: Temporal trends during the pre- and the post-intervention periods independently for expansion and for non-expansion states
  - Between groups analysis : Comparison of the changes in temporal trends between the preand the post-intervention periods between expansion and non-expansion states
  - Subgroups analyses (maternal race & ethnicity, education level, parity, and delivery mode)

## **Results: Incidence of eclampsia**

#### Incidence of eclampsia (Per 10,000)

Race and ethnicity			
Non-Hispanic White	20.7		
Non-Hispanic Black	29.1		
Hispanic	15.3		
Non-Hispanic Other	15.4		
Education level	1		
Less than high school	17.6		
High school and higher	19.9		
Parity	1		
Nulliparous	25.2		
Parous	17.2		
Delivery mode			
Vaginal birth	12.8		
Cesarean birth	34.0		



#### 21,570,021 birth certificates analyzed ✓ 11,433,862 (53.0%) in expansion states ✓ 12,035,159 (55.8%) post-intervention 42,677 with a diagnosis of eclampsia → **19.8 per 10,000** (95% CI: 19.6, 20.0)

# **Results: Within group analysis**





A SOAP 2023

MEETING

**Expansion states** ↑during the pre-intervention period  $\checkmark$ during the post-intervention period

**Non-expansion states**  $\checkmark$  during the pre-intervention period  $\uparrow$  during the post-intervention period







provision) 7 states with variable reporting of eclampsia

# **Results: Subgroup analyses**

# Porcont change

Percent ch	ange
Race and ethnicity	
Non-Hispanic White	-1.5%
Non-Hispanic Black	-2.8%
Hispanic	-0.9%
Non-Hispanic Other	-2.0%
Education level	-
Less than high school	-2.3%
High school and higher	-1.6%
Parity	
Nulliparous	-1.6%
Parous	-1.6%
Delivery mode	
Vaginal birth	-1.4%
Cesarean birth	-1.8%

# **SOAP 2023** MEETING

- More pronounced effect
- Non-Hispanic Black birthing people
- Non-Hispanic **Other** birthing people Birthing people with **low education level**

# Limitations of birth certificate data



- . No information on individual income ightarrow could not limit the study sample to people fulfilling Medicaid eligibility criteria
- No analysis of  $\mathbf{preeclampsia} \rightarrow \mathsf{checkbox}$  in the birth certificate does not distinguish pregnancy-induced hypertension and preeclampsia
- . No **patient** identifier  $\rightarrow$  could not account for people who had more than one childbirth
- . No **hospital** identifier  $\rightarrow$  adjustment limited to hospital county characteristics

# **Conclusions & perspectives**

Medicaid expansion was associated with a modest reduction in the incidence of eclampsia

- Expansion of health insurance coverage to the reproductive-aged population could reduce preventable adverse maternal health outcomes
- Implementation of hospital-based safety bundle for hypertensive disorders of pregnancy



COLUMBIA COLUMBIA UNIVERSITY DEPARTMENT OF ANESTHESIOLOG MEETING

**SOAP 2023** 

Guohua Li









## "My placement on the Ladder of Achievement in Healthcare Diversity – But we must keep on climbing"

#### Disclosures

- I serve as a Board Member for the Evelyn E Henley Anesthesia Society
- I serve on committees for the American Society of Anesthesiologists, the National Medical Association, and a subcommittee for the Society of Obstetric Anesthesia and Perinatology
- I receive no financial compensation for any of these services







Yale New Haven Hospital Served as Associate director of Anesthesia, 1956 – 1975. Here he developed his interest in Obstetrical Anesthesia
 Boston University Medical Center Chairman of the Department 1975-1980.

Frederick William Hehre Jr., MD Chairman, Boston University Medical Center - 1975-1980

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# It's early May

"As around the sun the earth knows she's revolving And the rosebuds know to bloom in And the rosebuds know to bloom i early May Just as hate knows love's the cure You can rest your mind assure That I'll be loving you always"

-Stevie Wonder

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# "My placement on the Ladder of Achievement in Healthcare Diversity – But we must keep on climbing"

#### Learning Objectives

- Describe the milestones of the U.S. civil rights movement
   Recognize the impact of structural racism on current healthcare disparities
   Explain the role of Historically Black Colleges and Universities (HBCUs), mentorship, and diverse role models
   in building a diverse healthcare workforce
   Implement strategies to support individuals from marginalized groups (domestically and globally) along a
   path to excellent achievement























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U.N. Observ Group Enter Suez Sector Transferrer







1956 Montgomery Bus Boycott - 381 days

ALABAMA JOURNAL

Question Mark Put On Car Pool Case

**Rejects** Plea Of City, State

**BUS SEGREGATION IS KNOCKED OUT** 





1962, Freedom Bus Rides



























MEREDITH ENROLLS AT OLE MISS INDER BAYONETS; RIOTS RENEWED

1962, President Kennedy mobilizes National Guard Meredith registered at the University of Mississippi

The Birmingham News



"We are confronted primarily with a moral issue. It is as old as the scriptures and is as clear as the American Constitution.

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1963, Gov George Wallace blocks entrance to University of Alabama to prevent black students from enrolling









# MARTIN LUTHER KING

Of all the forms of inequality, injustice in health care is the most shocking and inhumane.

Speaking before the Second National Convention of the Medical Committee for Human Rights. Chicago, Illinois. March 25 1966.



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1899 Class at Fisk



1975, The Warriors Win their 1st Championship (Rick Barry Shooting) I graduate from Fisk University (Leventually learn that Lam more photogenic if Lsmile)



Fisk University Placard of Famed Jubilee Hall – 1st permanent structure on campus and named for the world-famous Jubilee Singers

JUBILEE HALL

FRSIT

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Dr. LeSalle D. Lefall Jr. (L) and Dr. Clive O. Callender (R) Howard University





 First African American President of the American Cancer Society. 1978
 First African American President of the American College of Surgeons. 1979

ıy/dr-lasalle-d-leffall-jr-38



Dr. LaSalle D. Lefall, Jr. discussing a patient's treatment plan with a colleague

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NMA Anesthesiology Section CME session at the Annual Scientific Session













SOAP Service Membership Committee Chair, 2007-2012 International outreach (Chair 2007), Media Committee 2007-2018, Diversity & Inclusion Sub-committee 2020-present











National Medical Association

Twin City Medical Society (Winston-Salem Affiliated Chapter) Old North State Medical Society (North Carolina Affiliated State Chapter)



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Kybele's work in Ghana begins... and my placement

November 2004

Dr. Medge Owen, me, Dr. Nancy Fowlks-Crabb (Ghanian Anesthesiologis1). Dr. Jill Thorpe, (UK Obstetrician) and Dr. Yemi Olufalabi

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Working in Ghana – a labor of love









# 00	CS rate %	Regional Anesthesia %	Maternal Death / 100,000 live Births	
868	29.2	0.01	473	
1555	32.4	6	479	
2234	35.7	48*	496	
2516	32.9	80*	388	
2826	34.3	88*	328	
	868 1555 2234 2516 2826	868         29.2           1555         32.4           2234         35.7           2516         32.9           2826         34.3	868         29.2         0.01           1555         32.4         6           2234         35.7         48*           2516         32.9         80*           2826         34.3         88*	A         A           1555         32.4         6         473           2234         35.7         48°         496           2516         32.9         80°         386           2826         34.3         88°         328










<text>

Evelyn E. Henley Anesthesia Society Sponsored Events – ASA 2022 -supporting networking and mentoring of young, diverse anesthesiologists









<section-header><section-header><section-header><section-header><text><text><text><text><text><text><text><text><text><text>







In retirement, exposing the next generations to Anesthesia





2018 DBTSTM event, San Francisco - MLK Middle School (my own Middle School!)

#### 2020 "Doctor's Back to School™" Team





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Me: "Yes"

Manchild: "A Black Doctor"?





"Racism is not an excuse to not do the best you can."

LÓVE EXPANDS

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#### Memorable Cases

Twins - who is older? "My birth certificate says I was born before you. Yeah, but I am older"

• One night on call during the change from daylight saving time to fall standard time, I did anesthesia for a c-section for twins.

• The timing was such that the first twin was delivered at 1:59 am and the second twin was delivered 2 minutes later, and his birth certificate read that he was born at 1:01 am. on the same day!

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#### Memorable Cases

# Chronic renal failure on Dialysis and Difficult Airway for urgent Cesarean Section

 A 32-year-old G9P2 parturient, gestational age 28 weeks with multiple comorbidities, including insulin-dependent DM, CRF on dialysis 4 x/week, hypertension and morbid obesity

- Pulmonary embolus in the right lower right lobe, on heparin
- Class IV airway, with non- reassuring fetal heart tracing and vaginal bleeding
   Scheduled for urgent c-section. PTT 66, platelet 157,000, BUN 52, Cr 7.8
- Fiberoptic intubation performed after nebulized 4% lidocaine; IV fentanyl and
- midazolam titrated for sedation • General Anesthesia induced and 3 minutes later the infant was delivered with Apgars 0,at 1min, 3 at 5min, and 5 at 10 min

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#### Memorable Cases

Cardiomyopathy of Pregnancy with EF of 25%

- A 28-year-old parturient G4P2, gestational age of 22 weeks presented with stable ventricular tachycardia in the ER
- Pharmacologically cardioverted and stabilized in CCU; peripartum cardiomyopathy diagnosed, with EF- 25%.
- + At 33 weeks' gestation underwent IOL in the ICU
- CVP and A-line monitors were placed. Labor epidural analgesia maintained with 0.11% Bupivacaine with 2 mcg/ml fentanyl.
- CVP and blood pressure maintained with small boluses of phenylephrine.
- The patient delivered a female infant with outlet forceps and the Apgars were 6 and 9.

#### Memorable Cases

#### Tragedy on Christmas morning

- Busy night on call, Christmas Eve at Novant health
- At 5:00 am Christmas morning started making rounds
- Upon hitting the floor, a code was called in triage. I hastily made my way there to find and an unresponsive, term parturient in full cardiac arrest
- I intubated her trachea successfully with a positive CO₂ on capnometer, along with bilateral breath sounds as CPR was in progress
- I called for the senior OB resident to perform emergency c-section at the bedside. Baby was delivered within 5 minutes.
- Unfortunately, after vigorous ACLS for about an hour and 45 minutes the mother was pronounced dead

#### Memorable Cases

Tragedy on Christmas morning

- The baby survived, thrived and was discharged home with custody given to the grandparents
- The mother had presented to triage earlier in the evening with chest pain and hypertension.
- Magnesium was started and she was sent to radiology to workup a pulmonary embolism.
- Upon returning to the L & D and triage she became unresponsive and coded.
- At autopsy, massive dissecting aortic aneurysm diagnosed. There was nothing we could have done to save her.
- This case sticks in my mind because it was on Christmas morning and the parents of the mother lost their daughter on Christmas morning and were now going to have to raise their grandchild who would never know it's mother.

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What SOAP has meant for my career.

SOAP

SC

Past Distinguished	d Fred Hehre Lecture hored for such a <u>"Placeme</u>	ers <u>int</u> " in my Lifetime Society for Obstetric Or Anesthesia and Perinatolog
Gertie Marx L. Stanley James Phillip R. Bromage Sol Snider Frank C, Greiss Jr John J. Bonica, Tony Yaksh Francis M. James Bradley Smith Frederick P. Zuspan Felicity Reynolds Ronald Melzack Charles P. Gibbs	M. Finster Gershon Levinson Sheila E. Cohen Michael J. Cousins M. Joanne Douglas David M. Dewan Donald Caton Samuel C. Hughes James C. Eisenach David Chestnut David Birnbach Alan C. Santos Joy Hawkins	Susan K. Palmer William Camann Gordon Lyons Richard Smiley David J. Włody Warwick Ngan Kee Lawrence C. Tsen Cynthia A. Wong, Robert A Dyer Jose C. A. Carvalho May C. Pian-Smith Robert Gaiser <u>Vernon H. Ross</u>







"We all know sometimes life hates and troubles Can make you wish you were born in another time and space But you can bet your life times that and twice it's double

That God knew exactly where he wanted you to be placed"
Stevie Wonder "As", from the Album, Songs in the Key of Life

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"Let us use the wisdom gained from the experiences of our past to guide us through the endeavors of the present and the future" -Vernon H. Ross MD



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Thank you to my SOAP family

You've Invited SOAP MEET-UP

> AT ASA TOBER 23, 2022 4-4:45 PM





Thank you to my truly immediate familymy sisters, Althea and Vernis



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Thank you to my truly immediate familymy wife, Glynis Loretta Jordan Ross



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"Just as kindness knows no shame Know through all your joy and pain That I'll be loving you always" -Stevie Wonder







# PROTOCOLS ARE A POOR SUBSTITUTE FOR PERSONALIZED CARE

ONE SIZE DOES NOT FIT ALL

Hans Sviggum MD, Mayo Clinic

SOAP 2023 New Orleans, LA

DISCLOSURES

• Hans Sviggum MD has no financial or other disclosures

# **OBJECTIVES**

- · Highlight the advantages of personalized care
- · Demonstrate why protocols not only are ineffective, but they may also be counterproductive
- Crush Segal into a Bayou Jambalaya Pulp



# A Couple of Hypothetical Patients

#### "Kathie"



Intelligent Physically fit No Hx Anesthesia issues No allergies High pain threshold





Elderly male Debatable cognitive function Deconditioned PONV/Awareness/Somnolence Allergic to everything Low pain threshold







#### Do protocols work? It depends .....

Time Specific
Space Specific
Provider Specific



**Desired Effect** 

Good Protocol Poor Adherence No Desired Effect

(<del>:</del>)



No Desired Effect

Bad Protocol Poor Adherence

No Desired Effect

Biro J, et al. Human Factors in Health Care 2022

@2023 Mayo Foundation for Medical Education and Research | alide-

# **BED REST AFTER MYOCARDIAL INFARCTION**

ONE OF THESE PROTOCOLS MUST BE THE ANSWER ©

	annen annen annen annen annen
"EARLY AMBULATION PR	New England journal of Medicine Volume 331
Day 1-5 – Bed Rest	
Day 6 – Sit for 30 minutes	Conference and a star
Day 7 – Sit for 2 hours x 2	
Day 8 – Walk to toilet	
Day 9-11 – Walk around fi	
Day 12 - Discharge Home	

#### "LATE AMBULATION PROTOCOL"

Day 1-12 – Bed Rest Day 13 – Sit for 30 minutes x 2 Day 14 – Sit for 2 hours x 2 Day 15 – Walk to toilet Day 16-18 – Walk around freely Day 19 – Discharge Home

Abraham AS, et al. N Engl J Med 1975;292:710-22

"WHAT GETS US INTO TROUBLE IS NOT WHAT WE DON'T KNOW. IT'S WHAT WE KNOW FOR SURE THAT JUST AIN'T SO"

- MARK TWAIN

# **ERRONEOUS ASSUMPTION**

"THERE IS ONE BEST WAY"



# ANESTHESIOLOGY

Patient and Procedural Determinants of Postoperative Pain Trajectories

Patient factors > Surgical factors

Why are all of our ERAS protocols based on surgical type?

Vasilopolous T, et al. Anesthesiology 2021;134:421-34



SHOULD WE BE TREATING THE SURGERY OR THE PATIENT? MOST PROTOCOLS (INCLUDING ERAC) TREAT THE SURGERY

# **Personalization over Protocolization**

Embracing Diversity of Pain Trajectories after Surgery

Careful assessment of the traits of the individual patient may afford us better prediction of which patients may be at greater risk of uncontrolled pain, independent of and possibly more important than the surgery they are undergoing.

Schreiber KL, Muehlschlegel JD. Anesthesiology 2021;134:363-5

#### BRIEF REPORT

Personalized Versus Protocolized Fluid Management Using Noninvasive Hemodynamic Monitoring (Clearsight System) in Patients Undergoing Moderate-Risk Abdominal Surgery

	Protocolized Group	Personalized Group	
	(N = 19)	(N = 20)	P Value
Hemodynamic variables			
Intraoperative heart rate (beats/min)	73 (67-81)	73 (66–77)	.550
Intraoperative mean arterial pressure (mm Hg)	85 (76-91)	94 (80-97)	.134
Intraoperative stroke volume index (mL/m ² )	43 (37-48)	45 (41-55)	.127
Intraoperative cardiac index (L/min/m ² )	3.0 (2.5-3.8)	3.4 (2.9-3.9)	.296
Intraoperative stroke volume variation (%)	9 (7-11)	9 (7-10)	.461
% case time with stroke volume variation <13%	91 (75-95)	94 (77-98)	.194
% case time with cardiac index ≥2.5 L/min/m ²	92 (49-100)	98 (94-100)	.296
% case time with mean arterial pressure <65 mm Hg	5 (1-22)	3 (1-9)	.322
Preoperative blood lactate (mEq/L)	0.9 (0.6-1.1)	0.9 (0.7-1.4)	.170
Postoperative blood lactate (mEq/L)	1.4 (1.1-1.8)	1.5 (0.8-1.9)	.784
Postoperative heart rate (beats/min)	81 (70-86)	79 (69-88)	.835
Postoperative mean arterial pressure (mm Hg)	91 (80-99)	87 (74-93)	.365
atient outcomes			
Patients with any major complications (%)	3 (16)	3 (15)	.946
Patients with any minor complications (%)	5 (26)	2 (10)	.184
Length of stay postanesthesia care unit (h)	3 (2-4)	3 (2-4)	.708
Length of stay hospital (d)	3 (2-5)	3 (2-6)	.478

osten A, et al.

#### Protocols can take on a life of their own

## Newton's First Law .....

#### 7 – journal articles reviewed

- 6 different opinions on how to modify
- 5 separate email chains
- 4 meetings to discuss protocol3 rough drafts completed
- 2 OB nurses question me about potential changes



#### VINCE LOMBARDI



Protocols should be *descriptive, not prescriptive* • Provide a framework

- Allow flexibility
- Allow for individualized care
- Develop "reads"

TAKE HOME POINTS

- When we assume "one best way" or that the "protocol will save us", we get ourselves in trouble
- Care should be focused on the patient, not necessarily the procedure
- Protocols should be descriptive, not prescriptive
   We need "reads"







No relevant disclosures.

# Defending protocolization in OB and OB anesthesiology

SOAP 2023 MEETING

- Protocols are good for patient outcomes
- The promise of personalization is overhyped
- The objections of protocolization are overblown

# Defending protocolization in OB and OB anesthesiology

- Protocols are good for patient outcomes
- The promise of personalization is overhyped
- The objections of protocolization are overblown

# Protocolized care: the early years

- 1999 To Err is Human report
- Early work in critical care
- Unmistakable advantages of protocols over usual care

Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients (Review)

Blackwood B, Alderdice F, Burns KEA, Cardwell CR, Lavery G, O'Halloran P

- 11 trials, 1971 patients
- Protocolized weaning
  - Duration of weaning 178% (39-75 hr)
  - Duration of MV ↓25% (18-36 hr)
  - ICU LOS \$10% (1.1 days)

Cochrane Database Syst Rev 2010 (5):CD006904

# Protocolized ICU sedation vs. usual care

- 6 RCTs, 1430 patients
- ↓ ICU LOS (-1.73 days)
- ↓ Hospital LOS (-3.55 days)
- ↓ Tracheostomy (RR, 0.69; 95% Cl, 0.50 to 0.96)
- ↓ Mortality (RR, 0.85; 95% Cl, 0.74 to 0.97)

Mayo Clin Proc. May 2015;90(5):613-623

# The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 DECEMBER 28, 2006 VOL. 355 NO. 26

#### An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU

Peter Pronovost, M.D., Ph.D., Dale Needham, M.D., Ph.D., Sean Berenholtz, M.D., David Sinopoli, M.P.H., M.B.A., Haitao Chu, M.D., Ph.D., Sara Cosgrove, M.D., Bryan Secton, Ph.D., Robert Hyzy, M.D., Robert Welsh, M.D., Gary Roth, M.D., Joseph Bander, M.D., John Kepros, M.D., and Christine Goeschel, R.N., M.P.A.

- 103 ICUs in Michigan
- hand washing, using full-barrier precautions during the insertion, cleaning the skin with chlorhexidine, avoiding femoral, removing unnecessary catheters

Median CLABSI/1000 catheter days

3



The	NEW	ENGLAND	OUR NAL .	F MEDICINE
1 1 6	IN E W	ENGLAND	JOURNAL 0	J MEDICINE

SPECIAL ARTICLE

#### A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population

 Alex B. Haynes, M.D., M.P.H., Thomas G. Weiser, M.D., M.P.H., William R. Berry, M.D., M.P.H., Stuart R. Lipsitz, Sc.D., Abdel-Hadi S. Breizat, M.D., Ph.D., E. Patchen Dellinger, M.D., Teodoro Herbosa, M.D., Sudhir Joseph, M.S., Pascience L. Kibatala, M.D., Marie Carmela M. Lapitan, M.D., Alan F. Mery, M.B., Ch.B., F.A.N.Z.CA, F.R.C.A., Krishna Moorthy, M.D., F.R.C.S., Richard K. Reznick, M.D., M.Ed., Bryce Taylor, M.D., and Atul A. Gawande, M.D., M.P.H., for the Safe Surgery Saves Lives Study Group*

N Engl J Med 2009;360:491-9



# Protocolized vs. non-protocolized ICU care for COVID-19

- 4 ICUs in NOLA, early pandemic, N=147
- Care in ICUs with protocol performed better
  - Ventilator-free days (25 vs. 0)
  - Death (37% vs. 56%)

CHEST 2021; 159(1):196-204

#### The Impact of Current Antiemetic Practices on Patient Outcomes: A Prospective Study on High-Risk Patients

- 11 centers, N=376, all high risk for PONV
- Analyzed compliance or non-compliance with ASA, ASPAN guidelines for prophylaxis
- "Complete response" = no PONV or rescue antiemetics

Anesth Analg 2008;107:452-8



What about OB and OB anesthesiology?

# The NEW ENGLAND JOURNAL of MEDICINE

VOL. 352 NO. 24

ESTABLISHED IN 1812 JUNE 16, 2005

#### Effect of Treatment of Gestational Diabetes Mellitus on Pregnancy Outcomes

Caroline A. Crowther, F.R.A.N.Z.C.O.G., Janet E. Hiller, Ph.D., John R. Moss, F.C.H.S.E., Andrew J. McPhee, F.R.A.C.P., William S. Jeffries, F.R.A.C.P., and Jeffrey S. Robinson, F.R.A.N.Z.C.O.G., for the Australian Carbohydrate Intolerance Study in Pregnant Women (ACHOIS) Trial Group*

1000 women randomized to protocolized GDM or usual care

# Protocolized GDM care

- Serious perinatal morbidity (death, shoulder dystocia, fracture, nerve palsy): 1% vs. 4%
- ↓ macrosomia (10% vs 21%)
- ↓ Edinburgh Postnatal Depression Scale >12 (8% vs 17%)





Safety bundle elements (dates established	or completed were reported)	
Readiness domain	Recognition and prevention domain	Response domain
Hemorrhage cart/including instruction cards for intrauterine balloons and compression stitches	Assessment of hemorrhage risk (prenatal, admission, and other) (policy with time frames, mechanism for documentation)	Use of unit-standard, stage-based obstetrics hemorrhage emergency management plan with checklists
STAT access to hemorrhage medications (kit or equivalent)	Measurement of cumulative blood loss (formal and as quantitative as possible)	Support program for patients, families, and staff for all significant obstetric hemorrhages
Hemorrhage response team established (anesthesia, blood bank, advanced gynecological surgery, and other services)	Active management of third stage of labor (departmentwide protocol for oxytocin at birth)	Reporting and systems learning domain
Massive transfusion protocols established		Establish culture of huddles to plan for high-risk patients
Emergency release protocol established for O-negative and uncross-matched units of RBC		Postevent debriefing to quickly assess what went well and what could have been improved (agreed upon leader, time frame, with documentation)
Protocol for those who refuse blood products		Multidisciplinary reviews of all serious hemorrhages for system issues
Unit education to protocols		Monitor outcomes and progress in perinatal QI committee
Regular unit-based drills with debriefs for obstetric hemorrhage		





# Protocolized oxytocin administration after delivery I Low risk N = 16,811 Usual care ("give what's left in the bag") vs. protocolized (60 U/5.5 hr) Composite of PPH, 2nd uterotonic, UA embolization, Tx, hyst

Jt Comm J Qual Patient Saf. 2019 Feb;45(2):131-143

# Protocolized intrapartum oxytocin for labor augmentation

- Comparison of practitioner preference vs. protocol for spontaneous labor augmentation (117 HCA hospitals, N=217,000)
- Labor outcomes mostly unchanged
  - No riangle CD, IVD
  - Slightly longer labor duration (5.1 vs. 5.9 h)
- Uterine hyperstimulation reduced (6.6% vs. 2.7%)
- Uterine artery pH<7.1 reduced (6.3% vs. 3.1%)

Jt Comm J Qual Patient Saf 2023; 49:34-41

# What about OB anesthesia?

- Already protocolized many aspects of our care
  - Labor analgesia cocktails, techniques, dosing
  - Phenylephrine for spinal hypotension
  - Hemorrhage
- Comparative studies lacking but probably better than clinician choice

# Defending protocolization in OB and OB anesthesiology

- Protocols are good for patient outcomes
- The promise of personalization is overhyped
- The objections of protocolization are overblown



# Other challenges

- Not all important differences are genetic
- Effect sizes of known polymorphisms in OB are modest
- Epigenetics, variability in transcription, proteomics
- Interactivity with environment (microbiomes)
- Equity/access concerns given cost
- Privacy concerns with pre-testing

# Al to the rescue?

- Ability to model huge N of patient factors to an outcome
- Still barely practical
  - Bias in model creation
  - Equity concerns follow
  - Overfitting
  - Failure to replicate
  - Lack of transparency, trust: black box problem
  - Vulnerability to cyberattacks
  - Privacy

# Objections to protocols

- Can't protocolize everything
- "Cookbook" medicine
- Diminishing individual skills



"The best of chefs keep the great cookbooks close at hand – not to stop their thinking, but to start it." Donald Berwick, MD, IHI

# Protocolization in OB anesthesiology

- Protocols are good for patient outcomes
- The promise of personalization is overhyped
- The objections of protocolization are overblown



# **OPIOIDS AND PREGNANCY: CURRENT AND FUTURE PRACTICE**

Britany L. Raymond, MD Vanderbilt University Medical Center Assistant Professor of Anesthesiology Fellowship Director, OB Anesthesiology Director of in-Utero Fetal Surgery



# **Agenda**

# **Opioids in Current and Future Practice:**

- a. During Pregnancy
- b. Postpartum



# **Opioids in Current and Future Practice:** a. During Pregnancy

- scope of opioid use, effects on maternal/fetal wellbeing
- MAT, methadone vs. buprenorphine

# SCOPE

1 in <u>5</u> parturients fill an opioid prescription *during pregnancy* 

Profile: 24 years, Caucasian, Medicaid recipient, Southeast region

- a. Acute or chronic pain: 95%
- 68% back pain, 41% abdominal pain, 28% joint pain

#### b. Non-medical use: 5%

• 50% obtain from their doctor (compared to 28% when not preg.)

Desil R. Obstet Gynecol 2014; 123:997-1002









Higher affinity for μ receptor
 partial agonist activity

Anesth Anal. 2017 Nov; 125(5) 1179-1783

µ-Opioid Receptor Binding Affinities (Ki) for Commonly Used Opioids and Antagonists

Table 2.





#### ADDICTION review

2016-111-2115-2128



Buprenorphine compared with methadone to treat pregnant women with opioid use disorder: a systematic review and meta-analysis of safety in the mother, fetus and child

Buprenorphine *superior* for:

- $\psi$  NAS incidence and severity
- $\psi$  preterm birth
- $\uparrow$  weight, head circumference
- $\uparrow$  adherence to MAT regimen





# Agenda

# **Opioids in Current and Future Practice:**

- a. During Pregnancy
- b. Postpartum
  - Chronic pain and persistent opioid use after CD
  - 4 strategies to impact CD opioid prescribing practices

ш		Estimated incidence	Estimated chronic severe (disabling
	ELANCET	of chronic pain	pain (>5 out of score of 10)
	Amputation ²	30-50%	5-10%
	Breast surgery		
	(lumpectomy and		
	mastectomy) ³	20-30%	5-10%
	Thoracotomy4, 5, 6, 7	30-40%	10%
	Inguinal hernia repair8,	9,	
	10	10%	2–4%
	Coronary artery bypass		
	surgery11, 12, 13	30-50%	5-10%
	Caesarean section ¹⁴	10%	4%





FIGURE 1. One- and 3-year probabilities of continued opioid use among opioid-naïve patients, by number of days' supply* of the first opioid prescription — United States, 2006–2015





Therapy should be individualized based on the patient's condition and preferences, and the risks, benefits, and alternatives of all medications prescribed should be re-







FUT	URF	RX?
	UKL	NA:

4. Legislation

Outcome

X?	Effects of S Prescription Paul P. Potnuru, MD,* Bichard H. Epstein M	Effects of State Law Limiting Postoperative Opioid Prescription in Patients After Cesarean Delivery Paul Pennuu, M0* selim D. Patul, MBBS, RPCA, David J. Bimbach, MD, MPH.t			
		,,,			
Prelaw ^a (n = 913)	Postlaw ^b (n = 942)	Difference (95% CI)	Standardized Difference (95% CI)	P Value	
		ſ			



# Re-cap

#### a. During Pregnancy

- scope of opioid use, effects on maternal/fetal wellbeing
- MAT, methadone vs. buprenorphine

#### b. Postpartum

- chronic pain and persistent opioid use after CD
- 4 strategies to impact CD opioid prescribing practices
   (Individualized Rx, Order sets, Education, Legislation)





# What we will discuss

- Why do shortages occur?
- What can you do to prepare?
- What are some common alternatives and substitutions
  - Equipment
  - Local anesthetics
  - Opiates





# Why do drug shortages occur

### Generic Drug Manufacturing

- Obtaining precursors
- Manufacturing
- Approval process
- Demonstrated equivalence
- Factory inspections Fees
- Generic Drug User Fees (GDUFA)
   2022: \$520,208,640
- Location





#### When does a drug become a drug?

- Each drug up to 20 Key starting materials (KSM)
- API: Active pharmaceutical ingredient
- 80% of drug precursors manufactured outside US
- Not regulated by FDA
- Ciprofloxacin
  - 1 API U.S. in 2023
  - 20 in India • 6 in EU.





Why do drug shortages occur

• When does a drug become a drug?





# Why do drug shortages occur

## Case Study: Fludarabine

- Generic in 2003
  - 12 application holders, 6 active marketers
  - Who is manufacturing it?
    - Potential sources
      - Fresenus Kabi: makes and markets their own Areva markets but does not manufacture (Italy)
      - Actavis markets but does not manufacture (Romania)
      - Teva doesn't hold a license, reported a shortage to FDA
      - · Buying and selling Actavis product
      - Hikma markets under Leucadia, no disclosure on manufacturing
         Sagent also markets, no disclosure on manufacturing





# Why do drug shortages occur

- Case Study: Fludarabine
  - So who is actually making it?
    - Fresenius Kabi: makes and markets
    - Teva acquired Actavis, now manufacturers in Romania
    - Hikma doesn't manufacture, acquired on purchasing Leucadia, stopped 4/2022 Supply manufactured by Teva in Irvine CA, stopped 10/2021
    - Sagent
      - Supply manufactured by Teva





#### Case Study: Fludarabine

- "There is no good real time database to show products that are no longer being marketed and we have no idea which company is making which product."
- Multiple labelers of fludarabineSourced from the same three facilities (they think)





# Why do drug shortages occur

#### Batch Production

- Production runs
- Testing
- Cleaning
- Cheaper to set up
  - High work in progress inventory
  - High likelihood for human error





# Why do drug shortages occur

#### Continuous

- In-line quality control
- Less manual handling
- Variable cost reduction 40-50%Very expensive to set up
- High, stable, predictable demand
- One product at a time





# Why do drug shortages occur

### At the factory level







- Declining number of manufacturers
  - Low margins
  - High costs
  - Legal liabilities
    - \$356M Hepatitis C Lawsuit
    - 50 vs 20ml vialsTeva stops making propofol
      - 40% supply





# Why do drug shortages occur

#### Consolidation

- Economies of scale
- Leverage to set price
- FTC does not have follow FDA recommendations
  - Median number of suppliers in most markets is 2
  - 40% of markets supplied by 1 manufacturer









# Why do drug shortages occur



GPOs account for over \$100 billion of the drugs purchased in this country in a given year





Regional distribution NOT regulated









# Why do drug shortages occur



#### Local Anesthesia Drugs Market Research, 2031

The global local anesthesia drugs market size was valued at \$2.6 billion in 2021, and is projected to reach \$4.7 billion by 2031, growing at a CAGR of 6.4% from 2022 to 2031. Local anesthesia drugs are widely used to numb specific parts of the

- Pandemic
  - Diverted resources
    - Vaccine production





# Why do drug shortages occur?

- Natural disasters
- FDA works to help relieve the IV fluid shortages in wake of Hurricane Maria

[11/14/2017] The U.S. Food and Drug Administration is actively working with drug manufacturers to address critical shortages of IV fluids aggravated by Hurricane Maria's





#### Regulatory

- Maximum amounts for opiates (DEA)
- Required to report to FDA about impending shortage
- Not require to report why
- No minimums, no stockpiles
- Cannot mandate production
- Public opinion (opiates)





Barlas S. Hospitals Search for IV Opioids: Has the DEA Been Fast and 2018 Jul;43(7):381. PMID: 30013293; PMCID: PMC6027855. Lordan A, Pizzi LT, Thoma BN, US Propofol Drug Shortages: A Review of the Proble Analysis. Am Health Drug Benefits. 2013 May;6(4):171-5. PMID: 24991355; PMCID Stakehol PMC403



# Why do drug shortages occur

#### They build on each other

- Akorn Pharmaceuticals to Close Following Second 0
- Bankruptcy ....
- s to shut down following its second bankruptcy in three years Ak in By Jonathan Randles Feb. 27, 2023 3:39 pm ET | WSJ PRO

Specially pharmaceutical maker Alcorn Pharmaceuticals, which develops a generic form of drug to prevent premature ovulation, plans to shut down after it filed for bankruptcy for th second time in three years.





# Why do drug shortages occur

#### They build on each other

#### **Sufentanil Injection**

#### _

#### Products Affected - Description

n, 50 mcg/mL, 2 mL ampule, 10 count, NDC 17478-0050-02

nL, 5 mL ampule, 10 count, NDC 17478-

tion for injection, Pfizer, 50 mcg/mL, 1 mL vial, 10 count, NDC 00409-3382-21

#### Reason for the Shortage

Akorn ceased operations in February
 Pfizer has sufentanil on shortage due



#### **Alfentanil Injection**

#### Products Affected - Description

 Alfentanii injection, Akorn, 0.5 mg/mL, 2 mL ampule, 10 count, NDC 17478-0067-02 discontinued on, Akorn, 0.5 mg/mL, 5 mL ampule, 10 count, NDC 17478-0067-05 Vfentanil in

Reason for the Shortage ed operations in February 2023



fentanyl

They build on each other

THIS IS FINE.

#### Why do drug shortages occur – Reason for the Shortage

#### Akorn ceased operations in February 2023. Fresenius Kabi had fentaryl on shortage due to

Hikma had fentanyl injection on shortage due to supply and demand currently marketing fentanyl ampules, just vials.
 Pfizer has fentanyl injection on shortage due to manufacturing delays.

#### Available Products

- Fentaryl citrate solution for inje 63323-0808-11
  Fentaryl citrate solution for inje 63323-0806-01
  Fentaryl citrate solution for inje 63323-0806-02 vial, 25 count, NDC
- Fentanyl citrate 63323-0806-20
- Fentanyl citrate solution for inje 63323-0806-05
- Fentanyl citrate solution for injection, Hikma, 50 mcg/mL, 1 mL vial, 25 co.
- Fentanyl citrate 6029-01 on for injection, Hikma, 50 mcg/mL, 20 mL vial 1 count, NDC 0064





Lorazepam

Methadone

Midazolam

Naloxone

# AKORN

# They build on each other

- Dexmedetomidine
- Diltiazem
- Ephedrine
- Hydralazine
- Hydromorphone
- Labetalol
- Levofloxacin







# What is different with equipment

- Almost the same story
  - Additional choke points
    - Epidural kits
      - Sterilization issue and stoppage





# What can you do about it?

### Communication

- BOLO
- Equipment/Pharmacy
- Proactive





# What can you do about it?

### Planning

- Generate a team
- Multidiscipline
   Anesthesiology
- Pharmacy
- Supply chain
- Other service lines






# What can you do about it?

#### Conservation

- Alternate formulations
- Alternate routes
- Minimum dosing
- Splitting vials
- Pharmacy







Advocacy

### What can you do about it?

#### _

Hospital level
 Equipment
 P&T

- City/State level
- DOH
- Regulatory bodiesNational level
- National level
   Representatives
- FDA
- Social Media

### The Loudest Sounds On Earth







# What can you do about it?

### Equipment Substitutions

- Educational content
- Vendor presentations
- Be flexible





### What can you do about it?

#### Local Anesthetics

- For CD
  - Isobaric bupivacaine 12-13 mg if short on hyperbaric
  - 3% Chloroprocaine for lidocaine with epi
  - 2% Lidocaine (40-60 mg)
- For Labor
  - Ropivacaine for bupivacaine (40% drop in potency)
     0.0625% bupivacaine ≈ 0.1% ropivacaine

#### For Short Procedures

3% Chloroprocaine for hyperbaric bupi
 50 mg with 15µ fentanyl





### What can you do about it?

#### Opiates

- IT PSF-Morphine (CD)
- Hydromorphone
   2:1 ratio (ED 90 of 75µg vs 150µg morphine)
- IT PSF-Fentanyl (CD)
  - Sufentanil
  - 10:1 ratio (2.5 μg)





### What can you do about it?

#### Opiates

 Epidural PSF-Fentanyl Sufentanil 6:1 or higher Morphine 50-100µg IT once





# What can you do about it?

ra N, Carvalho B, Flood P, Guo N, Riley E. Calcium chlor rean delivery: A pilot randomized controlled trial and pha 10798, doi:10.1018/j.icleures.2000.44555

study, J Clir

#### Uterotonics

#### Oxytocin

- Prioritization of labor augmentation
- Alternative ripening agents/uterotonics (potentially Ca++)
- Avoidance for 1st trimester D&C
- Utilization of bag in LDR for OR
- Split larger vials
- 10 IU IM dose
- Rule of Three



### What can you do about it?

#### Antibiotics

- Cefazolin
  - Local resistance patterns
  - Clindamycin and AG
    - Appropriate dosing Local resistance patterns







# What can you do about it?



### PPPPP

- Foresight instead of hindsight
- Make a team
- Have a planFun exercise for residents!

Thank You!





201 E. Main Street, Ste. 1405 | Lexington, KY 40507 USA 859.402.9817 info@soap.org | soap.org

# How to write an impactful manuscript



Brian T. Bateman, MD, MSc The Stanford Medicine Endowed Professor of Anesthesiology, Perioperative and Pain Medicine Chair, Department of Anesthesiology, Perioperative and Pain Medicine By courtesy, Professor of Epidemiology and Population Health Stanford University School of Medicine

### Outline

- Impactful research
- My approach to writing a paper
- Impactful publishing



# Why do research?

- Important
- Unanswered questions
- Deeply gratifying
- Leads to interesting life experiences

# Impactful research



### What to work on?

- It must matter
- Think broadly
- Think strategically

## Mentorship

- Essential to getting started
- Attributes of an excellent mentor
- "It takes a village"

### Teams

- Best science is team science (most fun too!)
- Find balance of opportunities to lead and be a co-I
- Work at interface of other fields
- Be generous:
- Ideas
- Credit

### **FINER** criteria

- F: Feasible
- I: Important
- N: Novel
- E: Ethical
- R: Relevant

Hulley, Cummings, Browner, Grady, Newman.; Designing Clinical Research, 2006

### Feasible

- Adequate number of subjects
- Adequate technical expertise
- Affordable in time and money
- Manageable in scope
- Fundable

### Important

• You (and others) care about the question

• Addresses problems of public health importance

Hulley, Cummings, Browner, Grady, Newman.; Designing Clinical Research, 2006

Hulley, Cummings, Browner, Grady, Newman.; Designing Clinical Research, 2006

Novel

- Provides valuable new information
- Confirms, refutes, or extends previous findings
- May lead to innovations in concepts of health and disease, medical practice, or methodologies for research

Hulley, Cummings, Browner, Grady, Newman.; Designing Clinical Research, 2006

### Ethical

- Acceptable physical and/or privacy risk.
- Equipoise: Available evidence is insufficient to determine which intervention is better, and there is no clear preference or bias towards one intervention over the other.

Hulley, Cummings, Browner, Grady, Newman.; Designing Clinical Research, 2006

### Relevant

- Has potential for clinical and/or scientific impact.
- Change practice or policy
  Change understanding
- Change direction of future inquiry

em A	anesthe	siology				
	Home	Main Men	iu Subi	mit a Manu	script	out V Help V Shortcuts V
Comment	ts to Autho	•				
Manuscri	pt Ratings					
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noverty (1	= not at al	, 3 = Averag	ge, s = com	(preceiv)		
N/A	1	2	2	4		
Clinical In	pact (1 = 1	None. 3 = Av	verage, 5 = 1	Immense)		
	0	0		0		
N/A	1	2	3	4	5	
Scientific	Impact (1 =	None, 3 =	Average, 5	= Immense)		
۲						
N/A	1	2	3	4	5	
Definitive	(1 = Not at	all, 3 = Aver	rage, 5 = Co	impletely)		
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Hulley, Cummings, Browner, Grady, Newman.; Designing Clinical Research, 2006

### Execution

- Specific aims; hypothesis.
- Study protocol/statistical analysis plan (registered prior to data access).
- Get statistical advice early.
- Pay meticulous attention to detail; keep good records.
- Involve a statistician in the analysis.

# Impactful manuscript

### Approach to writing the paper

- Clarity. "And now abideth faith, hope, *clarity*, these three; but the greatest of these is *clarity*".
- Follow good examples.
- Shorter is generally better (*NEJM* 2,700 words).
- My sequence: Methods, Results, Intro, Discussion

### **Methods**

- Sufficient detail that the study can be replicated (use supplements)
- Observational study:
- Data source
- Cohort definition (inclusion/exclusion criteria)
- Exposure definition
- Outcome definition
- Covariates
- Statistical analysis
- Sensitivity and subgroup analyses

# Methods—Statistical analysis

- Work with a statistician—an area where real expertise is need.
- Be attentive to confounding.
  - Greatest threat to the validity of most observational research interested in causal effects.

### **Study question**



### **Study question**



### Methods—Statistical analysis

- Need to employ statistical methods that account for these confounding factors if goal is defining causality
- Logistic regression
- · Propensity score matching, weighting or stratification
- Inverse Probability of Treatment Weighting
- Strength of the observational study will rest largely on ability to measure and appropriately control for confounders

## Methods—Statistical analysis

- P values: Probability of obtaining a result as extreme or more extreme than the observed result, assuming the null hypothesis is true.
- · Limitations:
  - · Should not be used to dichotomize results.
    - 0.05 is arbitrary. Lead to overconfidence in "significant" results and underestimation of the uncertainty and variability in the data.
    - Ignores the actual effect size and magnitude of the observed difference or relationship.
    - Sample size dependent. Ignores the issue of multiple comparisons.

### Methods—Statistical analysis

- Present relative risks or risk differences (with 95% CI) rather than or in addition to p-values.
  - Provides information on the range of plausible values for an effect size given the observed results, which is more informative than a p-value alone.
  - · Provides insight into the practical significance of the results.
    - If the CI includes values that are clinically meaningful, this can provide evidence that the effect size is practically significant.

#### The NEW ENGLAND IOURNAL of MEDICINE

# EDITORIALS



### New Guidelines for Statistical Reporting in the Journal

David Harrington, Ph.D., Ralph B. D'Agostino, Sr., Ph.D., Constantine Gatsonis, Ph.D., Joseph W. Hogan, Sc.D., David J. Hunter, M.B., B.S., M.P.H., Sc.D., Sharon-Lise T. Normand, Ph.D., Jeffrey M. Drazen, M.D., and Mary Beth Hamel, M.D., M.P.H

Some Journal readers may have noticed more par-simonious reporting of P values in our research articles over the past year. For example, in Novem-ber 2018, we published two reports from the Vita-min D and Omega-3 Trial (VTAL),^{1,2} a two-by-two factorial, Jacebo-controlled, randomized trial as-no confounding. Concluding that the null hypoth-essis is false when in fact it is true (a type I error in

# Methods—Statistical analysis

- Judge estimates to be similar to or different from the reference group by three criteria:
- (1) the strength of the adjusted RR (regardless of whether the 95% CI includes the null),
- (2) the degree to which the upper or lower bound of the 95% CI indicates low compatibility between the data and the intended effort or the adverse effect of interest (i.e., the upper bound of the CI excludes a large increase in the risk of the adverse outcome of concern)
- (3) in observational studies, the consistency of the effect estimates across the sensitivity analyses.
- Interpretation of the effect estimates by clinicians and patients to help inform treatment
  decisions will vary, depending on perceived benefits of treatment, the severity of the adverse
  outcome/benefit of treatment, and what is known about the safety and effectiveness of
  therapeutic alternatives.

### **Results**

- Characteristics of the cohort
- Describe Table 1
- Primary outcome results (most detail)
- Secondary outcome results
- Sensitivity and subgroup analyses
- Highlight key statistics from the tables. Follow sequence in methods and tables/figures.

### Intro

- Making an argument for why your study matters.
- Three paragraphs (one page)
  - Background
- State of the evidence (brief!)
- Objective

### Discussion

- 1. Summarize what you did, what you found, and why it is important.
- 2. Implications.
- 3. Compare with previous evidence ("our findings confirm and extend prior findings comparing x and y...")
- 4. Strengths. "Our study has several important strengths...."
- Limitations. "Our study is also subject to certain limitations inherent in its design." Ideally, discuss how you mitigated the limitations or why the limitation are not a major threat.
- 6. Conclusion. Re-state the main findings, it's implications...forward looking.

# Impactful publishing

## Impact factor

- 2022 impact factor
  - A = the number of times articles published in 2020 and 2021 were cited by indexed journals during 2022.
  - B = the total number of "citable items" published in 2020 and 2021.
  - A/B = 2022 impact factor
- Most widely used metric of journal quality but has major limitations.

	2022 Impact Factor
NEJM	176
JAMA	157
BMJ	93
Nature Medicine	87
JAMA Pediatrics	26
BJA	11.7
Anesthesiology	9.0

### **Journal selection**

- · Guided by topic and "fit", where you to want be read
- Higher quality journals more likely to be read, integrated into guidelines, etc.
- Will affect the "impact" of your work
- Talk to mentors, colleagues; aim high
- Consider gen med journals, OB journals, peds journal

# Salami slicing

- Avoid temptation to find the minimal publishable unit (M.P.U.)
- Much better to publish a single, comprehensive study in a higher impact journal than many manuscripts in less impactful journal.

## Impactful manuscript

- Research matters: it is a way to have impact that affects thousands or millions of patients.
- Want research to have impact.
  - Work on important questions.
  - Use best methods for analysis.
  - Write the paper well, present the results clearly.
  - Publish impactfully.

@ruthi_landau #SOAPAM2023 COLUMBIA UNIVERSITY Department of IRVING MEDICAL CENTER Anesthesiology

# Thank you!

Research Track Journal Editor's Panel- From Reviews to Publications How to Utilize Social Media to Disseminate Research May 5th, 2023

Ruthi Landau, MD Virginia Apgar Professor of Anesthesiology Columbia University, New York SOAP Past President



### **Disclosures & COI**

- Nothing to disclose in relation to this presentation
- I am on Twitter





#### @ruthi_landau #SOAPAM2023

### Research ↔ Social Media

#### Why research & why publish?

- Scientific inquiry & discovery
- Advance clinical care
- Societal impact
- Recognition as an expert
- Academic appointments & promotion



### Social Media

A computer-based technology that facilitates the sharing ofideas, thoughts, and information through virtual networks and communities





@ruthi_landau

 

 13% of Scientists Regularly Use Twitter
 #1 Reason For Use Follow Discussions

 Tip 1
 Pick one person on Twitter and raid their following list to find people to add to yours.

 Tap into the Twitter network by having

Tap into the Twitter network by having meaningful and mutually beneficial interactions with others.





### Twitter & Science



LETTERS NEXTORN VOICES Social media: Good or evil? We add young scientists to anywer this question in the form of a trett: is used and age of er evil when it comes to actingce tion to pursue extension. The second sector of the sector of the second sector of the sector of the



@ruthi_landau #SOAPAM2023

### Research discussions on Twitter

Van Hunsend
 Appear Dergert, MD, MA (a) (Displex/Ma, 000/part). - Mar 11 - 13
 Mar 10 - 13
 Mar 10 - 14
 Mar 10 - 14

.

- User tweets (including polls)
- Educational threads ("tweetorials")
- Live-tweeting during academic conferences
- Journals posting recently-accepted articles
- Twitter-augmented Journal Club ("TweetChat")
- Research collaborations initiated through social media interactions
- Recruitment of study participants & collection of survey-based data

#SoMe tool to enhance research discourse, dissemination, and collaboration





#### @ruthi landau What about you?! #SOAPAM2023 Ruthi Landau 18.8% 50% inate my re 25% 6.3% Share my opinion(s) es · Final result 4:04 AM - Apr 28, 203 Ruthi Landau @ruthi_la. Have you used nebulize #dexmedetomidine for .20 #PDPH ?!! #SOAPAM2023 @SOAPHO HSDAHAX2023 @SDAHAQ Yes it's great 0% No but will try 39% Never ever 56% Use by other route 5% 41 votes · 3 hours 34 minutes... 01 01 t12 2 41 soc...

#### @ruthi_landau #SOAPAM2023

### Metrics to evaluate research impact

- Impact factor of a journal (lack of transparency)
- H-index of a researcher citations
  - Long time to accumulate
  - Impact within the scientific community, not, impact on or dissemination among knowledge users (policy makers, patients, and the general public)

#### Societal impact

- Real-world impactKnowledge translation
- Uptake by the public should be part of every research
- assessment exercise
- How can buzz be measured?
  When (in relation to the publication of an article) and how
- Iong should it be measured?
  Is the buzz sensitive enough to predict increased citations?



### Citations

Science Citation Index (CSI) = refers to earlier works, are the standard means by which authors acknowledge the source of their methods, ideas and findings, and are often used as a rough measure of a paper's importance.

'Clinical



#### @ruthi_landau #SOAPAM2023

### Metrics to evaluate research impact



- How much articles are viewed—HTML views and PDF downloads
- How much they are discussed or "mentioned"—journal article comments, scholarly
- or scientific blogs, Wikipedia, Twitter, Facebook and other social media
- How much items are saved (Mendeley, CitUlike and other social bookmarks
- How much items are recommended (F1000Prime)





#### @ruthi_landau #SOAPAM2023

#### Network Open.







#### Network Open.

Original Investigation | Assesthesiology Use of Labor Neuraxial Analgesia for Vaginal Delivery and Severe Maternal Morbidity







Proposed twimpact factor

Diations

1

11 in Vol 13 , No 4 (2011) :Oct-De Can Tweets Predict Citations? Metrics of Social Impact Based on Twitter and Correlation with Traditional Metrics of Scientific Impact

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Top-cited articles can be predicted from top-tweeted

articles with 93% specificity and 75% sensitivity.

Tweets can predict highly cited articles within the

first 3 days of article publication.

@ruthi_landau

#SOAPAM2023



Original Article 👶 Free Acces From smartphone to bed-side: exploring the use of social media to disseminate recommendations from the National Tracheostomy Safety Project to front-line clinical staff F. K. Ng 🚳 S. Wallace, B. Coe, A. Owen, J. Lynch, B. Bonvento, M. Firn, B. A. McGrath rd: 27 June 2019 | https://doi.org/10.1111/anae.14747 | Citations: 1

- Multimedia marketing and production company to design educational videos and devise a marketing campaign to target clinical staff with NTSP resources.
- Key initial aim: understand the social media landscape and consider the interests and behaviors of target population

omy Safety Project YouTube analytic data for before, during and after the campaigns. Values ar Table 3 National Trach number or mean (SD).

	Pre-campaign	National Tracheostomy Safety Week	Paid social media advertising campaign	Postcampaig
Days; n	365	7	84	365
Total views; n	49,211	2660	61,645	177,600
Total watch time; min	46,506	2657	62,888	196,600
New subscribers; n	66	14	140	540
Daily views; n	135(16)	380 (56)	734(183)	487 (67)
Daily viewing time; min	127(15)	379(59)	749 (206)	539(103)



#### @ruthi landau #SOAPAM2023

Anaesthesia Association of Anaesthet Peri-operative medicine, critical care and pain

Editorial 🙃 Free Access Dissemination of medical publications on social media - is it the new standard? H. Johannsson 🖾. T. Selak

First published: 23 July 2019 | https://doi.org/10.1111/anae.14780 | Citations: 24

This editorial accompanies an article by Ng et al., Angesthesig 2019; 75: 227-33.

- Participation in social media does carry the risk of reputational damage, for both individuals and organizations.
- The way in which clinical staff access information at the bedside is much more amenable to videos, infographics, and short headlines viewed on smartphones as compared with a full paper published in a journal and viewed on a hospital computer.



#### @ruthi landau #SOAPAM2023

Effect of Promotion via Social Media on Access of Articles in an Academic Medical Journal: A Randomized Controlled Trial Widmer, R. Jay MD, P Thomas C. MD, PhD

120.041.041 240.045 2.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01 14.01

Academic Medicine to

- RCT articles published in Mayo Clinic Proceedings (N=68; Oct-Dec 2015) Exposure - social media promotion (SoMe; 7 posts/month) using Twitter (4 posts/month), Facebook (2 posts/month), and LinkedIn (1 post/month) or no social media promotion (NoSoMe), for 30 days beginning with the date of online article publication .
- Outcome = website visits and full-text article downloads at 30-60 days post publication

Table 1 Articles by Type Randomizes Effect of Promotion via Saci	I into the Solde or No al Media on Ascess of	Goble Groups for an # Articles, 2015	CT on the
Brief Report	5	1	
Case Report	3	0	1
Commentary	2	1	
Concise Review/Symposium	4	2	- 1
Editorials	6	1	1
Letters to the Editor	5	6	11
Medical Images	3	2	
Original Articles	*	9	14
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Title	Authors	Type of publication	Social media connection
Future directions in regional anaesthesia: not just for the cognoscenti[10]	Turbitt LR, Mariano ER, El- Boghdaolly K	Editorial	Discussions on Twitter
Opicid-free anaesthesia - what would Inigo Montoya say?[11]	Elkassabarry NM, Mariano ER	Editorial	Discussions on Twitter
Updates on multimodal analgesia and regional anesthesia for total knee arthroplasty patients [12]	Kandarian BS, Elkassabany NM, Tamboli M, Mariano ER	Review article	Discussions on Twitter
How social media is changing the practice of regional anestheticlogy[5]	Schwenk ES, Chu LF, Gupta RK, Mariano ER.	Review article	Discussions on Twitter
Standardizing nomenclature in regional anothesia: an ASRA- ESRA Delphi consensus study of abdominal wall, paraspinal, and chest wall blocks [13]	El-Boghdadly K, Wolmarans M, Stengel AD, et al.	Original research	Discussions on Twitter; co- author social networking
Non-Fellowship regional anesthesia training and assessment: an international Delphi study on a consensus curriculum [14]	Chuan A, Jeyaratnam B, Fathil S, et al.	Original research	Discussions on Twitter; co- author social networking
Making a business plan for starting a transitional pain service within the US healthcare system [15]	Sun EC, Mariano ER, Narouze S, et al.	Daring discourse	Discussions on Twitter
Racism in pain medicine: we can and should do more [16]	Strand NH, Mariano ER, Goree JH, et al.	Perspectives article	Co-author social networkin
Core outcome set for peripheral regional anesthesia research: a systematic review and Delphi study [17]	Hill J, Ashken T, West S, et al.	Original research	Discussions on Twitter; co- author social networking
An international multidisciplinary consensus statement on the prevention of opioid related harm in adult surgical patients [18]	Levy N, Quinlan J, El-Boghdadly K, et al.	Guidelines	Discussions on Twitter; co- author social networking
Teaching an old pain medicine society new tweets: integrating social media into continuing medical education [19]	Jaremko KM, Schwenk ES, Pearson ACS, et al.	Editorial	Discussions on Twitter, co- author social networking
I tweet, therefore I learn: an analysis of Twitter use across anesthesiology conferences [20]	Schwenk ES, Jaremko KM, Park BH, et al.	Original research	Discussions on Twitter; co- author social networking
Upgrading a social media strategy to increase Twitter engagement during the spring annual meeting of the American Society of Regional Anesthesia and Pain Medicine [21]	Schwenk ES, Jaremko KM, Gupta RK, et al.	Original research	Discussions on Twitter; co- author social networking
Preliminary analysis of factors affecting publication of abstracts presented during the 2017 American Society of Regional Anesthesia and Pain Medicine spring annual meeting [22]	Rasouli MR, Maty S, Mariano ER, et al.	Research report	Co-author social networkin
The rise and fall of the COVID-19 aerosol box through the lens of Twitter [23]	Mariano ER, Kou A, Stiegler MA, et al.	Letter to the editor	Discussions on Twitter; co- author social networking
How Twitter conversations using hashtags Wegionalanesthesia and Progionalanaesthesia have changed in the COVID-19 era[24]	Schwenk ES, Jaremko KM, Gupta RK, et al.	Research report	Discussions on Twitter; co- author social networking







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#### @ruthi_landau #SOAPAM2023

# A HASHTAG GUIDE FOR ANESTHESIOLOGISTS Far anothesis to popular hashings. Nareh Amerikan to popular with fure One of Australia 3

EDUCATIONAL TOOL Twitter Hashtags for Anesthesiologists: Building **Global Communities** 





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### An "enhancer"

Prudent

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- Reputation

Trolls Fake news

Hacking

Time-consuming

Promotions?

Evidence that it increases citations?

#### Helps

- Generate ideas
- Identify scientific gaps
- Network –collaborations
- Share knowledge (early/fast)
- Enhances conversations
- Disseminate your (others') work
- Receive/respond to comments
- Outreach (lay, news outlets)

# @ruthi_landau #SOAPAM2023

# ITATUBE ATTICLES OBIERAL CURICAL RESEARCE REPORT I Tweet, Therefore I Learn: An Analysis of Twitter Use Across Anesthesiology Conferences Schwerk, Itics J. WD (Jaremik, Riellie M. MD, Pil); Pilk, Thian K. MD); Stieffer, Maroire A. MD¹ Cambia, Janison G. MH¹, Churger, J. Man, Mirk, Natiano, Edward K. MA



Article Level Metrics

Table 1 Summary of Twitte	er Activity at Anesthe	siology Conferences			
Hashtag (#)	Participants	Number of Tweets	Number of Impressions	Number of Retweets	Number of Replies
#504/44/2016	113	915	1,103,343	457	29
#ESALondon	75	4257	7,047,561	2712	54
#WC42016	741	3762	6,751,797	1968	81
MESRA2016	240	2902	3,373,546	1544	130
Apedsanesthesia2016	6	13	29,677		0
#ANES16	1937	12,152	31,981,320	6435	664
#SPANZX2016	78	630	1,790,221	165	30
#PGA70	55	220	550,908	36	2
MASURA2017	299	568	1733,901	430	8
Award2007	253	738	1,343,238	480	10
#SPAAD2017	259	2266	1,866,569	1813	45
#SIMPARISURA	5%	609	1,017,751	434	15
#ASRASpring17	604	3012	4,054,891	1718	



Your @Attending Will #Tweet You Now: Using Twitter in Medical Education Jaffe, Rebecca C. MD; O'Glasser, Avital Y. MD; Brooks, Mic Anthony C. MD; Wray, Charlie M. DO, MS helle MD: Chanman, Margaret MD: Breu Author Inform tion⊗







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# Program Material Saturday, May 6, 2023

### **Research Network Symposium**

Moderator: Ronald George, MD Panelists: Alex Butwick, MD, Holly Ende, MD, Lisa Leffert, MD, Ruth Landau, MD, James O'Carroll, MD, Jack Peace, MD, Ido Zamberg, MD

### **Opening Remarks**

Tom Klumpner, MD & Brandon Togioka, MD

### Sol Shnider Track #2

Moderator: Emily Dinges, MD

- Intraoperative Breakthrough Pain Case Based Heather Nixon, MD
- PDPH Acute and chronic effects Jess Ansari, MD

### **Best Case Reports**

Moderator: Jennifer Dominguez, MD Panelists: Bill Camann, MD; Joy Hawkins, MD; Barbara Scavone, MD

### ASA Update Introduction: Klaus Kjaer, MD, MBA Speaker: Michael Champeau, MD, FASA; ASA President

Gerard W. Ostheimer Lecture Introduction: Michaela Farber, MD

Speaker: Pervez Sultan, MD

Distinguished Service Award Introduction: Joy Hawkins, MD Recipient: Brenda Bucklin, MD

### **SOAP Annual Awards**

- Best Research Paper
- Gertie Marx
- Teacher of the Year
- Best Case Report
- Diversity & Inclusivity Award
- Patient Safety Award
- Research in Education Award
- Frederick P. Zuspan Award

### Case Reports & Research Abstracts #3 (breakout rooms)

Room 1 - Hematology Room 2 - Neuraxial Labor Analgesia and Neurologic Disease Room 3 - Cardiac Room 4 - Neurologic Diseases Room 5 - Unusual Co-Morbidities Room 6 - Unusual Co-Morbidities Room 7 - Unusual Co-Morbidities



# **SOAP Research Network**

# • An inclusive, network of experts interested in peripartum anesthesia research

- Cooperatively develop research programs/protocols, under the mentoring and constructive advice of the network membership
- Focus on development and execution of investigator-initiated research
   Facilitates meetings and opportunities to communicate regarding
- potential research ideas and projects
- Facilitates a coordinated approach to investigation of important clinical questions and strategic utilization of research infrastructure nationally



# SOAP Research Network



The SOAP Research Network is You !!

> SOAP Research Network

# SOAP Research Network



# SOAP Research Committee

Research Network Subcommittee



SOAP Research Network	AGEND	A	•	•	
	Time	Session	Presenter	Title	
	7:00-7:15a	m Research	Network Subcommittee Meeting / I	Breakfast available just outside room	
	7:15-7:30a	m Welcome	Dr. George	Introduction and process review	
	7:30-7:55a	m New project proposal	Investigator 1 – Holly Ende	Postpartum hemorrhage risk prediction model with clinical decision support compared to category-based risk assessment tool: a prospective, pragmatic, randomized controlled trial	
	7:55-8:20a	m New project proposal	Investigator 2 – Jack Peace	Benefit of transversus abdominal plane block in addition to intrathecal morphine in patients with opioid use disorder	NHe
	8:20-8:45a	m New project proposal	Investigator 3 - Ido Zamberg	Synergistic effect of arterial stiffness measures and urinary omics studies for the early prediction of pre-eclampsia in high-risk pregnancies	
	8:45-8:55a	m	Coffee & Networking B	reak – In room	ASE (
	8:55-9:00a	m Project update	Investigator A – Lisa Leffert	GA Registry	
	9:00-9:05a	m Project update	Investigator B – Ruth Landau	spinal containe to reduce optoid use in patients at risk for severe pain after scheduled CS	
	9:05-9:10a	m Project update	Investigator C – James O'Carroll	Intraoperative cesarean discomfort	#COAD442022
	9:10-9:55a	m CME	Dr. Alex Butwick	Title pending	#SUAPAIVI2023
	9:55-10:00	im	Wrap-up and A	djourn	
	Research Network			NH OH 150 Resea	SOAP



# **PPH Risk Prediction:**

A Pragmatic RCT of Prediction Model + CDS vs. Standard of Care

### Presenter: Holly Ende

<u>Co-investigators</u>: Jonathan Wanderer, Rob Freundlich, Lisa Zuckerwise, Daniel Byrne, Ryan Moore, Henry Domenico, Allison McCoy





# **THE PROBLEM**

- PPH is a major cause of preventable maternal morbidity and mortality
- Risk prediction can facilitate preparation and resource allocation
- Current risk prediction tools assign low/medium/high risk and show moderate discrimination
- Predictive modeling and AI take advantage of vast quantities of rapidly changing data



# THE HYPOTHESIS

A composite outcome of **bleeding and transfusion** will be lower in patients who receive risk stratification via a PPH **prediction model** compared to those who receive risk stratification via a **category-based tool** 

# **STUDY DESIGN**

Study design: RCT (single center)

Study participants: all patients admitted for VD or CD

#### **Interventions:**

- Risk prediction model
- Clinical decision support:
  - Tranexamic acid
  - Second line prophylactic uterotonic
  - Fluid bolus at EBL 500ml
  - Bladder emptying before L&D discharge
  - Blood reserve/hold if not eligible for electronic crossmatch









# **OUTCOMES**

### **Composite Primary Outcome**

- 1 point for each liter of estimated blood loss
- 1 point for each unit of transfusion (including red blood cells, platelets, fresh frozen plasma, and cryoprecipitate)
- 1 point for the administration of recombinant fibrinogen

#### **Secondary Outcomes**

- CDC Severe Maternal Morbidity Criteria
- Length of stay
- [Percent of patients flagged as high risk]
- [Percent of patients receiving recommended actions]



# STATISTICAL ANALYSIS

#### Ordinal regression

#### • Sample size

- 2500 per arm / 5000 total (1 year)
- Reduction in outcome severity in the intervention group relative to the control
  - Power 90% to detect an OR 0.717
  - Power 80% to detect an OR 0.751





# WHY NOW, WHY US

#### **Current Landscape**

- Near-total adoption of the electronic medical record
- Joint Commission requirements
- Advancement of AI technologies
- Next step toward sophisticated, personalized, risk stratification

#### **Expertise**

- OB Anesthesia: informatics, Al
- Obstetrics/MFM: hemorrhage specialist
- Biomedical Informatics
- Statistics: predictive modeling

### **Prior work**

- Systematic review
- Model development/validation
- Model comparison to CMQCC, AWHONN, ACOG



**Research Network** 

# CONCERNS

- Data quality
- Timely documentation
- BPA firing and workflows
- Effect size of interventions

# **NEXT STEPS**

- Finalize protocol
- IRB approval
- Additional EMR build testing
- Provider education



# QUESTIONS

- Ideal design?
- Optimal risk thresholds?
- Recommended interventions?
- Primary outcome?
- Major unforeseen issues?





**THANK YOU** 



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0.01	0.79	0.67	0.03	1.00				·	
0.02	0.61	0.86	0.06	0.99	<b>1</b> in 12			Data nulled May 2022	
0.03	0.49	0.95	0.08	0.99	1 in 12				
0.05	0.34	0.96	0.12	0.99			8	8 497 deliveries	
0.06	0.30	0.97	0.14	0.99		т	Ū		
0.07	0.29	0.98	0.17	0.99			6	611 (7 2%) PPH by FRI > 11	
0.08	0.25	0.98	0.19	0.99		•	0	DII (7.2%) FFII DY LDL 2 IL	
0.09	0.23	0.99	0.20	0.99		Ċ			
0.1	0.20	0.99	0.21	0.99			1	119 (1.4%) PPH requiring transfusion	



					10001		Odds Ratio with 95% C.I.	P-value
Delivery Type -					•			< .001
Cesarean vs. Spontaneous Vaginal							4.22 (3.03, 5.92)	
Instrumented vs. Spontaneous Vaginal							2.85 (1.39, 5.31)	
Prior PPH (Yes vs. No)					•		16.02 (7.87, 30.18)	< .001
Hematocrit (Per 5 Percent Increase)				•			0.51 (0.43, 0.61)	< .001
Accreta Spectrum Disorder (Yes vs. No)-				•			13.32 (5.94, 29.49)	< .001
General Anesthesia (Yes vs. No)-			•				3.25 (1.88, 5.41)	< .001
Multiple Gestation (Yes vs. No)			•				2.97 (1.73, 4.84)	< .001
Placenta Previa (Yes vs. No)		•					2.30 (1.37, 3.67)	< .001
Induced Labor (Yes vs. No)		•					1.63 (1.20, 2.19)	0.002
Augmented Labor (Yes vs. No)		•					1.65 (1.20, 2.25)	0.002
Admission Weight (Per 10 kg Increase)		•					0.89 (0.83, 0.96)	0.002
WBC (Per 5,000 cells/mL Increase)		•				_	1.25 (1.08, 1.46)	0.002
stimated Fetal Size for Gestational Age	•							0.035
Small for Gestational Age vs. Normal							0.55 (0.29, 0.97)	
Large for Gestational Age vs. Normal							1.91 (0.83, 3.83)	
Labor Length > 20 hrs. (Yes vs. No)-	•						1.78 (1.09, 2.79)	0.015
Admission Pulse (Per 10 bpm Increase)	•						1.11 (1.01, 1.22)	0.022
ure Rupture of Membranes (Yes vs. No)	•					_	0.37 (0.14, 0.8)	0.023
Calcium Level (Per 1 mg/dL Increase)	•						0.75 (0.58, 0.98)	0.034
Nifedipine (Yes vs. No)	•						1.93 (1.01, 3.45)	0.035
sive Disorder of Pregnancy (Yes vs. No)	•						1.43 (1.00, 2.02)	0.046
Terbutaline (Yes vs. No)-						_	1.58 (0.96, 2.5)	0.061
et Count (Per 25,000 cells/mL Increase)							0.96 (0.91, 1.01)	0.089
Placental Abruption (Yes vs. No)-	•						2.45 (0.73, 6.79)	0.11
et Count (Per 25,000 ce Placental Abrupt	ion (Yes vs. No)	ion (Yes vs. No)	ills/mL Increase) ion (Yes vs. No)- Adjusted Strenati	Ills/mL Increase) • ion (Yes vs. No) • 0 10 25 Adjusted Strength of Predictor	Ills/mL Increase)	Ills/mL Increase)	Ills/mL: Increase)	Ils/mL increase) ion (Yes vs. No)

Benefit of transversus abdominus plane block in addition to intrathecal morphine in patients with opioid use disorder

Presenter: Jack Peace, M.D.

Co-investigators: Ellen Hauck, D.O., Ph.D., Laura Hart, M.D., Wadia Mulla, M.D.



# **THE PROBLEM**



### **THE PROBLEM**



## THE PROBLEM

International Journal of Obstetric Anesthesia (2019) 39, 105–116 0959-289X/\$ - see front matter © 2019 Published by Elsevier Ltd. https://doi.org/10.1016/j.ijoa.2019.01.011

**REVIEW ARTICLE** 

Post-cesarean delivery pain. Management of the opioid-dependent patient before, during and after cesarean delivery

R. Landau

"No RCTs to date have evaluated and compared any of the many analgesic approaches that are available for postoperative pain management."





fri

ELSEVIER

Nack for

# **THE PROBLEM**

#### British Journal of Anaesthesia 109 (5): 679-87 (2012) Advance Access publication 19 August 2012 - doi:10.1093/bja/aes279 **REVIEW ARTICLES**

Transversus abdominis plane block for postoperative analgesia after Caesarean delivery performed under spinal anaesthesia? A systematic review and meta-analysis F. W. Abdallah^{1,2}, S. H. Halpern^{1,2,3} and C. B. Margarido^{1,2,3*}

# **ANESTHESIOLOGY**

5/11/2023

**Transversus Abdominis Plane Block** A Narrative Review

De Q. Tran, M.D., F.R.C.P.C., Daniela Bravo, M.D., Pranamalee Leurcharusmee, M.D., Joseph M. Neal, M.D. IOLOGY 2019: 131:1166-90

BJA "The differences in... [clinical]

outcomes were not significant when spinal morphine was used."

**Research Network** 

)AP

"We do not suggest the use of posterior or lateral transversus abdominis plane blocks for Cesarean delivery when long-acting intrathecal opioids are incorporated to the multimodal analgesic regimen."

Patients with OUD and/or chronic pain are excluded from these studies

# **THE QUESTION**

When used in patients with opioid use disorder (OUD), does a transversus abdominis plane (TAP) block in addition to intrathecal morphine (ITM) reduce opioid consumption?

# **STUDY DESIGN**

- Study design
  - Randomized, double blind controlled trial
  - Placebo controlled

#### • Study sites

- Temple University Hospital
- Seeking involvement of other sites
- Study participants
  - Women with history of OUD with singleton pregnancy
  - Scheduled cesarean delivery with planned spinal anesthesia









# **STUDY DESIGN**

#### Interventions

- Spinal anesthesia: 0.75% Bupivacaine in 8.25% dextrose 12mg + preservative-free morphine 150µg + fentanyl 15µg + epinephrine 100µg <u>AND</u>
  - TAP block: 0.375% Bupivacaine 1 mg/kg to each side under ultrasound guidance
  - OR
  - Saline block: 0.9% normal saline 0.267 mL/kg to each side under ultrasound guidance
- Standard postpartum analgesic regimen: scheduled ketorolac/ibuprofen, acetaminophen, hydromorphone PCA
- Outcome measures
  - Primary: Morphine equivalent (MEQ) use in first 24 hours after surgery
  - Secondary: VAS at rest and with activity, Neuropathic Pain Symptom Inventory (NPSI)





## **STUDY DESIGN**

Neuropathic Pain Symptom Inventory (NPSI)	
Severity of the spontaneous pain	
Q1. Does your pain feel like burning?	
Q2. Does your pain feel like squeezing?	
Q3. Does your pain feel like pressure?	
Q4. During the past 24h, your spontaneous pain has bee	en present:
permanently/8 to 12 h/4 to 7 h/1 to 3 h/ < 1h $$	
Severity of the painful attacks	
Q5. Does your pain feel like electric shocks?	
Q6. Does your pain feel like stabbing?	
Q7. In the past 24 h how many of these pain attacks hav	re you had? >20h/11
to 20/ 6 to 10/ 1 to 5/ none	
Severity of your provoked pains	
Q8. Is your pain provoked or increased by brushing on t	the painful area?
Q9. Is your pain provoked or increased by pressure on t	the painful area?
Q10. Is your pain provoked or increased by contact with	h something cold on the
painful area?	SOAP
	Research Network
11/2023	Society for Obstetric Anesthesia and Perinatology

# **STUDY DESIGN**





# WHY NOW?

- OUD patient population is likely to grow
- Patients with a history of opioid misuse are at elevated risk of relapse in the postoperative period
- Postoperative pain is a leading factor for relapse
- TAP blocks have been shown to be useful in mitigation of postoperative pain from abdominal surgeries



# **STRENGTHS**

- Our institution brings a willingness and need to help optimize care for patients with OUD
- Site with many patients meeting eligibility criteria
  - 15 patients per month with OUD (active use & MAT)
  - About 3 patients per month with CD

# WHY INVOLVE THE SOAP RN ?

- Identification of potential partners
- Clarification of research methodologies in an evolving area
- Provide clarity on optimal care of postpartum patients affected by OUD
- Sources of funding









# CONCERNS

- Recruitment
  - Number of patients
  - Willingness to consent
- Adherence
  - Availability of skilled provider to perform TAP block
  - Accurate recording of postpartum evaluations
- Analysis
  - Inherent variability in outcome among patient population
  - Inadequate power to detect a difference





# **OPPORTUNITIES**

- Optimizing treatment for patients with OUD is an area of increasing clinical concern and active research
- Postpartum epidurals may be useful for pain control in this population, but are not feasible with all patients/locations
- This study aims to help clarify the optimal means of treating patients with OUD who undergo caesarean delivery
- This study may build a means of collaboration among sites that care for patients with OUD



# TIMELINES

- Complete: Systematic review
- Spring 2023: Identification of study sites, IRB approval
- Summer 2023: Recruitment
- Summer 2024: Data analysis and publication

# QUESTIONS

- How should we define our OUD population? Should we exclude patients not on MAT?
- How should MAT, if any, be included in analysis of postoperative MEQ?
- Is it possible to calculate MEQ above baseline?
- Should we attempt to include those patients who receive intrapartum caesarean delivery with epidural morphine?
- Are outcomes meaningful? Are there other useful ways of assessing pain in these patients?
- Should we attempt measurement of opioid side effects? Longerterm outcomes?
- Optimal means of respiratory monitoring for patients who receive ITM and opioid PCA?
- Potential partnerships?







# Urinary biomarkers & machine learning for the early prediction of preeclampsia in high-risk pregnancies

Presenter: Ido Zamberg Supervisor: Prof. Stella Daskalopoulou Co-investigators: Dr. Helena Papacostas, Maria Matossian, Dr. Brenda Valdes, Elli Fadel, Mekayla Forrest



## **OBJECTIVES**

- Introduction
- Preeclampsia and kidney
- PULSE study
- Experimental design
- Strengths / Concerns / Opportunities / Next steps / Questions





# BIOSKETCH

- General Internal Medicine
- Anesthesiology
- Computer science
- MSc Candidate @ McGill University Health Centre, Division of Experimental Medicine







# **PROBLEM #2**

- Clinical manifestations
- Hypertension
- Proteinuria hallmark sign
- Edema
- ATN
- AKI
- HELLP Syndrome
- Seizures







# Kidney & Preeclampsia

### On one hand :

- Hypertension, AKI, ATN
- 15% would develop AKI
- Proteinuria (proteinuria is always pathological)



### On the other hand :

- Patients with CKD are at a x10 higher risk to develop preeclampsia
- 40% of women with CKD develop preeclampsia



# Kidney & Preeclampsia





# **REVEAL – Background**



artery Doppler, and angiog	enic biomarkers
Ran several logistic regre pest predicted PE onset	ession models to see which indicators in first trimester:
3P	AUC 0.71
Jltrasound	AUC 0.58
Angiogenic markers	AUC 0.64
Arterial Stiffness	AUC 0.83
rterial Stiffness	AUC 0.83



#### **The PULSE Study - Procedures** Arterial Stiffness Informed Uterine Artery Doppler Biomarker Blood Draws Questionnaires Outco Visit 1 (10-14 weeks) Visit 2 (18-21 weeks) Outcome (6-8 weeks PP) Screening Blood Pressure and Arterial Stiffness Measurements Detailed Chart Review Informed Consent Blood Draw for Biomarker Analysis Blood Pressure and Arterial Stiffness Measurements Follow-up Questionnaires Blood Draw for biomarker analysis Uterine Artery Doppler Baseline questionnaires Update Chart Review (tracking hemodynamics, weight) Chart Review **Research Network**

# The pulse study – inclusion criteria

1. > 18 yrs
 2. 1 high or
 2 moderate

### HIGH-RISK FACTOR

- Autoimmune disease (including antiphospholipid syndrome and systematic lupus erythematosus)
- Diabetes Mellitus type 1 or 2
- Chronic hypertensionHypertensive disorder in a
- Hypertensive disorder in a previous pregnancy
- Chronic kidney disease
   Placental-mediated
- Placental-mediated complications of pregnancy in a previous pregnancy (stillbirth, clinically relevant abruption, severe IUGR necessitating preterm delivery)

### MODERATE-RISK FACTOR

- Nulliparous
- Assisted reproduction (including IVF)
- Family history of preeclampsia
- African-American race
- Sleep apneaConnective tissue diseases
- BMI >30 kg/m2
- Age ≥35 y



# AIM

5/11/2023

10

Among high-risk pregnant women, we aim to assess the ability of urinary biomarkers to early predict preeclampsia, alone or in combination with other measures.

(Arterial stifness, Serum biomarkers, UAD, Clinical charateristics and more)




## **Urinary biomarkers & Preeclampsia**

Study	Time of sampling	Technique	Biomarkers	Sensitivity/specificity
Buhimschi et al. 44	Clinical PE	SELDI-TOF- MS	Specific SERPINA 1 and albumin fragments (diagnosis of PE)	100%/100%
Lee et al. 45	Clinical PE	SELDI-TOF- MS	Four biomarkers to differentiate severe from mild PE	90.9%/93.3%
Chen et al. 46	Clinical PE	iTRAQ and LC-MS/MS	Increased SERPINA 1 can discriminate PE from other hypertensive disorders	
Carty et al. 47	Twenty-eight weeks' gestation	CE-MS	Fifty peptides for the diagnosis of PE	100%/100%

#### Urine proteomic studies in preeclampsia (2015)

Aggeliki Kolialexi, Danai Mavreli, Georgia Tounta, Ariadni Mavrou, Nikolas Papantoniou





## Urinary biomarkers & Preeclampsia

Towards biomarker-based tests that can facilitate decisions about prevention and management of preeclampsia in low-resource settings (2015)

Nathalie Acestor , Jane Goett , Arthur Lee , Tara M. Herrick , Susheela M. Engelore	scrit, claudia ivi.
Harner-Jav . Bonnie J. Howell and Bernhard H. Weigl EMAIL logo	

Good

Biomarker	Urine congophilia (Co	ongo Red dot test)			Adipsi	1
Detection level ^b	V				$\checkmark$	
Sensitivity to PE ^c	√				$\checkmark$	
Specificity to PE ^c	√				$\checkmark$	
Clinically relevant ^d	$\checkmark$				$\checkmark$	
RDT ^e	√				V	
Antibodies ^f	√				$\checkmark$	
Assay ^g	√				$\checkmark$	
Jse in first trimester						
Ranking category	Adequate					
Biomarker	Podocyturia	NGAL	P-IPG	sEng	PIGF	KIM-1
Detection level		$\checkmark$				$\checkmark$
Sensitivity to PE	√		~		V	
Specificity to PE	√	$\checkmark$		$\checkmark$		
Clinically relevant	~	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$
RDT						
Antibodies	√	$\checkmark$	√	$\checkmark$	$\checkmark$	$\checkmark$
Assay		$\checkmark$	V	$\checkmark$	$\checkmark$	V .
Jse in first trimester			V			
				-		JUCE
				Rese	arch	Netwo
5/11/2	023					

## **Experimental design**



### Outcomes

**Ranking category** 

- 1. Differences in urinary proteins and metabolites expression profiles between patients with preeclampsia and without preeclampsia
- Assess the predictive ability of urinary biomarkers for preeclampsia at each measurement time point, alone or in combination with arterial stiffness and other measures
- If the data permit, we will assess the predictive ability of the urinary biomarkers for:
  - 1. late vs. early onset of preeclampsia
  - 2. preeclampsia severity



## **STRENGTHS**

- The PULSE study is already ongoing (Over 430 women already recruited)
- Large prospective cohort of high-risk pregnant women
- Multi-center design (8 international centers)
- Multidisciplinary group with experience in developing predicting models for preeclampsia

## WHY INVOLVE THE SOAP RN?

- Large prospective cohort of high-risk pregnant women
- Preeclampsia is a high incidence and high burden disease
- Joining forces in order to find a scalable model for the early prediction of preeclampsia using non-invasive measures



## CONCERNS

- Recruitment of patients
- Finding a scalable and cost-effective proteomics and metabolomics assays
- Establishing an external validation cohort

## **NEXT STEPS**

- Finalizing systematic reviews (Proteins & Metabolites, microRNAs)
- Testing urinary samples at different time points in pregnancy in order to identify and define the minimal concentration for urinary biomarkers
- Finalizing the experimental design by selecting sampling methods in collaboration
  with our institutional proteomics platform team
- Grant application for the omics study









## TIMELINES

- Systematic reviews to be finalized by the end of August 2023
- Finalizing the experimental design by November 2023
- Finalizing grant application by December 2023

## **OPPORTUNITIES**

- Joining a multinational study
- Large unmet clinical need for the early prediction of preeclampsia which could allow its prevention and, targeting of resources – precision medicine approach
- Becoming a part of the development of a new, non-invasive, point-of-care testing for the early prediction of preeclampsia
- Shaping guidelines for maternal care









## QUESTIONS

- In order to validate our model, we will need an external cohort. Are the members of the symposium aware of such proteomics/metabolomics cohort which could be used? Or are interested to prospectively be this validation cohort?
- 2. Do the members of the symposium have experience and are aware of a specific targeted proteins assay which could be a fit for this study? Specifically for measurements of urinary (as opposed to plasma) proteins and metabolites?
- 3. Are members of the panel aware of/had experience with other, more accurate prediction machine learning models than SVM?
- 4. Are members of the panel aware of minimal concentrations of urinary proteins/metabolites to be able to be detected in the sample?



## Thank you







## **Arterial stiffness**

### Morphology of the Arterial Pressure Waveform

A Longitudinal Analysis of Arterial Stiffness and Wave Reflection in Pre-eclampsia: Identification of Changepoints



## References

1.Rasanen J, et al. (2015) Novel early predictors for pre-eclampsia: placental growth factor and soluble Fms-like tyrosine

1.Rasaner J, et al. (2015) Novel early predictors for pre-eclampsia: placental growth factor and soluble Fms-like tyrosine kinase-1.
2.Rasanen JP, et al. (2016) Early second-trimester serum and urine metabolites predict the development of gestational diabetes mellitus later in pregnancy.
3.Koelman DL, et al. (2017) Angiogenic and fibrinolytic factors in blood and urine during the first half of pregnancy and in the week before delivery in women with or without precedampsia.
4.Kucs, et al. (2013) Prediction of precedampsia by analysis of cell-free DNA in maternal plasma.
5.Rana S, et al. (2012) Angiogenic factors and the risk of adverse outcomes in women with suspected precelampsia.
6.Nishida, Y et al. (2011) Angiogenic factors and the risk of adverse outcomes in women with suspected preclampsia.
6.Nishida, Y et al. (2011) Angiogenic factors and the risk of adverse outcomes in women with suspected preclampsia.
7.Nishida Y et al. (2011) Angiogenic factors and the risk of adverse outcomes in women with suspected preclampsia.
7.Nishida Y et al. (2011) Angiogenic factors and the risk of adverse outcomes in women with suspected preclampsia.
7.Nishida Y et al. (2011) Angiogenic factors and the risk of adverse outcomes in women with suspected preclampsia.
7.Nishida Y et al. (2011) Angiogenic factors and the risk of adverse outcomes in women with suspected preclampsia.
8.Nishida, Y et al. (2011) Angiogenic factors and the risk of adverse outcomes in women with suspected preclampsia.
9.Nishida Y et al. (2011) Angiogenic factors and the risk of adverse outcomes in women with suspected preclampsia.
9.Nishida Y et al. (2011) Angiogenic factors and the risk of adverse outcomes in women with suspected preclampsia.
9.Nishida Y et al. (2011) Angiogenic factors adverse outcomes in women with suspected preclampsia.
9.Nishida Y et al. (2011) Nishida Y et

urinary liver-type fatty acid-binding protein. 7. Nishida Y, et al. (2013) Urinary liver-type fatty acid-binding protein in diabetic pregnancy: relationship with development of preeclampsia and subsequent postpartum recovery. 8. Yu L, et al. (2013) Urinary podocyte-associated mRNA profile in various stages of diabetic nephropathy. 9. Bao H, et al. (2014) Podocyte injury in preeclampsia: a potential prognostic marker of preeclampsia-associated fetal and maternal adverse outcomes. 10. Noori M, et al. (2010) Novel biomarkers for preeclampsia: a review. 11. Associated for each 2013 (Comparative studied university intervention)

10.Noon W, et al. (2010) Novel biomarkers for preeclampsia: a review. 11.Aggarval PK, et al. (2012) Comparative study of urinary biomarkers for early detection of pre-eclampsia. 12.Ouyang Y, et al. (2021) Evaluation of urinary collagen type I alpha-1 chain in predicting preeclampsia. 13.Perni U, et al. (2014) Urinary collagen IV and kidney injury molecule-1 as early predictors of nephropathy in women with type 1 diabetes. 14.Khadzhieva M, et al. (2019) Urinary uromodulin and risk of preeclampsia. 15.Philops EA, et al. (2014) Plasma and urine proteomic profiling reveals the association of urinary kallikrein with preeclampsia. reeclampsia

16. Menezes Filho H, et al. (2016) Urinary uromodulin and risk of developing hypertension in pregnancy: a prospective cohort study.





Society for Obstetric 📎

Anesthesia and Perinatology

#### **SOAP Network GA Registry**

Research Symposium May 6, 2023

Lisa Leffert, MD, Principal Investigator Yale School of Medicine

### Objectives

#### **PRIMARY AIM:**

To identify the patient, provider, institutional, anesthetic management, and obstetric characteristics associated with general anesthesia for cesarean delivery.

#### **ANALYSES:**

- Descriptive analysis of characteristics of patients receiving general anesthesia for cesarean delivery: surgical and anesthetic details, airway management, maternal and neonatal outcomes
- Bivariate associations between outcomes and patient, provider, institution and anesthetic management level factors



### **Participating Institutions**





### Successes and Challenges

- Diverse group of academic and community hospitals actively engaging
  Looking to convert "yes" to "ready to enroll"
- Rich, granular details of each general anesthetic but data collection challenging as not information available in EMR
  - Piloting data collection form (if immediate entry not feasible)
- Lag time in IRB approval process
  - Specifics of protocol and DUA have not been problematic



### Next Steps

- Beta testing to begin soon- first 5-10 sites
- · Group meeting to discuss to "what we learned" soon after



Spinal clonidine to reduce opioid use in patients at risk for severe pain after scheduled CS: a placebo controlled RCT

#### Presenter: Ruthi Landau

Co-investigators: Habib, George, Wong, Leffert, Hess





### THE PROBLEM



Questions?

### THE QUESTION

We intend to combine these concepts:

- 1) Screen patients to identify those at risk for severe pain (record pain during LA infiltration)
- 2) Randomize patients to receive spinal clonidine (intervention) or placebo (control)

Hypothesis:

- Spinal clonidine is effective in reducing in-hospital opioid use in patients at risk for severe pain.
- We will evaluate whether there is a benefit to adding clonidine to "everyone", "only patients at risk for pain", "no one".





### **STUDY DESIGN**

Design: A placebo-controlled RCT adding spinal clonidine to stepwise opioid-sparing multimodal analgesia in patients at risk for severe pain who are receiving spinal/CSE anesthesia for a scheduled CS.

#### Patients/Participants:

Scheduled CS (non-laboring), > 37 weeks, all co-morbidities accepted except for CHRONIC OPIOID USE

#### Participating sites should have:

- Preservative-free clonidine
- Phenylephrine infusion for management of spinal hypotension
- Monitoring patients in a standard PACU for 2-3h
- Have already implemented opioid-reduction strategies
- A robust opioid-sparing multimodal analgesia protocol to identify differences in oxycodone use.





### **STUDY DESIGN**

#### Intervention

Spinal clonidine vs placebo (added to standard spinal administration of hyperbaric bupivacaine 0.75%, fentanyl, and preservative-free morphine). Study procedures:

- Patient enrolled pre-op
- Screening during local anesthesia infiltration will result in 2 arms for the study
- Arm 1: low risk (pain <7)</li>
- − Arm 2: high risk (pain  $\geq$ 7/10)

RCT to receive:

- Control group:
  - Hyperbaric bupivacaine 12mg
  - Fentanyl (15mcg)
  - Preservative-free morphine (150mcg)





Hyperbaric bupivacaine 12mg

### **STUDY DESIGN**

#### Main Outcome Measures:

#### Primary outcome

• Proportion of patients not taking any oxycodone on day 0

#### Secondary outcomes:

- Proportion of patients not taking any oxycodone during hospital stay
- Among patients taking oxycodone: oxycodone dose on day 0, 1 and 2
- Hypotension + VASOPRESSOR USE
- Shivering, sedation, nausea
- time to regression of block
- Length of PACU stay.
- Statistical Analysis Plan:
- Assuming the expected differences presented below, approximately 400 cases?



### **STUDY DESIGN**



### WHY NOW

#### Implications:

• This will be the first RCT evaluating the effect of spinal clonidine based on risk stratification, in a US cohort.

- Demonstrate whether clonidine (at that small dose) "works"
- Address the side effects (prolongation of PACU stay)





### **DEXMEDETOMIDINE**?

Introduction: Cesarean deliveries are common obstetric procedures that often require spinal anesthesia. The addition of adjuvants to spinal anesthesia can provide improved analgesia and reduce the need for opioids. Spinal clonidine and dexmedetomidine are two adjuvants that have been studied extensively for their use in cesarean deliveries. This systematic review aims to evaluate the current evidence on the use of spinal clonidine and spinal dexmedetomidine for cesarean deliveries

Methods: A comprehensive literature search was conducted using PubMed, Cochrane Library, and Embase databases to identify studies on the <u>use of spinal clonidine or spinal dexmedetedomidine for cesarean deliveries</u>. Only randomized controlled trials (RCTs) were included. The primary outcome measures were the onset and duration of sensory and motor blockade, hemodynamic changes, intraoperative analgesia, and adverse effects.

Results: Nine RCTs involving 584 patients were included in the review. The results showed that the addition of spinal clonidine or spinal dexmedetomidine to spinal anesthesia for cesarean delivery resulted in prolonged sensory and motor blockade, improved intraoperative analgesia, and reduced intraoperative opioid consumption. The use of these adjuvants was associated with a higher incidence of hypotension and bradycardia, but no serious adverse effects were reported

Conclusion: The current evidence supports the use of spinal clonidine or spinal dexmedetomidine as adjuvants to spinal anesthesia for cesarean deliveries. The addition of these adjuvants can provide improved analgesia and reduce the need for opioids. However, the potential risks of hypotension and bradycardia should be carefully monitored and managed. Further studies are needed to the potential risks of hypotension and bradycardia should be carefully inclusive and humages a strain the benefits of their use in determine the optimal dose and duration of these adjuvants to minimize adverse effects and maximize the benefits of their use in





#### **ChatGPT references**

- Goyal V, Kumar A, Gupta R, et al. A comparison of spinal clonidine and spinal dexmedetomidine in lower limb surgeries: A randomized, double-blind study. Saudi J Anaesth. 2016;10(1):18-23. 1.
- Innomisco, Josuber Mind Study, Java Jinakskii. 2004 [Jul 24] Jabalameli M, Pakzadmoghadam SH, Ghaedi F, et al. Spinal dexmedetomidine versus intravenous dexmedetomidine for the management of postoperative pain: a randomized, double-blind, placebo-controlled study. Pain Res Treat. 2019;2019:5386057. Khawaja A, Mohseni M, Amirshahi M, et al. Comparison of spinal clonidine and sufentanil in caesarean section. Middle East J Anaesthesiol. 2011;21(4):529-534. 2. 3.
- dine for cesarean delivery: a double-blind. ran 4. Lavie A. Atias I. Gu
- tet Anesth. 2018;36:36-41. nt I Ob Euroy, Int J Obstet Anesth. 2013;4:5:36-41 Jee AR, Yi HW, Chung IS, et al. Effect of adding dexmedetomidine to spinal anesthesia on maternal satisfaction during cesarean section. Korean J Anesthesiol. 2013;64(6):511-516. Mahendru V, Tewari A, Katyal S, et al. A comparison of intrathecal dexmedetomidine and fentanyl as adjuvants to bupivacaine for lower limb surgery: A double blind controlled study. J Anaesthesiol Clin Pharmacol. 2013;29(3):342-346. Nafisi M, Ghaffaripour S, Shafa A, et al. Effects of adding intrathecal dexmedetomidine to bupivacaine for spinal anesthesia in minute and the spinal anesthesia in the spinal anesthesia of the spinal anesthesia in spinal anesthesia in spinal anesthesia in the spinal anesthesia in spinal anesthesia in the spinal anesthesia in the spinal anesthesia in spinal anesthesia anesthesia anesthesia anesthesia anesthesia anesthesia anesthesia anesthesia anesthesi 5.
- 6.
- 7. cesarean section. Anesth Pain Med. 2019:9(3):e89760.
- Clean escution: Angle McG. 2015;10:1637-00.
  Siddiqui KM, Siddiqui MS, Rafque M. Efficacy of intrathecal dexmedetomidine added to bupivacaine in spinal anaesthesia for caesarean section. J Pak Med Assoc. 2016;66(12):1593-1597.
  Yardehnavi N, Parthasarathy S, Jaiprakash H, et al. Comparison of spinal dexmedetomidine and spinal clonidine added to low 8
- dose bupivacaine for lower limb surgeries: a double-blind randomized controlled study. Anesth Essays Res. 2019;13(1):18-22





### **QUESTIONS?**

Q1. Intervention: clonidine vs placebo? 3-arms (dexmedetomine? ??

Q2. Sample size:

We assumed

- That the proportion patients with pain ≥7/10 on local anesthesia infiltration (high-risk group) is 20%?
- That the current proportion of patients who do not take any systemic opioids on the day of CS is 30%?

Q3. Multimodal analgesia:

W assumed it does not matter, each sites has a multimodal (NSAIDs +Acetamonophen q6h – and opioids PRN)

O4. Randomization:

Randomize before the ILA screening (even if groups are uneven)







### The problem

- Neuraxial anesthesia for cesarean delivery
- Gold standard
- Not completely failsafe
- · Incidence is variable depending on measurement and anesthesia
- Approximately 15% incidence
- Large ethnic disparities seen

5/11/2023

Most commonly reported concern of those during cesarean

**Research Network** 



## The scale of the problem

- 1.15 million Cesarean deliveries each year in the US
- Increasing worldwide
- 19% pain score 4-10 at start of surgery
- 220,000 patients with intraoperative pain



More developed countries

Less developed countries

70

60

## Consequences

#### Litigation

- 17% Closed Claims due to inadequate block in Cesarean delivery
- UK higher litigation due to regional failure than GA
- Severity of harm of inadequate anesthesia equivalent to that after awareness under GA

5/11/2023

#### Patient

- Linked to incidence of postpartum depression
- Linked increased risk of development of PTSD
- Impact on breastfeeding, bonding and neonatal development







We aim to determine the incidence of intraoperative pain during cesarean delivery under neuraxial anesthesia and characterize this experience through patient centric reporting outcomes.

### **Primary Outcome**

 Incidence of intraoperative pain during cesarean delivery performed under neuraxial anesthesia the north American setting.













## Secondary Outcome

- Characterization of intraoperative pain experienced using modified McGill patient-reported outcome measure.
- Assessment of timing and duration of pain experienced.
- Correlation between intraoperative and current postoperative pain scores.
- Correlation with satisfaction of intraoperative pain management.
- Correlation between intraoperative documented and patient reported pain.
- Explore demographic, obstetric, anesthetic associations with intraoperative pain.
- Identify institutional factors associated with intraoperative pain.

# Study Design

#### Study design

- Two parts
- 1 A QI improvement multicenter, prospective observational cohort study.
- Prospectively collecting data across North America.

#### Study sites

- Any obstetric center in North America is eligible
- Coordinated by Stanford



**Study Design** 

Fig.1. Patient flow diagram

Day 1 postpartu



053



## **Quality Improvement**

 Did you experience any pain During your Caesarean Delivery? Y / N
 If yes, how would you rate your worst pain experienced during Caesarean Delivery?



#### 1 2 3 4 5 6 7 8 9 10

3. If yes, were you satisfied with how your pain was managed during your anesthetic? **Y / N** 

4. Comments:



## **Quality Improvement**

- All patients
- 24 hours (+/- 8) post partum
- 2 month time period



## Inclusion and exclusion criteria

- Inclusion
  - ≥18 years
     All gestation
  - All gestations
     Scheduled or intrapation
  - Scheduled or intrapartum CD
     Neuraxial anesthesia as planned primary mode of anesthesia

#### Exclusion

- Patient refusal
- Other surgery (e.g., cervical cerclage)
- Other delivery mode (e.g., operative vaginal delivery)
- De novo general anesthetic









## Data collection

- Patient demographic
- Obstetric
- Psychiatric
- Family
- Previous medical history
- Anesthesia history
- McGill Pain questionnaire



## **Strengths of the Project**

- Allow us to prospectively collect data
- Patient and physician response
- · Low impact on patients
- High impact
- Potential for change











## **Strengths of Us**



- Experience in multicenter prospective PROM studies
- Published systematic review on Intraoperative pain
- Have a dedicated statistical support





### Why involve the SOAP Research Network

- Facilitate better understanding of intraoperative pain
- Earlier identification and development of appropriate management strategies.
- Targeted interventions to improve postpartum recovery
- Potentially reduce psychological morbidity.



## **Opportunities**

- Unmet need
- Fundable, including FAER, pilot data for PCORI and NIH
- Complement work with PROMs and postpartum recovery

Timeline

5/11/2023



- Summer 2023: Sites IRB
- September 2023: Start study













### **Webinar Dates**

- Further information two webinar dates
- 18th May 12:00 PST
- or
- 25th May 09:00 PST

### **Questions to you**

Our Questions to you:

- Feasibility of data collection and study recruitment target per institution?
- Data collection by primary clinical team day 1 after surgery?
- Follow up at 6 weeks postpartum?



Jamesoc@stanford.edu Twitter @jamesocarroll



Contact

Jamesoc@stanford.edu Twitter @jamesocarroll 5/11/2023

Research Network

### **Questions to us**









# What is Big Data?

What is Big Data?

National Science Foundation

- Large, diverse, complex, longitudinal, and/or distributed data sets generated from instruments, sensors, Internet transactions, email, video, click streams, and/or all other digital sources available today and in the future ¹
- Data that challenge existing methods due to size, complexity, or rate of availability ²



1. NSF-12-499; 2012 2. NSF-14-543; 2014

# Advantages

- Large Sample Sizes
- Real-world Data
  - EHR
  - Claims data
- Diverse data types
  - Clinical; genomic; socioeconomic; environmental; biologic
- Cost-effective
- Long follow-up periods
- Hypothesis Confirming / Generating



- Early diagnosis
- ↑ Effectiveness & quality of treatments
- Disease prevention
- Improve pharmacovigilance & patient safety
- Outcome prediction

Selecting the Data Source

European Commission. Study on Big Data in public health, telemedine and healthcare. 2016 https://ec.europa.eu/health/sites/health/files/ehealth/docs/bigdata_report_en.pdf%0A%0A

#### • AHRQ

• HCUP - NIS, SIDs

- CDC
  - PRAMs (state-specific, maternal attitudes and experiences)
  - US Vital Statistics Reports (birth certificate data)
- NICHD
  - Consortium on Safe Labor
- CMS
  - Medicaid Analytic eXtract (MAX)
- Commercial Claims Datasets • Optum, Truven, Premier
- MPOG

Phillippi. J Midwifery Women's Health 2017; 62: 545-61 Abel-Kader. Anesth Analg 2021; 132: 1012-1022



Glezerson. J Neurosurg Anesthesiol 2020; 32: 1-3.



# Examples

# Descriptive Epidemiology





## Post-Cesarean Analgesia

- Premier
- 2008 2018
- 805,000 cesarean deliveries
- Analgesics:
- 76% neuraxial morphine
- 59% acetaminophen-opioid drug
- 6% neuraxial morphine, NSAIDs, acetaminophen

Reed. Anesth Analg 2021;133:1550-8





## Exposure – Outcome Associations

## Bias

- Residual confounding
- Confounding by indication
- Selection bias
- Misclassification bias
- Underascertainment bias

• Statistically significant false-positive/false negative results

Hemkins. CMAJ 2016 188: E158-E164;



- Matching
- Stratification
- Multivariable modeling

   Y = β0 + β1X1 + β2X2 + ... + βp*Xp + ε
- Propensity scoring matching / weighting
- Sensitivity Analyses
- Instrumental Variable Analyses
- Unmeasured confounders

Sessler. Anesth Analg 2015;121:1043-1051 D'Onofrio. Annu Rev Clin Psychol. 2020; 16:25-48.

## Example

## **ANESTHESIOLOGY**

Association of Gestational Age with Postpartum Hemorrhage: An International Cohort Study

Alexander J. Butwick, M.B.B.S., F.R.C.A., M.S., Can Liu, Ph.D., M.Sc., M.B., Nan Guo, Ph.D., Jason Bentley, Ph.D., Ellot K. Main, M.D., Jonathan A. Mayo, M.P.H., Gary M. Shaw, Ph.D., Old Stephanson, M.D., Ph.D. Awestnesiology 2021; 134:874–86

## Why?

- 40% PPHs occur in low risk women ¹
- Reduced myometrial contractility post-term ²
- Potential ↑PPH risk in preterm pregnancies –

impaired placentation ³⁻⁵

Bateman Anesth Analg 2010
 Arrowsmith Plos One 2019

3. Endler Obstet Gynecol 2012

## Why?

 ? Geographical variation ~ gestational age and PPH risk ¹⁻³

## Hypothesis

 A nonlinear association - Gestational age at birth and the Odds of PPH, with women who deliver before 37 weeks and after 41 weeks having the highest odds.

- 1. Mehrabadi BJOG 2013 2. Bennet Blee One 2013
- 2. Bonnet Plos One 2013
- 3. Caughey Obstet Gynecol 2007

### Analytic Samples

- California: 2011 2015
- 2 million births
- Sweden: 2014 2017
- 328,000 births

California: Adjusted for maternal age, race/ethnicity, insurance type, prepregnancy body mass index, parity, hypertensive disorder of pregnancy, placenta previa, macrosomia, chorioamnionitis, and polyhydramnios. (10 covariates)

Sweden: Adjusted for maternal age, country of birth (world region), body mass index at first antenatal visit, parity, hypertensive disorder of pregnancy, placenta previa, macrosomia, chorioamnionitis, and polyhydramnios (9 covariates)





#### Appendix K: Obstetric Hemorrhage Risk Factor Assessment Screen (Risk factors added since Obstetric Hemorrhage Toolkit V2.0, 2015, are shaded) Blood bank recommendations should be highly localized. Many institutions no longer hold a specimen in the blood bank, others utilize automated technology to type and screen all obstetric patients. An example of arisk-based approach is included in the table below.

A	MISSION AND LABOR RISK FACTO	RS	
Low	Medium	High	
MONITOR FOR HEMORRHAGE Routine obstetric care	NOTIFY CARE TEAM Personnel that could be involved in response are made aware of patient status and risk factors	NOTIFY CARE TEAM MOBILIZE RESOURCES Consider anesthesia attendance at delivery	
Specimen on hold in blood bank	Type and screen	Type and cross, 2 units on hold	
No previous uterine incision	Prior cesarean(s) or uterine surgery	Placenta previa, low lying placenta	
Singleton pregnancy	Multiple gestation	Suspected/known placenta accreta spectrum	
≤ 4 vaginal births	> 4 vaginal births	Abruption or active bleeding (> than show)	
No known bleeding disorder	Chorioamnionitis	Known coagulopathy	
No history of PPH	History of previous postpartum hemorrhage	History of > 1 postpartum hemorrhage	
	Large uterine fibroids	HELLP Syndrome	
	Platelets 50,000 - 100,000	Platelets < 50,000	
	Hematocrit < 30% (Hgb < 10)	Hematocrit < 24% (Hgb < 8)	
	Polyhydramnios	Fetal demise	
	Gestational age < 37 weeks or > 41 weeks	2 or more medium risk factors	
	Preeclampsia		
	Prolonged labor/Induction (> 24 hrs)		

TICNATURE NEWS & News Best Countries Best States Healthinst Communities Cities Elections The Berial Divide		JAMA Pediatrics   Original Inves Association Between of Autism Spectrum Chunyuan Qiu, MD, MS; Jane C. Lin, MS; Ji Vu T. Nguyen, MD; Robert J. MB: Partice Providence State Vu T. Nguyen, MD; Robert J. MD; Robert S. MD	tigation n Epidural Analgesia During Labor and Risk Disorders in Offspring axiao M. Shi, PhD; Ting Chow, MPH, Vim J. Nesai, MD: R. Khar Fedman, MS. Socit Segut, MM, MHCM: Anny H. Xang, PhD
Home / News / Health News Epidurals During Childbirth Tied to Autism Risk Oct. 13, 2020, et 12:00 p.m.	• Kai • 200	ser Permanente )8 – 2015	S. California Hospitals
JAMA Pediatrics   Original Investigation	• 150	),000 singleton c	hildren
Association Between Epidural Analgesia During Labor and Risk of Autism Spectrum Disorders in Offspring		Unadjusted	Adjusted for sociodemographic, preexisting, preg-related and perinata
Chunyuan Qiu, MD, MS; Jane C. Lin, MS; Jiaxiao M. Shi, PhD; Ting Chow, MPH; Vimal N. Desai, MD; Vu T. Nguyen, MD; Robert J. Riewerts, MD; R. Klara Feldman, MD; Scott Segal, MD, MHCM; Anny H. Xiang, PhD	HR	1.48 (1.34 – 1.65)	1.37 (1 23 - 1 53)
JAMA Pediatr. 2020; 174: 1168-1175.		(1.54 - 1.65)	(1.25 - 1.55)

JAMA Pediatrics | Original Investigation

### Association of Epidural Labor Analgesia With Offspring Risk of Autism Spectrum Disorders

Elizabeth Wall-Wieler, PhD; Brian T. Bateman, MD, MSc; Ana Hanlon-Dearman, MD; Leslie L. Roos, PhD; Alexander J. Butwick, MBBS, MS

	Unadjusted	Adjusted for sociodemographic, preexisting, preg- related and perinatal factors
HR	1.25 (1.15 – 1.36)	1.08 (0.97 – 1.2)
JAMA F	ediatr. 2021; 175: (	698-705



#### Invited Commentary | Anesthesiology

Evidence Mounts Refuting an Association Between Epidural Use and Neurodevelopmental Adverse Outcomes in Children Alexander J. Butwick, MS; Elizabeth Wall-Wieler, PhD



British Journal of Anaesthesia, 128 (3): 393–398 (2022) doi: 10.016f/bja.2021.12.017 Advance Access Publication Date: 15 January 2022 © 2021 British Journal of Anaesthesia. Published by Elsevier Ltd. All rights reserved.

EDITORIALS

Epidural labour analgesia and autism spectrum disorder: is the current evidence sufficient to dismiss an association? Alexander J. Butwick^{1,*}, Daniel A. Abrams² and Cynthia A. Wong³

#### OBSTETRICS

Labor epidural analgesia and subsequent risk of offspring autism spectrum disorder and attentiondeficit/hyperactivity disorder: a cross-national cohort study of 4.5 million individuals and their siblings

Tor-Arne Hegvik, MD, PhD; Kari Klungsøyr, MD, PhD; Ralf Kuja-Halkola, PhD; Hanna Remes, PhD; Jan Haavik, MD, PhD; Brian M. D'Onofrio, PhD; Niina Metsä-Simola, PhD; Anders Engeland, PhD; Seena Fazel, MD; Paul Lichtenstein, PhD; Pekka Martikainen, PhD; Henrik Larsson, PhD; Amir Sariaslan, PhD

Check for updates

- 4.5 million singletons
- Finland: 1987-2005
- Norway: 1999-2015
- Sweden: 1987-2011

Am J Obstet Gynecol. 2023;228:233.e1-233.e12.



# Development of a Nomogram for Prediction of Vaginal Birth After Cesarean Delivery

William A. Grobman, MD, MBA, Yinglei Lai, PAD, Mark B. Landon, MD, Catherine Y. Spong, MD, Kenneth J. Leveno, MD, Duight J. Rouse, MD, Mishael W. Varner, MD, Atef H. Moauxad, MD, Steve N. Caritis, MD, Margaret Harper, MD, Ronald J. Wapner, MD, Yoram Sorokin, MD, Menachem Miodornik, MD, Marshall Carpenter, MD, Mary J. O'Sullivan, MD, Baha M. Sibai, MD, Oded Langer, MD, John M. Thorp, MD, Susan M. Ramin, MD, and Brian M. Mercer, MD, for the National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units Network (MFMU)*

Obstet Gynecol 2007;109: 806-12.

#### HEALTH EQUITY

Call race-based algorithms what they are: sources of harm

SEP 28, 2022 • 4 MIN READ

6 💟 🛅 😂



FIGURE 2 Associations between labor epidural analgesia and offspring ASD and ADHD.

----

Finland: Population-wide aHR = 1.18 (95% CI: 1.15 - 1.20)

Finland: Sibling-comparisons aHR = 0.99 (95% CI: 0.94 - 1.04)

Norway: Population-wide aHR = 1.19 (95% CI: 1.16 - 1.22)

Norway: Sibling-comparison aHR = 1.01 (95% CI: 0.94 - 1.09

Sweden: Population-wide aHR = 1.22 (95% Cl: 1.20 - 1.24)

Sweden: Sibling-comparison aHR = 0.98 (95% CI: 0.94 - 1.02

Pooled: Population-wid aHR = 1.20 (95% CI: 1.19 - 1.2)

Pooled: Sibling-compa aHR = 0.99 (95% CI: 0.96 -Adjusted hazard ratio

Finland: Population-wide aHR = 1.20 (95% CI: 1.15 - 1.25)

Finland: Sibling-comparison aHR = 1.07 (95% Cl: 0.98 - 1.13

Norway: Population-wide aHR = 1.04 (95% Cl: 0.98 - 1.10

Norway: Sibling-comparise aHR = 0.97 (95% CI: 0.84 - 1.

Sweden: Population-wide aHB = 1 10 (95% CI: 1 07 = 1 14

Sweden: Sibling-comparisor aHR = 0.94 (95% CI: 0.88 - 1.0

Pooled: Population-wid aHR = 1.12 (95% CI: 1.10 - 1.1

Pooled: Sibling-compa aHR = 0.98 (95% CI: 0.93 - ADHD

++1

- 25 yo
- 5 ft 7 in
- 170 lb
- No prior VD
- Prior arrest of dilatation last CS

	White	Black	Hispanic
Probability of VBAC success	63 %	46 %	46 %

## VBAC

#### OBSTETRICS Prediction of vaginal birth after cesarean delivery in Check for updates term gestations: a calculator without race and ethnicity

William A. Grochman, MD, MAS, Gracio Sandoval, MA; Madeline Murguia Rice, PhD: Jennifer L. Baliti, MD, MPH; Suneet P. Chauhan, MD; Maged M. Costantine, MD; Cynthia Gyamfi-Bannerman, MD, MSc; Torri D. Metz, MD, MS; Samuel Parry, MD; Dwight J. Rouse, MD; George R. Saade, MD; Hyagriv N. Simhan, MD; John M. Thorp Jr, MD; Alan T. N. Tita, MD, PhD; Monica Longo, MD; Mark B. Landon, MD; On behalf of the *Eurice Kennedy Shriver* National Institute of Child Health and Human Development Matemai-Fetal Medicine Units Network

### • BMI

- History of vaginal birth
- Arrest disorder for prior cesarean
- Treated chronic hypertension

Am J Obstet Gynecol. 2021;225(6):664.e1-664.e7

## Artificial Intelligence







Serving as a teacher and an assessor in medical education Creating realistic "flight simulators" for simple and complex patient encounters



Haug. N Engl J Med 2023;388:1201-8



#### JAMA Internal Medicine | Original Investigation

Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum

John W. Ayers, PhD, MA; Adam Poliak, PhD; Mark Dredze, PhD; Eric C. Leas, PhD, MPH; Zechariah Zhu, BS; Jessica B. Kelley, MSN; Dennis J. Faix, MD; Aaron M. Goodman, MD; Christopher A. Longhurst, MD, MS; Michael Hogarth, MD; Davey M. Smith, MD, MAS

#### JAMA Intern Med 2023 [epub]

Welcome to this informative PDF file on comparing physician and artificial intelligence chatbot responses to patient questions! This study explores the potential of Al assistants to aid in creating quality and empathetic responses to patient inquiries, ultimately reducing the workload and burnout among healthcare professionals.

Chatpdf.com



The main findings of the study were that in a cross-sectional analysis of 195 patient questions from a social media forum, the responses generated by an AI chatbot were preferred over those written by physicians. The chatbot responses were rated significantly higher for both quality and empathy. These results suggest that AI assistants may be able to aid in drafting responses to patient questions. However, it is important to note that further research is necessary before any definitive conclusions can be made regarding their potential effect in clinical settings.

#### Chatpdf.com

•	B Savi
🍈 Thinkir	g (Restart if this takes more than 30 seconds)
🔲 Added t opportuni	ask: Analyze emerging technologies and trends in the healthcare industry to identify ies for innovation
Added t solutions	ask: Collaborate with healthcare professionals and researchers to develop new for improving patient outcomes
□ Added t identify	ask: Implement machine learning algorithms to analyze large healthcare data sets and atterns and insights that can inform decision-making and improve patient care
👩 Thinkir	g (Restart if this takes more than 30 seconds)
Name:	NextMed Health Agent
Goal:	Reimanine the future of health and medicine

### Concerns

- False / misleading output
- Research output / inventions
- Ethics loss of human potential / autonomy vs. Alrelated research acceleration
- Data security
- Bias / Discrimination / Inequity

van Dis. Nature 2023; 614, 224-226

## Cool AI-based apps

- Chatpdf / Audemic / Scholarcy Paper Review
- Elicit Lit Search (Don't only use this)
- Paperpal / Cliovis- Academic writing
- Gamma / Runway ppt presentations

Nature 616, 639-640 (2023)



https://runwayml.com/



# Conclusion – Big Data Research

### Benefits

- Risk prediction
  - Therapeutic strategies
    - Generalizability

## Concerns

- Bias
   False precision
- Privacy
- Transform research / clinical practice
- Early days

### Association of Medicaid Expansion With Neuraxial Labor Analgesia Use in the United States: A Retrospective Cross-Sectional Analysis

Maggie Z. X. Xiao, BSc,* Dylan Whitney, BASc,* Nan Guo, MS, PhD,† Eric C. Sun, MD, PhD,† Cynthia A. Wong, MD,‡ Jason Bentley, PhD,§ and Alexander J. Butwick, MBBS, FRCA, MS†





# Call for Thematic Issue focusing on Obstetric Anesthesia Quality

ANESTHESIA & ANALGESIA" | A PRACTICE

## **Obstetric Anesthesia Quality**

- Studies that evaluate quality measures for obstetric anesthesia care, including identifying benchmarks, describing practice variation, and correlating quality metrics with patient centered outcomes
- Investigations of the SOAP Center of Excellence program
- Benchmarking studies for performance standards across each of the four ACOG Levels of Maternal Care
- Research that evaluates the Quality Metrics proposed by the ASA Committee on Obstetric Anesthesia

ANESTHESIA & ANALGESIA" | A PRACTICE

## Obstetric Anesthesia Quality

- Studies of the effects of various staffing models on obstetric anesthesia quality metrics
- Evaluation of various approaches to obstetric anesthetic care aiming to ameliorate the mental health consequences of peripartum and perinatal complications and to optimize the birth experience for complex delivery
- Investigations of novel quality metrics, quality improvement tools, or systems that could improve care for obstetric and perinatal patients

ANESTHESIA & ANALGESIA" | A PRACTICE



Optimizing Intraoperative Anesthesia : What Can We Do to Improve Care

> Heather Nixon, MD Professor of Anesthesiology Division Head – Obstetric Anesthesiology University of Illinois at Chicago

So you can get CME credit.....

I do not have financial disclosures for this presentation"



# My Actual Disclosures:

Audience participation is planned

No real consensus and little data

Strong held beliefs

Some of the content may be graphic





## I want them to know...

...that for the first weeks after birth that I could not close my eyes without hearing my screams in my own head

## I want them to know...

...that I could not wash my own incision

....when my husband came near me to wash it, I was

scared

...there were renching sobs every time I needed to wash it

## I want them to know...

...that despite all the **fucking ketamine** and whatever else, I could still feel the pain

...I was just hallucinating and could not make sense, but I can remember begging them to stop

Google

Q Pain during Cesarean Delivery

My Epidural Didn't Work—Here's What I Wish I Had Known

Ļ

Mom Sues Hospital for Performing an Emergency C-Section Without Anesthesia

### Woman's Day

Kiwi mum's C-section horror: 'I felt every slice of the scalpel'

Mom claims epidural failed during emergency C-section: 'It was like living in a nightmare



**Scope of the Problem** 





Intraoperative CD Pain

15%

Patel et al, Anesthesia,77, 598-604





6%



24%

, ,

**18%** Kinsella, Anesthesia, 2008, 63,822-832







#### Guidelines

Raising awareness to prevent, recognise and manage acute pain during caesarean delivery: The French Practice Bulletin

Hawa Keita ^{a,b,*}, Philippe Deruelle^c, Lionel Bouvet^d, Martine Bonnin^c, Dominique Chassard^d, Anne-Sophie Bouthors¹, Eric Lopard⁸, Dan Benhamou^h, the French Practice Bulletin Taskforce: "Préconisations - insuffisance d'analgésie au cours de la césarienne sous anesthésie périmédullaire: prévention - prise en charge immédiate et différée^{*1}

doi:10.1111/anae.15717

Anaesthesia 2022, 77, 588-597

Guidelines

Prevention and management of intra-operative pain during caesarean section under neuraxial anaesthesia: a technical and interpersonal approach

F. Plaat,¹ S. E. R. Stanford,² D. N. Lucas,³ ⁽⁶⁾ J. Andrade,⁴ J. Careless,⁵ R. Russell,⁶ ⁽⁶⁾ D. Bishop,⁷ ⁽⁶⁾ Q. Lo⁸ and D. Bogod⁹





https://saferbirth.org/patient-safety-bundles/



Neuraxial Blocks Team Education







Reframe



**Readiness:** 

# Spinal Anesthesia










Ginosar, 2012 IJOA, 21, 3;207-211

## How MUCH is Necessary?

#### Hyperbaric Bupivacaine:

ED50 = 7.64 ± 0.45 mg ED95 = 11.0 ± 0.95 mg

#### **Isobaric Bupivacaine:**

ED50 = 7.25mg ED95 = 13mg

Ginosar, 2004 Anesthesiology, 100;676-682

# Adjuncts:



15-75mcg



5-25mcg



Singh et al., 2022, IJOA, 50, 2022 May;50:103270

## 50-200mcg





**Readiness: Epidural Catheter** 





# Inadequate Pain Relief

- >3 VAS
- Initiation of analgesia
- During labor course
- Failure to have sensory coverage

# **Epidural Space**

Continuous Space

Lateral Aspects



## **Epidural Catheter Failure During Labor**

Incidence = 5 - 24%

Patient:

Multiparity **Previous Failed Epidural Opioid Tolerance** 

Provider or Placement: Uniport Catheters Use of Air for Loss of Resistance Depth of Catheter at Skin **Radicular Pain during Placement** Technique (Dural Puncture) Non-Obstetric Trained

Intrapartum: **Requirement for multiple boluses** Prolonged Intrapartum Course Greater Urgency of Surgery

Agaram et al., UOA, 2009; 18 : 10-14 Lee et al., Anesthesia and Analgesia, 2009;108:252-254 Mankowitz et al., Anesthesia and Analgesia, 2016;123:1174-1180 Paech et al., UOA, 1998;7:5-11

# Failure to Convert Catheter for Cesarean

**Recommendations Royal College** of Anaesthetists:

< 3% General for Labor Epidurals

Russell, 2006 - Raising the Standards: A Compendium of Audit Recipes

## **Epidural Management**



- SOAP Centers of Excellence Recommend
  - "Regular Assessments of Neuraxial Labor Analgesia"
     Assessment of GA rates <5% for Conversions</li>

  - □ GA rates <15% for emergent cases
- ASA Practice Guidelines 2016 • No Guidance on Frequency of Rounding
- Intrapartum Management may Lower Rates of General ٠ Anesthesia

Carvalho and Myhre, Anes & Anal, (2019) 128;5 ASA Practice Guidelines (2016), Anesthesiology 124;2; 270-300 Mankowitz et al., Anes & Anal (2016) 123:5;1174-80.

Quality assurance methods to reduce general anesthesia rates in cesarean delivery



- Correspondence: Quality Assurance Data Scheduled 2-3% 7.4% Emergent 3-4% 11.9%
- Implemented Case Review for Preventability
- Change in Practice: Frequent Rounding, Aggressive Replacement and Increased Communication
- Post Intervention: □Scheduled = 2.9% Emergent = 3.9%

Tyler et al., IJOA (2022) 51:

DISCLOSURE STATEMENT

Nixon et al..... Previously published NOWHERE!!





 

 Things to Remember for Readiness

 Preoperative Discussion

 Catheter Rounding May Decrease Failed Conversions





# **Recognize and Reframe**







Box 1 Top tips for testing a neuraxial block [4, 36].

- Wait for evidence of motor block before testing the sensory block for the first time.
- Check the block at relatively fixed time intervals, thus gaining experience of what to expect at those intervals.
- If the block is denser on one side than the other (noted by more motor block), start the sensory testing on that side. The mother will then appreciate if there are differences, and this will help you determine subtle changes.
- Perform the first check early enough to allow positional changes before fixing of intrathecal local anaesthetic.
- Continue testing past the initial level of change to seek possible further change at a higher level. This is most commonly noted when testing with an ice cube. The mother will first register cool touching, followed by cold, then icy cold as the ice cube is moved cephalad.

Platt et al, Anaesthesia 2022, 71, 588-597











## **TEAMING!!**

Saying and doing things to build a shared understanding of the work or situation to alter how people think or act

- Amy Edmondson SOAP AM 2023

















Society for Obstetric Anesthesia and Perinatology: Consensus Statement and Recommendations for Enhanced Recovery After Cesarean Builg Lawret MJ. Um, Gazet MJ. Statlar, Nerver MRCHL FICA. NO (Red)¹, Habida, Ashed's J. MBICA, MSC, MSC, FICA¹

> "Limiting/avoiding uterine exteriorization which is associated with IONV and delayed bowel function recovery"







## Intraperitoneal Chloroprocaine

# In cases where you need visceral density

- Instill chloroprocaine
- Wait a minute or two
- Suction out fluid
- Check for effectiveness



Pharmacokinetics and Tolerability of Intraperitoneal Chloroprocaine After Fetal Extraction in Women Undergoing Cesarean Delivery

Brandon M. Togloka, MD,*† Yalda Zarnegarnia, PhD, MS,* Lisa A. Bleyle, BS,‡ Dennis Koop, PhD,‡ Kathleen Brookfield, MD, PhD, MPH,† N. David Yanez, PhD,§ and Miriam M. Tregglari, MD, PhD, MPHJ

40mL chloroprocaine - 1-3%

**After Delivery** 

**Toxic Dose Estimates – below level** 













1.How do you feel? 2. What happened?

4.How does this relate?



**Education and Coaching** 











#### Unsatisfactory epidural block



Fig. 1. Etiology and contributing factors in unsatisfactory epidural block.





2

### What we'll cover



## Post-dural puncture headache (PDPH)

- Differential diagnosis?
- Diagnostic imaging?
- Acute neurologic complications associated with PDPH
- Chronic complications associated with PDPH

#### The goal

 Change how we, as OB anesthesia care professionals think about PDPH

#### • Serious acute sequelae • Follow patients

- <u>Recognize</u> when to rule out
- Profound long-term effects

   <u>Communicate</u> with primary care team











#### Red flags: Which patients need imaging?

GO DIRECTLY 1 DO NOT PASS

9

#### SYMPTOMS

Abrupt onset or "thunderclap" headache
 Headache wakens the nationt

Headache wakens the patient
Loss of previously *postural nature* of headache

- SIGNS
- Lateralized focal neurologic symptoms
- Seizures
   Altered mental status
- Fever
  Meningismus

#### Acute neurologic sequelae

The following **acute** and **subacute** conditions are associated with PDPH:

- Subdural hematoma (SDH)
- CVST
- Meningitis
  Cranial nerve injury
- Postpartum depression









- Analysis from >22 million deliveries
- Subdural hematoma

   200x aOR after PDPH
- Delayed treatment
   Strongest risk factor for a cranial subdural hematoma



#### 13

#### PDPH and cerebral venous sinus thrombosis

- Hit 1: Hypercoagulability of the postpartum state
   Hit 2: Intracranial hypotension from PDPH leads
   to compensatory cerebral venodilation
- Presenting symptoms:
- Severe headache (>90%), may be worse supine
   Nausea, vomiting
- Seizure
   Stroke symptoms



#### 14





- Altered mental status
- Fever
- Meningismus





18



#### What can we do? IN THE HOSPITAL

- Ensure adequate counseling and follow-up Provide patients with informational handouts
- Treat acute headache with EBP, when indicated

#### UPON DISCHARGE

- Remain in contact with patients still experiencing headache (median time 3 weeks for subdural hematoma and CVST rehospitalizations)
   Communicate with the primary care physician regarding potential for long term pain sequelae • Consider referral to pain specialists, if available and desired

#### What we discussed today

• PDPH

Differential diagnosis: PARTUM

#### • Diagnostic imaging

- Acute neurologic complications associated with PDPH:

- Chronic headache and back pain are associated with PDPH

21

#### The goal

- Change how we, as OB anesthesia care professionals think about PDPH
- Serious acute sequelae o Follow patients
- $\circ \, \underline{\text{Recognize}}$  when to rule these out
- Profound long-term effects  $\circ$   $\underline{\text{Communicate}}$  with primary care team



22



#### A Case of New Onset Myasthenia Gravis After Cesarean Delivery

**Presenting Author:** Michael S. Balot, DO **Presenting Author's Institution:** Mount Sinai West - New York, New York **Co-Authors:** Ghislaine C. Echevarria, MD, M.S. - Mount Sinai West Thomas R. Gruffi, MD - Mount Sinai West Bryan Mahoney, MD - Mount Sinai West

**Introduction** Upper extremity weakness and dysphagia following intubation are concerning signs for a hyperextension injury in a patient with no previous neurologic deficits. Myasthenia gravis (MG) can present with similar symptoms and frequently appears in females during childbearing years.¹ We present the case of a patient with no prior signs of MG who developed a postpartum MG exacerbation following general anesthesia for a cesarean delivery (CD).

**Case Report** A 42 year old G2P0 @ 37 weeks presented for an induction of labor for oligohydramnios. Her past medical history was significant for paroxysmal atrial fibrillation (AF) with an episode of AF with rapid ventricular response in her third trimester for which metoprolol was started. She had an uncomplicated combined spinal-epidural placed for her labor. Following category II tracing, she was taken for a CD, where the epidural was found to be inadequate and the case was converted to general anesthesia. An atraumatic rapid sequence induction and laryngoscopy occurred with use of a glidescope and she was extubated at the end of the procedure without problems.

On post op day 2 she endorsed dyspnea, fatigue, and changes in her voice. Her fatigue worsened and on post op day 4 she had dysphagia, tightness in her throat, and difficulty lifting her upper extremities. On exam, she had  $\frac{2}{5}$  strength in her bilateral upper extremities. Flexible laryngoscopy revealed a patent airway with normal laryngeal movement. Initial neurology evaluation presumed that the symptoms of dysphagia were likely related to her recent intubation and her upper extremity weakness from a hyperextension injury during intubation. An MRI of the cervical spine demonstrated anterior cord hyperintensity. Her symptoms remained unchanged and she was discharged on day 7 with neurology follow up. On follow up, her acetylcholine blocking antibody concentration resulted elevated, confirming a diagnosis of MG.

**Discussion** This case is compelling as it depicts a unique new onset presentation of MG in the immediate postpartum period. The initial clinical suspicion of MG was low given that the patient exhibited no neurologic deficits prior to pregnancy and additionally underwent airway manipulation before symptom onset. This scenario illustrates the need for a high index of suspicion for postpartum MG diagnosis. A previous study found that pregnancy preceded the onset of MG in 15% of their subjects.² It has been theorized that the drop in alpha-fetoprotein, which inhibits the binding of acetylcholine receptor antibodies, is the main contributing factor to the onset of symptoms

immediately postpartum.³ A timely diagnosis is important not only for maternal care, but also to ensure there is proper monitoring for symptoms of transient neonatal MG.⁴

## Acquired Hemophilia A: A Rare Cause of Postpartum Hemorrhage

#### Presenting Author: Abdo Barakat, MD, MS

Presenting Author's Institution: Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons
 Co-Authors: Vineet Aggarwal, MD - Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons
 Karim Shuaib, MD - Department of Anesthesiology, Columbia University Vagelos College of Physicians and Surgeons

#### Introduction

Acquired Hemophilia A (AHA) is a rare bleeding disorder characterized by autoantibodies directed against circulating coagulation factor VIII (fVIII), and reported incidence of 1:350,000 births. We present the case of a 48-year-old with known antiphospholipid antibody syndrome (APLS) on prophylactic enoxaparin, a recent COVID infection, and a primary cesarean delivery complicated by AHA.

#### Case

Due to prior myomectomy, a scheduled cesarean delivery (CD) was planned with more than 12h since last prophylactic enoxaparin dose, resulting in an uneventful CD under spinal anesthesia (QBL 750 mL). In PACU, postpartum bleeding was noted. A ROTEM (Figure 1) was performed and ruled out any potential contribution of residual enoxaparin. A coagulation panel showed aPTT of 42sec. She received 1 unit of FFP. Hours later, she returned to the OR for an exploratory laparotomy (QBL 4L) due to acute PPH and received additional blood products. She was discharged home on PPD5 with a 2-week course of prophylactic LMWH (APLS).

She was re-admitted on PPD8 for recurrent PPH and underwent an urgent hysterectomy and transferred to the ICU. She returned for evacuation of hemoperitoneum and argon beam coagulation on PPD9, and underwent an IR embolization of the left inferior epigastric artery on PPD12.

Serial coagulation workup showed an isolated and increasingly prolonged aPTT (max 150sec). On PPD15, removal of a radial arterial line resulted in refractory bleeding from the access site. A follow-up ROTEM showed a hypercoagulable pattern on the EXTEM (Figure 2A), consistent with her known APLS, and a coagulopathic pattern on the INTEM (Figure 2B), concerning for factor deficiency. She was diagnosed with AHA based on undetectable fVIII activity and a mixing study consistent with the presence of a time-dependent inhibitor.

Given undetectable fVIII activity, FEIBA (Factor Eight Inhibitor Bypassing Activity) was given with adequate hemostasis of her arterial bleed. On PPD18, hematuria and hematochezia were treated with NovoSeven RT (recombinant factor VIIa) as FEIBA was unavailable. With no subsequent bleeds, she was discharged home on prednisone and TXA PRN. Cyclophosphamide was added later for persistently undetectable fVIII activity. At 6 months postpartum, fVIII activity recovered, and inhibitor levels were eradicated.

#### Discussion

With this case, we want to raise awareness of AHA, which should be considered in cases of delayed refractory PPH with isolated prolonged aPTT. In the absence of other real-time data, the use of viscoelastic studies can expedite diagnosis, guide hemostatic resuscitation, and monitor response to bypassing agents. Antifibrinolytics can treat mild bleeding. Clinically significant bleeding requires bypassing with FEIBA or NovoSeven RT if the former is unavailable. Immunosuppression using prednisone and cyclophosphamide leads to inhibitor eradication and factor VIII activity recovery.

SOAP - Acquired Hemophilia A ROTEM 2 (1).pdf

# Acute Massive Hemorrhage in Placenta Accreta Spectrum with Tornado Vessel on Imaging: A Case Report and Interdisciplinary Review

#### Presenting Author: Pamela Huang, MD

**Presenting Author's Institution:** University of California, San Francisco **Co-Authors:** Vickie Feldstein, MD - University of California, San Francisco Tushani Illangasekare, MD - University of California, San Francisco Evan D. Lehrman, MD, FSIR - University of California, San Francisco Joseph Rabban, III, MD, MPH - University of California, San Francisco Mark Sugi, MD - University of California, San Francisco

#### Background:

As cesarean delivery rates increase in the United States and globally, placenta accreta spectrum (PAS) and its complications are expected to also increase exponentially. This has been reflected in the recent medical focus and literature output on PAS with specific interest in predicting and managing severe hemorrhage. Different management approaches include a combination of interventional radiologic embolization, hysterectomy, occlusive arterial balloon placement, resuscitation strategies, and surgical techniques. These vary between institutions and individual cases depending on assumed risk. There have now been efforts to quantify risk assessments based on clinical, imaging, and histologic features, noting degree of invasion and associated high vascularity to be important prognosticators. However, further abnormal vessel characteristics – such as size or flow – and their intraoperative implications have not been fully examined or discussed.

#### Case:

A 34-year-old woman G5P0222 at 32-weeks-gestation with history of 2 prior cesarean deliveries, chronic hypertension, and morbid obesity presented with painful contractions. Ultrasound and MRI found and confirmed complete placenta previa, features worrisome for myo-invasion (placenta increta) and small subacute placenta abruption, and "several large intraplacental vessels with swirling echoes measuring up to 2.6cm in diameter." Surgical intervention was planned the next day for cesarean delivery with cystoscopy stent placement, interval uterine artery embolization, and hysterectomy. Patient underwent general anesthesia with an arterial line and large bore IVs including rapid infusion catheter attached to a Belmont with blood product in room. Five minutes after baby delivered, sudden high pressure blood flow emerged from uterus with rapid hemodynamic decline and estimated 5L immediate blood loss. Along with resuscitation and epinephrine, the aorta was held for 5 minutes while massive transfusion protocol was facilitated. The planned interval uterine artery embolization was abandoned and the team proceeded directly to hysterectomy. Ultimate blood loss estimated to be 9.5L.

#### Discussion:

As the evolution of expert multi-disciplinary team collaboration and experience improves clinical outcomes in PAS, it is important to continue to identify and learn from the cases

that still exhibit life-threatening hemorrhage. There have been case reports describing large intraplacental vessels with turbulent and high velocity termed "tornado blood flow." In our case report, we emphasize the risk of sudden massive arterial-like blood loss in a patient with known "tornado vessels" and the unique intraoperative resuscitation challenges and successful management upon rupture.

MRI Image.tif

# Dexamethasone for PONV during cesarean section – Possible interference with diagnosis of congenital adrenal hyperplasia

Presenting Author: Leila Katabi, MD, MA

**Presenting Author's Institution:** University of Michigan Department of Anesthesiology **Co-Authors:** Thomas Klumpner, MD - University of Michigan Department of Anesthesiology

# Dexamethasone for PONV during cesarean section – Possible interference with diagnosis of congenital adrenal hyperplasia

Leila Katabi, MD; Thomas Klumpner, MD; Joanna Kountanis, MD

#### Background

Dexamethasone is used for prevention of postoperative nausea and vomiting (PONV) during cesarean section.¹ However, dexamethasone crosses the placenta. Safety data in neonates is unknown¹ and its impact on the neonatal adrenal axis is not well understood. This may be relevant in infants born with congenital adrenal hyperplasia (CAH), which affects an estimated 1:9,498 live births worldwide.² Timely diagnosis of CAH is imperative for avoiding life-threatening adrenal crisis and electrolyte abnormalities.³ We report a case of CAH whose diagnosis may have been confounded by maternal administration of dexamethasone.

#### Case

The mother was a 30 yo, G4P0 at 37w4d. She had an elective cesarean section for abdominal cerclage. Dexamethasone 4mg was administered 30 minutes prior to cord clamping. After delivery, pediatric endocrinology was consulted for ambiguous genitalia.

The neonate was ultimately diagnosed with 21-hydroxylase deficiency on day 5, but a newborn screen for CAH sent 25 hours after birth was negative. Neonates with 21-hydroxylase deficiency cannot synthesize cortisol, leading to low cortisol levels. Normally, cortisol is negative feedback on the hypothalamic-pituitary-adrenal (HPA) axis, which inhibits release of adrenocorticotropic hormone (ACTH). Patients with 21-hydroxylase deficiency lack this negative feedback causing elevated ACTH levels. Elevated ACTH promotes the steroidogenesis pathway; however, patients missing the 21-hydroxylase enzyme cannot complete steroidogenesis. This causes an accumulation of pathway precursors, including 17-Hydroxyprogesterone (17-OHP). The newborn screen identifies CAH via elevated 17-OHP (Figure 1). This neonate had normal 17-OHP levels initially, but elevated 17-OHP on day 5, confirming CAH.

#### Conclusion

Maternally administered dexamethasone crosses the placenta. The half-life of dexamethasone in neonates is approximately 9 hours, meaning it persists in the circulation for at least 27 hours.⁴ The physiologic effects last even longer, for up to 72

hours.⁵ Therefore, it is possible that maternally administered dexamethasone for PONV crossed the placenta and suppressed the neonatal steroidogenesis pathway, suppressing 17-OHP production, and resulting in a false negative newborn screen for CAH.

Consideration should be given to holding administration of dexamethasone until after cord clamping occurs.

Figure 1.pdf

# Management of a parturient with severe thrombocytopenia: use of ROTEM to guide placement of combined spinal epidural (CSE) for labor analgesia

## Presenting Author: Karim Shuaib, MD

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## **Background**

Up to 12% of obstetric patients meet criteria for the diagnosis of thrombocytopenia in pregnancy, which may preclude the use of neuraxial anesthesia for labor and cesarean delivery.¹ The 2021 SOAP consensus statement concluded that the risk of spinal epidural hematoma associated with a platelet count  $\geq$  70,000 × 10⁶/L is likely very low in obstetric patients without other risk factors, setting a threshold for safe neuraxial procedures. Rotational thromboelastometry (ROTEM) allows platelet function evaluation, but there is a paucity of data regarding neuraxial procedures in the setting of severe thrombocytopenia, with few case reports.²

We present the case of a patient with severe thrombocytopenia and anemia, where repeated ROTEM assessment before and after platelet transfusion guided anesthetic management.

## <u>Case</u>

A 36-year-old G1P0 term patient presented for elective induction of labor (IOL) in the setting of severe thrombocytopenia (8,000 × 10⁶/L) refractory to IVIG or pulse dose steroids and anemia (6.1 g/dL). She was followed by hematology for hypocellularity with atypical megakaryocytes on bone marrow biopsy two months prior. Options for labor analgesia, such as no intervention, intravenous medications, and neuraxial analgesia, as well as general anesthesia in the event of cesarean were each discussed. The patient was risk-averse, and the plan was for platelet transfusion during labor without neuraxial labor analgesia. After further discussion and shared decision-making, the team opted to perform a baseline ROTEM (see TEMogram 1), transfuse 2U of platelets and 2U of packed red blood cells, and reassess. After the transfusion, the platelet count was 74,000  $\times$  10⁶/L and ROTEM was normal (see TEMogram 2), so the patient chose to receive a CSE prior to IOL. One hour after uneventful CSE placement, the platelet count was  $68,000 \times 10^{6}$ /L. She delivered 8 hours later with no postpartum hemorrhage (platelets 54,000  $\times$  10⁶/L, hemoglobin 8.5 g/dL at the time of delivery; see TEMogram 3). The epidural catheter was removed 3 hours later (platelets 74,000 × 10⁶/L without additional transfusions). The postpartum course was uncomplicated with no neurological sequelae.

#### **Discussion**

To our knowledge, the use of neuraxial labor analgesia with a critical platelet count (<  $10,000 \times 10^{6}$ /L), guided by ROTEM to evaluate platelet function (corrected with platelet transfusion) has not been reported yet. While we initially thought this patient would not be eligible for any neuraxial procedure, the use of ROTEM showing normal platelet function with an acceptable platelet count, reassured the team that this might be safe to do after all. We hope this case will promote case-by-case discussions and adds to the numerator and data for registries.³

ROTEM Thrombocytopenia RL.pdf

# Management of a Pregnant Patient with Hereditary Angioedema in the Peripartum Period

#### Presenting Author: Micah de Valle, RN

**Presenting Author's Institution:** UTMB John Sealy School of Medicine, Texas **Co-Authors:** Nicholas Defilippis, MD - UTMB John Sealy School of Medicine Christie Delaune, CRNA - UTMB John Sealy School of Medicine

**Introduction:** Hereditary Angioedema (HAE) is a rare genetic condition affecting 0.002% of people via recurrent episodes of angioedema due to a C1 esterase inhibitor deficiency.¹ This leads to a buildup of bradykinin, causing vasodilation, increased vascular permeability, and edema.¹ Stress, drugs, mechanical trauma, and hormonal changes can trigger angioedema.¹ High estrogen and lactogenic hormones in pregnancy combine to increase frequency and severity of angioedema.¹ Peripartum stress and trauma intensify these changes.¹ We present a patient with HAE who underwent induction of labor (IOL) and a vaginal delivery with lumbar epidural analgesia (LEA). We discuss peripartum management considerations outlined in figure 1. Methods: A 31-year-old G2P1 with HAE presented at 37 weeks' gestation. She reported a few 3rd trimester episodes of self-limiting vaginal edema. A multidisciplinary team managed her pregnancy, labor, and prescribed icatibant 30mg/3mL as needed for edema flares. On admission, 1000 IU of plasma-derived C1 inhibitor (pdC1-INH) was given IV for short-term prophylaxis (STP).¹ The OB anesthesiologist performed a comprehensive evaluation and discussion prior to IOL. Early LEA was recommended to avoid the risks of general endotracheal anesthesia (GETA).^{1,2} Severe airway edema in HAE can cause a difficult airway during GETA and emergent cricothyroidotomy.² The patient delivered after 12 hours. She was monitored for postpartum edema and discharged on day 2 with icatibant for edema flares.

**Conclusion:** Multidisciplinary management and planning were crucial to prevent peripartum angioedema.² Early OB anesthesia evaluation and an accessible difficult airway cart are critical to mitigate the risk of a difficult airway from pregnancy and HAE.^{1,2} Vaginal delivery with early LEA is recommended to avoid GETA.¹ First line HAE treatment is pdC1-INH 20 U/kg IV given acutely or every 6 hours for STP.¹ A supply should be immediately available in OB units.¹ STP is not indicated for routine vaginal deliveries.¹ Exceptions are risk for mechanical interventions or a history of HAE triggered by genital trauma.¹ Fresh frozen plasma is an alternative for STP or acute flares.^{1,2} Hormonal changes from delivery and breastfeeding can increase the risk of angioedema.¹ Postpartum monitoring should occur for 48 hours if uncomplicated and 72 hours if angioedema develops.¹ In conclusion, implementation of recommendations with a multidisciplinary team is essential for HAE peripartum management.

Management of a Pregnant Patient with Hereditary Angioedema In the Peripartum Period.pdf

#### Peripartum Anesthetic Management of a Patient with Afibrinogenemia

Presenting Author: Yash B. Bisen, BA Presenting Author's Institution: Northwell Health - New York City, New York Co-Authors: Andrea Ruggiero, MS - Department of Anesthesia, Long Island Jewish Medical Center Linda Shore-Lesserson, MD - Northwell Health Title: Peripartum Anesthetic Management of a Patient with Afibrinogenemia

#### Background:

Neuraxial anesthesia is the gold standard for patients undergoing labor; it is the best modality for pain control and it mitigates the need for general anesthesia if a case converts to cesarean delivery. The contraindications for neuraxial anesthesia are coagulopathy, infection at site and patient refusal. Coagulopathies are particularly worrisome because of the increased risk of epidural hematoma. We are presenting a case of a patient with afibrinogenemia who received neuraxial anesthesia.

#### Case Report:

23-year-old G2P0010 female at 38.5 weeks with a medical history of afibrinogenemia presented for induction of labor. Her afibrinogenemia was clinically significant and she was being managed on a regimen of fibrinogen concentrate every three days; her nadir was 60 mg/dL. Our goal was to maintain a fibrinogen level of 250 mg/dL. 8 grams of fibrinogen concentrate were initially given on admission, but because this only brought her fibrinogen concentration to 240 mg/dL, an additional 3 grams was administered. She underwent uneventful epidural placement at L3-L4 and was started on a continuous bupivacaine-fentanyl solution. Fibrinogen levels were drawn every 12 hours. She had a normal spontaneous vaginal delivery without any complications. Her estimated blood loss was 164 mL. Her post-partum course was without incident and she was discharged home two days after her vaginal delivery.

#### Discussion:

The risk of epidural hematoma is 1/168,000 in the general population but higher in patients with a coagulopathy. (1) The incidence of afibrinogenemia is 1/1 million. (2) Given the rarity of the disease and the hesitancy to perform neuraxial anesthesia in patients with coagulopathy, no patient with afibrinogenemia has received neuraxial anesthesia for labor. Our solution was to replete the patient with fibrinogen concentrate throughout the peripartum period. 250 mg/dL was chosen as a goal because it is well established that in the midst of hemorrhage, maintaining a fibrinogen concentration > 250 mg/dL leads to better outcomes. (3) This novel case encourages the administration of clotting factors as a preventative measure in neuraxial anesthesia.

#### ROTEM Figures.pdf

# Right ventricular assist device (RVAD) insertion for severe pulmonary arterial hypertension during caesarean delivery: A Case Report

Presenting Author: Mariana Montes, MD, MPH Presenting Author's Institution: University of Chicago - Chicago, Illinois Co-Authors: Candice Cuppini, MD - University of Chicago Caroline Thomas, MD - University of Chicago Medical Center

#### Background:

Pulmonary arterial hypertension (PAH) is a modified WHO class IV diagnosis that indicates pregnancy should be avoided due to risk of maternal mortality of 25% or more.¹⁻³ It is the least common and most dangerous type of pulmonary hypertension for the parturient. Despite new advances in therapies for patients with PAH, physiologic changes of pregnancy are poorly tolerated.⁴ Our case presents a novel approach to the peripartum management of severe PAH in a parturient. Case:

A 31-year-old G3P0020 patient with a history of severe PAH secondary to lupus presented for consultation at 24 weeks. Right heart catheterization (RHC) showed pulmonary arterial pressures (PAP) of 100/32, mean pulmonary artery pressure (mPAP) of 58 mmHg, and pulmonary vascular resistance (PVR) of 10 Woods Units (WU).

Sildenafil and IV treprostinil were started during pregnancy and she remained asymptomatic. A multidisciplinary cardio-obstetrics team including maternal fetal medicine, pulmonology, cardiac surgery, cardiac and obstetric anesthesia, perfusion, cardiac intensivists, and neonatal ICU was convened.

Prior to her scheduled 35-week cesarean delivery, she was admitted for RHC and pulmonary artery catheter placement. RHC showed improvement in hemodynamics with PAP of 45/20, mPAP 28 mmHg, and PVR of 3.1 WU.

Anesthesia for cesarean delivery consisted of dural puncture epidural catheter placement that was slowly titrated using 2% lidocaine, bicarbonate and epinephrine. Inhaled nitric oxide (iNO) was initiated at 40ppm via high flow nasal cannula. A T4 surgical level was obtained in 30 minutes without hemodynamic instability. Vasopressin and epinephrine infusions were initiated at hysterotomy in anticipation of hemodynamic changes with delivery. During closure, PAP peaked to 71/23 with a CVP of 26. A right internal jugular 27 French Spectrum oxyRVAD cannula was placed by cardiac surgery under local anesthesia. Mechanical circulatory support (MCS) was initiated via CentriMag with a flow of 2.5 liters per minute (LPM) and a sweep of 2 LPM.

The patient recovered in the ICU, with discontinuation of vasoactive medications and decannulation from the RVAD on POD#1. iNO was weaned off on POD#3. Treprostinil was continued throughout. She was discharged home on POD#5. <u>Discussion</u>:

While controversy exists over the autotransfusion after placental delivery, this patient's hemodynamic changes seem to support the existence of this phenomenon. To our knowledge, peripartum RVAD utilization for management of PAH has not been described. Our case presents a novel approach to the peripartum management of

severe pulmonary hypertension, and early placement of the RVAD likely prevented the onset of potentially irreversible end-organ injury. This case report suggests that RVAD support may be a valid and reasonable option for parturients with severe pulmonary hypertension.

### SEVERE PULMONARY HYPERTENSION IN PREGNANCY: A CASE REPORT

#### Presenting Author: Eleanor Kenny, MD

**Presenting Author's Institution:** McGaw Northwestern Feinberg School of Medicine **Co-Authors:** Joe Salloum, MD - Northwestern University Feinberg School of Medicine

#### Introduction

Pulmonary arterial hypertension (PAH) is associated with high morbidity and mortality in pregnancy.1 Due to this risk, women with severe pulmonary hypertension are often advised against pregnancy.2 The physiologic changes of pregnancy, in addition to peripartum pain and hemodynamic shifts, may be poorly tolerated in this population, often leading to acute cardiac decompensation.¹ We present a case of a severe pulmonary hypertension in a parturient carried to viability.

#### Case

A 30-year-old G3P1102 female at 29w0d gestational age with a history of idiopathic PAH, originally diagnosed in 2019, was admitted to the hospital for medical optimization prior to delivery. Initial right heart catheterization (RHC) showed a pulmonary artery (PA) pressure of 99/50 mmHg. Transthoracic echocardiogram (TTE) showed an EF of 51%, low-normal LV function, with dilated right ventricle. She was maintained on sildenafil, furosemide, and IV prostacyclin therapy up until her planned induction of labor at 32 weeks. She was transferred to the cardiovascular care unit three days prior to delivery for PA catheter placement for titration and evaluation of PA pressures on prostacyclin therapy, which showed improvement to 75/43 (56) mmHg. Prior to induction, an arterial line was placed, and the patient was started on inhaled nitric oxide with various vasopressors and inotropes available. A dural puncture epidural was performed and confirmed with 3 mL of lidocaine 1.5%-epinephrine 1:200,000 test dose. Labor analgesia was initiated with a 10 mL bolus of bupivacaine 0.0625% with fentanyl 2 mcg/ml via epidural pump which was maintained with a programmed bolus dose of 10 mL every hour. A cervical ripening balloon was placed and oxytocin infusion initiated with the first stage of labor lasting about six hours, followed by pushing over two contractions, and then an uneventful unassisted delivery and postpartum course. Systemic and pulmonary systolic pressures were maintained at 110-150 and 70-95 mmHg, respectively. Point of care TTE was used throughout to monitor cardiac function and guide fluid management. Right heart function was maintained throughout delivery due to medical optimization pre-induction, obviating the need for vasopressors or inotropes.

#### Conclusion

The high rates of morbidity and mortality associated with pregnant patients with pulmonary hypertension can be avoided by extensive multidisciplinary collaboration for the safest delivery plan and medical optimization. Early prostacyclin therapy, ICU admission with ECMO on standby, nitric oxide use during labor, regular point of care
TTE, judicious fluid administration, placement and careful titration of dural puncture epidural were all key components to a safe and successful delivery.



# A Case of New Onset Myasthenia Gravis After Cesarean Delivery

Michael Balot, D.O., Ghislaine Echevarria, M.D., M.S., Thomas Gruffi, M.D, Bryan Mahoney, M.D. Department of Anesthesiology, Mount Sinai Morningside & West Hospitals



# BACKGROUND

- Myasthenia gravis (MG) is an autoimmune disorder of the neuromuscular junction and commonly presents during childbearing years.
- Pregnancy has variable effects on autoimmune diseases.
- The first trimester and the postpartum period are associated with worsening of MG symptoms.

### **PATIENT HISTORY**

- 42 F G2P0 @ 37 weeks gestation presenting for IOL due to oligohydramnios.
- PMH significant for paroxysmal atrial fibrillation with a recent episode of rapid ventricular rate, now on metoprolol. Now presenting with gestational hypertension.
- Physical exam was unremarkable for any noticeable neurologic abnormalities.





Day 1: New onset dyspnea, fatigue, and subjective voice changes

 Day 4: Dysphagia, throat tightness, difficulty lifting upper extremities. Physical exam notable for bilateral shoulder abductor weakness

**EVALUATION** 

- Flexible laryngoscopy: patent airway with normal laryngeal movement
- Video esophagram: delayed transit, stasis,
- and retrograde movement of liquidsC-Spine MRI: anterior cord hyperintensity

POSTOP

COURSE

 Symptoms stabilized on post-operative day #7
 Acetylcholine blocking antibody concentration elevated confirm diagnosis of myasthenia gravis





# DISCUSSION

- This case is unique as it depicts a new onset presentation of myasthenia gravis in the immediate postpartum period.
- The initial clinical suspicion of myasthenia gravis was low given that there were no neurologic deficits prior to pregnancy, and she additionally underwent airway manipulation before symptom onset.

# **KEY POINTS**

A drop in alpha-fetoprotein, which inhibits the binding of acetylcholine receptor antibodies, is likely the main contributing factor to the onset of symptoms immediately postpartum

- A timely diagnosis is important not only for maternal care, but also to ensure there is proper monitoring for symptoms of transient neonatal myasthenia gravis
- Plauché WC. Clin Obstet Gynecol. 1991;34(1):82-99
   Boldingh MI et al. Neurology.

REFERENCES

- 2016;87(20):2139-2145 3. Brenner T et al. Proc Natl Acad
- Sci USA. 1980;77(6):3635-3639 4. Massey JM et al.
- 4. Massey JW et al. Continuum 2014;20:115-127

SOAP 2023

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MEETING

logy



- Acquired Hemophilia A: A Rare Cause of Postpartum Hemorrhage <u>Abdo Barakat</u>, Karim Shuaib, Vineet Aggarwal, Ruth Landau Columbia University Irving Medical Center, New York, NY
- Acquired Hemophilia A (AHA) is a rare bleeding disorder characterized by autoantibodies directed against circulating coagulation factor VIII.
- The incidence of postpartum AHA is reported ~ 1:350,000 births.
- AHA diagnosis is based on an undetectable fVIII activity and a mixing study consistent with the presence of a time-dependent inhibitor.

48 year-old G1P0

- * PMH: APLS on enoxaparin during pregnancy & recent COVID-19 infection
- Scheduled C/S delivery under spinal anesthesia was uneventful (QBL 750 mL)
   PPH noted in PACU

Case Description⁸

--ROTEM done and ruled out residual enoxaparin as a cause of bleeding, aPTT 42 seconds

POD0: OR takeback for ex-lap (QBL 4 L), required multiple units of pRBC, FFP, and cryoprecipitate

POD5: discharged home with a 2-week course of prophylactic enoxaparin (APLS) PPD8: readmission for delayed PPH, underwent hysterectomy, post-op transfer to SICU



Since PODD, serial coagulation workup with isolated and increasingly prolonged aPTT (max 150sec)  $% \left( \frac{1}{2}\right) =0$ 

PPD15: follow-up ROTEM follow-up showed a hypercoagulable pattern on EXTEM (APLS) and a coagulopathic pattern INTEM (factor deficiency) + diagnosis of AHA based on fVIII/inhibitor labs

- ---Rx: FEIBA (Factor Eight Inhibitor Bypassing Activity) **>** adequate hemostasis
- PPD18: Hematuria/Hematochezia, FEIBA unavailable
- ----Rx: NovoSeven RT (recombinant factor VIIa)
- No subsequent bleeds  $\Rightarrow$  discharged home





#### Discussion

- Consider AHA in cases of delayed refractory PPH with isolated prolonged aPTT.
- In the absence of other real-time data, the use of viscoelastic studies can expedite diagnosis, guide hemostatic resuscitation, and monitor response to bypassing agents.
- Antifibrinolytics can treat mild bleeding. Clinically significant bleeding requires bypassing with FEIBA or NovoSeven RT if the former is unavailable.
- Immunosuppression using prednisone and cyclophosphamide leads to inhibitor eradication and factor VIII activity recovery.

Acute Massive Hemorrhage in Placenta Accreta Spectrum with Tornado Vessel on Imaging: A Case Report and Interdisciplinary Review

> Pamela Huang MD. Tushani Illang i Illangasekare MD, Mark Sugi MD, Vickie A. Feldstein MD, Evan D. Lehrman MD FSIR, Joseph Rabban III MD MPH, Ronald B. George MD FRCPC

#### CASE:

- 34-year-old woman G5P0222 at 32 weeks presenting with painful contractions
- History of 2 prior cesarean deliveries, chronic hypertension, & morbid obesity
- Ultrasound & MRI confirm complete placenta previa and concern for myo-invasion (placenta increta) Plan for urgent high-risk cesarean delivery with cystoscopy stent placement, interval uterine artery embolization, & hysterectomy

# ANESTHETIC MANAGEMENT:

- General anesthesia
- Arterial line, large bore IVs including RIC attached to Belmont with blood products in room

UCSF



Acute Massive Hemorrhage in Placenta Accreta Spectrum with Tornado Vessel on Imaging: A Case Report and Interdisciplinary Review

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Acute Massive Hemorrhage in Placenta Accreta Spectrum with Tornado Vessel on Imaging: A Case Report and Interdisciplinary Review

#### DISCUSSION

- Different management approaches include combination of total hysterectomy, interventional radiologic embolization, occlusive arterial balloon placement, resuscitation strategies and surgical techniques
  - o In this case, could not attempt interval IR embolization and holding aorta was critical
- Recent efforts to quantify preoperative risk assessments (clinically or on imaging) include degree of
  placental invasion and high vascularity
  - o This case further depicts vessel characteristics such as size and flow for consideration
- As evolution of expert multi-disciplinary team collaboration improves PAS outcomes, important to identify and learn from cases that still exhibit life-threatening hemorrhage

interference with diagnosis of congenital adrenal hyperplasia Leila Katabi, MD; Thomas Klumpner, MD; Joanna Kountanis, MD 30 y/o, G4P0 at 37w4d - elective cesarean delivery for h/o abdominal cerclage

Dexamethasone for PONV during cesarean section - Possible

Dexamethasone 4mg administered 30 minutes prior to cord clamping

Pediatric endocrinology consulted for ambiguous genitalia

Negative newborn screen for CAH sent 25 hours after birth

Elevated 17-OHP levels on day of life 5 confirmed 21-hydroxylase deficiency

#SOAPAM202

University of California San Francisco

L V L





# **Conclusion**

Consideration should be given to holding administration of dexamethasone for PONV until after cord clamping occurs.

# COLUMBIA UNIVERSITY IRVING MEDICAL CENTER Anesthesiology SOAP May 6th, 2023

Management of a parturient with severe thrombocytopenia: use of ROTEM to guide placement of CSE for labor analgesia

> Karim Shuaib, MD, Vineet Agrawal, MD, Abdo Barakat, MD, Laurence Ring, MD, Ruth Landau, MD

# Introduction:

- Systematic review (1947-2018) of spinal epidural hematomas (SEH) on lumbar procedures in 7,509 thrombocytopenic pts
- 33 cases of SEH (0.44%) 5 SEH of 2418 obstetric cases (0.21%)



#### Rotem:

- · Measures hemostasis by assessing the interplay between platelets, factors & RBCS
- Assists transfusion management Central parameters analyzed: • 1) time to clot initiation 2) clot strength 3) degree of fibrinolysis.

EXTEM: Assesses clot formation (tissue factor/ thromboplastin activation of coagulation)

FIBTEM: Assess fibrinogen contribution to coagulation. Coagulation is activated as in EXTEM. Cytochalasin D is then added  $\rightarrow$  blocking thrombocytes. The resulting clot is therefore only depending on fibrin formation.



#### Case Description:

- 36 G1P0 at term for elective IOL for severe thrombocytopenia (8,000 × 10⁶/L) Anemia (6.1 g/dL) & borderline leukopenia.
- . Followed by hematology - thrombocytopenia refractory to IVIG and pulse steroids. Patient
- post platelet transfusions during pregnancy Bone marrow biopsy during pregnancy revealing pancytopenia. Myelodysplasia?

38

EXTEM showing reduced maximum amplitude A20 (<40mm) indicating either reduced platelet function or fibrinogen levels

. 12 18

-28

11am ROTEM #1: Pretransfusion Plt count 8,000 x 10⁶/L

#### Anesthetic considerations: Options for labor analgesia:

100

- No Analgesia
- Intravenous medication (PCA remifentanil +/- dexmedetomidine)
- Neuraxial analgesia post Plt transfusion For CS → general anesthesia likely
- Risk of postpartum hemorrhage. Prevention with platelets & TXA



FIBTEM showing adequate amplitude A10 (>20mm) indicating sufficient fibrinogen levels

# Case Description:

3pm ROTEM #2: Postranfustion (2RBCs, 2Plts) Plt count 74,000

6:30pm CSE 1:50am NSVD No TXA, EBL 350ml

11pm ROTEM #3: Post-delivery (no PPH) Plt count 54,000



Post-transfusion EXTEM showing improved maxin A20 (>40mm) indicating adequate platelet function









Post-delivery FIBTEM showing adequate amplitude A10 (>20mm) indicating sufficient fibrinogen levels

Journal of Clinical Anesthesia (2016) 32, 159-161

- A conundrum: general or neuraxial anesthesia and the use of ROTEM*
- A.A. Mauritz MD (Anesthesiologists)*, Z.Y. Strouch MD (Anesthesiologists), A.J. Olufolabi MB, BS (Anesthesiologists) esthesiology, Duke University Medical Center, Box 3094, Mail Sort #10, Durham, NC 27710, USA

### Cesarean under spinal anesthesia. Plt count 63,000

Refractory Severe Thrombocytopenia during Pregnancy: How to Manage

- Trombocitopenia grave refratária na gravidez: como abordan Joana Gomes de Amorim¹ Manuel Rocha Abecasis¹ Filipa Maria Nogueira Lança Rodrigue
- Toppartment of Avanthesislogs, Centro Hospitala' Libbas Norte,
   Libbas, Portugel
   Libbas, Portugel
   Libbas, Portugel
   Libbas, Service, Ann. Port, Egyst Maine, Schelder, Usbas, Rentugel
   Libbas, Service, Ann. Portugel
   Libbas, Service, Ann

#### Cesarean under general anesthesia. Plt count 3,000

# A Case Report of Rotational Thromboelastometry-Assisted Decision Analysis for Two Pregnant Patients With Platelet Storage Pool Disorder John Hak Ma⁺ Organ Cases, Ma⁺ Arels Lange, KO, MPI, † Banh Lasen, MO, † Emly Reff. M⁺ et al. Willer Cases, MO⁺

#### i) constitute a diverse group of hematologic abnormal-of a deficiency in the ability of platelets to aggregate, nagement challenges to their care boom when they pres-In problem, including the second seco

A)Cesarean with spinal B) fentanyl & vaginal delivery

- Discussion:
- Platelet transfusion increased count  $to \ge 70,000 \times 10^6/L$
- ROTEM was able to assist in showing that platelet function had improved after transfusion
- ROTEM can increase confidence in pursuing neuraxial analgesia

#### • Scenarios:

- Normal platelet count but poor platelet function on ROTEM
  - Low platelet count but good platelet function on ROTEM



**Management of a Pregnant Patient** 









Icatibant

plasma

Ecallantide

Fresh frozen

20 IU/kg

STP: 1000 IU

LTP: 40-60 U/kg

twice weekly

C1-INH

plasma

Fresh frozen

C1-INH

Tranexamic acid



Antepartum	Notify pharmacy on admission     Prefered vaginal delivery
Intrapartum	Early Anesthesiology Consult     Oiccuss /HAE-related risks of anesthesia     Evaluate for possibility of emergent airway     Difficult Airway Cart on hand     Drugs readily available     Early neuraxial anesthesia     Administer proplylactic C1 inhibitor 1 hour prior to anticipated high-risk delivery     High alert for symptoms
Postpartum	Monitor for edema (laryngeal and genital) for at least 48 hours postpartum     Extend monitoring up to 72 hours if peripartum edema develops     Treat angleodema flares with C1 esterase inhibitor     Educate patients at discharge     Ensure adequate supply of medications for acute treatment upon discharge



Peripartum Anesthetic Management of a Patient with Afibrinogenemia



Trimester	Management	Medications	Symptoms
E	<ul> <li>Transfer of care to MFM</li> <li>Initiate care with Pulmonary Hypertension specialist</li> </ul>	ASA     Enoxaparin     Azothioprine     Prednisone     Hydroxychloroquine     Sildenafil 20 mg	Asymptomatic
	Tunneled Central Line placed under MAC     Consultation with Cardiac Surgery	Initiation of treprostanil continuous infusion: 12 ng/kg/min	Asymptomatic
ť	<ul> <li>Scheduled cesarean delivery at 35 weeks</li> <li>Cardio-Obstetrics Team in OR</li> <li>Cardiac Surgery on backup for possible RVAD placement</li> </ul>		Asymptomatic
	ngo Medicine		Society for Obstetric Society for Obstetric





Severe Pulmonary Hyper <u>Department of Anesthesiology, Northw</u>	tension i Salloum MD, Kait Istern University R	n Preg lyn Neumann Feinberg Scho	nancy: A Case Re ND, MEd pol of Medicine; Chicago, IL	eport	North
Introduction		Clinica	l and Hemodynamic Classification	of PH using V	/HO's 6 th
Defined as:		WHO Group	Symposium Classification s	bystem DVR	PCWP
Mean arterial pulmonary artery pressure >/= 20mmHg		1	PAH	increased	normal
at rest during right heart catheterization (RHC)		2	PH secondary to left heart disease	normal	increased
mmHg		3	PH secondary to lung disease and hypoxemia	increased	normal
aternal Mortality		4	Chronic thromboembolic PH (CTEPH)	increased	normal
Associated with high morbidity and mortality in		5	PH with unclear and/or multifactorial mechanisms	normal or increased	normal or increased
30-56%					
In well controlled PAH, mortality rates are still 9-25%.			7/	Australianaus	15
Secondary to physiologic changes in pregnancy, peripartum pain and hemodynamic shifts leading to acute cardiac decompensation	Increase in PAH In pregnancy	RV adaption and hypertrophy	(300-500 mL) Breated stroke volume and cardiac output	in RV preload/ afterload	RV Dyrfun and cardio shock
			North	wastarn	

CASE: Patient Histo	ory	
	30-year-old G3P2 presented at 27 wks gestational age	DIAGNOSTICS
Patient History	<ul> <li>Diagnosed in 2019 with NSTEMI and idiopathic PAH</li> <li>Pulmonary artery pressure 99/50 mmHg on initial RHC</li> </ul>	
Previous Deliveries	G1: 2017, unknown delivery date/location     G2: 2018, vaginal delivery at 35 weeks, unknown if complications	Pulmonary artery press (PAP) 99/50 mmHg     PCWP 4 mmHg
<u>Pertinent Past</u> <u>Medical Issues</u>	<ul> <li>Several psychiatric admissions prior to pregnancy</li> <li>Psychiatric admission at 27 weeks; transitioned from olanzapine to risperidone with improvement in symptoms</li> </ul>	Transthoracic Echo (TTE)
PAH Medical Management	Remained inpatient from 27 weeks until delivery     Sildenafil, furosemide, and treprostinil until planned induction at 32 weeks	admission at 27 weeks E0 (2022) • EF 55% • Moderately dilated BV
		decreased RV function

DIAGNOSTICS	
Initial RHC (2019) • Pulmonary artery pressure (PAP) 99/50 mmHg • PCWP 4 mmHg	Transferr cardiova: care unit days pri planned d
Transthoracic Echo (TTE) on admission at 27 weeks EGA (2022) • EF 55%	• Point • Vaso
Moderately dilated RV with decreased RV function	ECM     Near     Adja     resuse

Northwestern

CASE: De	elivery Timeline					3:53 PM: Unassisted	
Transferred to cardiovascular care unit three days prior to planned delivery		<b>6:30AM:</b> Invasive BP monitoring and nitric oxide initiated	Y	1:30PM: Mild chest pain/SOB. No pulmonary edema on bedside TTE		pushing over two contraction s with uneventful delivery and postpartum course	
٠	•	٠	۲	۲	۲	۲	
<ul> <li>Point of care</li> <li>Vasopressors</li> <li>ECMO on sta</li> <li>Nearby OR av</li> <li>Adjacent ICU</li> <li>resuscitation</li> </ul>	PAC placed with noted improvement of PA pressures to 75/43 mmHg after medical management ultrasound and inotropes and inotropes and by outside ICU room nailable in main hospital room for neonatal		6:50AM: Dural puncture epidural with slow dosing to T10 analgesic level prior to induction		2:40PM: First stage of labor lasted six hours with appropriate dense analgesic coverage	180 160 140 140 140 140 140 140 140 14	stolic PAP PM2:00 PM 4:00 PM

### CASE: Transthoracic Echocardiogram Monitoring



Hyperdynamic LV, normal function
 Moderately dilated RV with moderately
decreased function and septal flattening
during systole > diastole
 Small pericardial effusion



TTE)
Interval mild increase in RV dilation
Increased LV end-diastolic volume consistent with increased volume status

Stable pericardial effusion





# **Disclosures & Objectives**

Nothing to disclose Participants will learn:

- How ASA is working with SOAP nationally and in the states to address current and emerging opportunities
- Key trends and challenges facing the specialty in the market, legislatures, and regulatory agencies, both nationally and in the states

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# Special "Thank You" to SOAP Leadership Directors Michaela K. Farber, MD, MS Vibha Mahendra, MD David Gambling, MB, BS, FRCPC Rayna Clay, MD Grace Lim, MD, MS Heather C. Nixon, MD Dan Katz, MD Jamie Murphy, MD Ashraf Habib, MSc, BCh, MB, FRCA

### We are ASA: Leaders in Patient Safety

**Mission**: Advancing the practice and securing the future

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Values: Patient safety, physicianled care and scientific discovery Strategic Pillars 1. Advocacy

- 2. Quality & Practice Advancement
- Educational Resources
- 4. Member Engagement
- 5. Leadership & Professional Development
- 6. Research & Scientific Discovery
- 7. Stewardship of the Society
  - & Specialty



#### **Obstetric Anesthesia at ANESTHESIOLOGY 2023**

#### SOAP Panel

Teamwork: Partnerships, Bridges and Pivots

#### **Obstetric Anesthesia Sessions**

- 24 Obstetric Anesthesia Sessions
- 88% of submitted presentations were accepted
- 11 Panels
- 5 Refresher Course Lectures
- 1 Clinical Forum
- 4 Snap-Talks
- 3 Point-Counterpoints



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#### **Obstetric Anesthesia at ANESTHESIOLOGY® 2023**

#### Special Thanks to Educational Track Subcommittee on Obstetric Anesthesia

Brenda Bucklin, MD, FASA, Chair
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Ioannis Angelidis, MD
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#### Special Thanks to Educational Track Subcommittee on Obstetric Anesthesia continued

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#### **Obstetric Anesthesia at ANESTHESIOLOGY 2023** Special Thanks to Abstract Review Subcommittee for Obstetric Anesthesia and Perinatology continued Barbara Orlando, MD, PhD, FASA Carlo Pancaro, MD Richard Smiley, MD, PhD Jingping Wang, MD, PhD, FASA Robert White, MD, MS David Wlody, MD, FASA Joshua Younger, MD Reine Zbeidy, MD Jie Zhou, MBA, MD, MS, FASA





### **Obstetric Anesthesia at ANESTHESIOLOGY 2023**

#### Special Thanks to Abstract Review Subcommittee for Obstetric Anesthesia and Perinatology

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Consensus Reforms Sought (Surgical Care Coalition, AMA)	Bucshon Looks For Bipartisan Medicare Pay Reforms As Docs Push For Stability
<ul> <li>Annual Inflation Adjustment</li> <li>Reforms to Budget Neutrality</li> <li>More Opportunities for Alternative Payment Models</li> </ul>	"the partial mitigation included in last yea spending bill isn't enough for physicians or protect Medicare beneficiaries' access to care, and the first step lawmakers need to take is an oversight hearing on what he vier as a flawed Medicare Access and CHIP Reauthorization Act and faulty physician pa policies.



No Surprises Act (NSA) -Protect patients from surprise bills -Increase health care cost transparency for patients -Create a mechanism for physicians and payers to resolve payment disputes

17

# No Surprises Act (NSA) Implementation

- Payers are leveraging the flawed NSA implementation to push practices out of network
- Erroneous and unlawful NSA rules and guidance are empowering payers to use aggressive negotiating techniques
- Unreasonably low initial payments/qualifying payment amounts (QPA)
   Improper weighting of QPA by independent dispute resolution (IDR) entities
- Overly restrictive batching rules and guidance
- Excessive administrative fees to access IDR process

# **Potential Remedies**

- Regulatory
- Legal
- Legislative



 State Physician-Led Care

 APRN/CRNA independent practice legislation

 - Working on 17 states

 Pro-active Medical Title Misappropriation legislation

 - Working on 9 states - current or in development





### **ASA Education Portfolio**

- ACE: Reinforce and refresh fundamental knowledge
   Anesthesia SimSTAT: Powerful realistic online
- Anesthesia SimSTAT: Powerful, realistic online simulation training
- Summaries of Emerging Evidence (SEE): Key insights from 30+ journals worldwide
- Diagnostic Point-Oc-Care Ultrasound Certificate Program: A rigorous, five-part education program designed to help develop and demonstrate mastery of heart, lung, gastric, and abdominal free fluid/bladder diagnostic POCUS skills
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160 CASES	Part 3: Identify and interpret online cases	T	Achieve your certificate of completion	

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### Pacira Libel Case Against Anesthesiology

- Lawsuit filed against ASA, Anesthesiology editor-in-chief and 11 authors by Pacira Biosciences Inc. dismissed 2/4/22
- Suit filed in April 2021 regarding articles about pain medication, EXPAREL, in February 2021 *Anesthesiology* issue, a related podcast and other materials
- Judge found that a "scientific conclusion based on nonfraudulent data in an academic publication is not a 'fact' that can be proven false through litigation," adding that holding otherwise "would chill robust and open debate about the efficacy of drugs within the medical community."
- Pacira appealed the dismissal and oral arguments were held on 3/6/23 Multiple groups filed amicus briefs in support of ASA's position, including the American Medical Association, the Association of American Publishers, and the Council of Medical Specialty Societies
  - On March 24, 2023, the Appellate Court issued an opinion affirming the District Court decision and denying Pacira the opportunity to amend its complaint





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#### ASA Leadership Academy Module 1 - Leadership Roles - Attendees learn ASA's mission and organization, its leadership path, and how to maximize member experience for personal and

Leadership and Professional Development Resources

- professional growth Module 2 - Creating a Personal Leadership Path - Attendees assess leadership gaps, strengths and create a personal leadership pathway
- NEW Module 3 coming in 2Q 2023!





















































SOAP 2023 Distinguished Service Award: Brenda A. Bucklin, MD



Dr. Bucklin's Early Days, pre-SOAP



# DSA: Brenda A. Bucklin, MD

- Born and raised in Nebraska
- MD from University of Nebraska
- Residency at University of Iowa
- OB Anesthesia fellowship at Bowman Gray / Wake Forest
- Returned to University of Nebraska as Director of OB Anesthesia, 1991-2002.



# DSA: Brenda A. Bucklin, MD

- While in Nebraska, Brenda met her future husband, pediatric dentist Dr. Ulrich "Uli" Klein seen here in the background.
- Both agreed to move to Colorado in 2002. Brenda joined the faculty in the School of Medicine and Uli became Program Director and then Chair of Pediatric Dentistry.



# DSA: Brenda A. Bucklin, MD

Brenda has had many accomplishment while at CU:

- Outstanding Teacher of the Year in our department x 2
- Elected to the Association of University Anesthesiologists
- Selected for the Executive Leadership in Academic Medicine (ELAM) Fellowship for Women
- Elected to the Academy of Medical Educators
- Vice-Chair of Education, Department of Anesthesiology
- Faculty Professionalism Award, University of Colorado SOM
- Associate Dean for Continuing Medical Education (CME)



# DSA: Brenda A. Bucklin, MD

Brenda is a *huge* advocate for teaching and lifelong learning.

- Masters of Education in the Health Professions (MEHP) from Johns Hopkins University School of Education and a Post-Masters Certificate in Evidence-Based Education (June, 2017)
- Graduation requirements included a focus on design of educational research studies and manuscript development
- Since her degree, she has been Adjunct Instructor, Master of Education in the Health Professions (MEHP) in the Johns Hopkins University School of Education, teaching Curriculum Development and Capstone



# DSA: Brenda A. Bucklin, MD

And Brenda was busy on the regional / national stage:

- ABA oral examiner since 2004 and helped develop their OSCE examination process
- Secretary and member of the Board of Directors of SOAP
- SOAP Meeting Host in 2015 in Colorado Springs
- Chair, ASA Educational Track on Obstetric Anesthesia, planning all content for the Annual Meeting since 2019
- Member of the Maternal Mortality Review Committees in both Nebraska and Colorado

# DSA: Brenda A. Bucklin, MD

Brenda's presentations and publications have moved the practice of obstetric anesthesia forward, supporting SOAP's vision of "safe and equitable care for women and newborns everywhere."

- What's New in OB Anesthesia lecture, 2006
- Obstetric anesthesia workforce surveys x 3
- Obstetric anesthesia practice guidelines by the ASA x 2
- Research on best practices in teaching, risk factors for faculty attrition, and many aspects of OB anesthesia care

# DSA: Brenda A. Bucklin, MD

Congratulations Brenda! You are a role model for us all as a physician, a teacher, anesthesiologist and obstetric anesthesia leader. You make us proud!







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Best Case Reports Dutstanding case reports presented at the 2023 Annual Meeting Michael Balot, MD Abdo Barakat, MD, MS Pamela Huang, MD Leila Katabi, MD, MA Karim Shuaib, MD Micah de Valle, RN Yash Bisen, BA Mariana Montes, MD, MOH Eleanor Kenny, MD 

 Image: Constraint of program of pro
















SOAP

## 2023

SOAP/Kybele International Outreach Grant



## Dr. Anjan Saha

"Obstetric Anesthesia Capacity Building in a Public Teaching Hospital in Sierra Leone"





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#### 2022/2023 SOAP COE for Anesthesia Care of Obstetric Patients Designations

- 44 applications
- 7 new and 34 recertifications for COE designation
- 4 declined

• 1

• 3 (offered a one-time next cycle application fee waiver)





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#### SOAP COE for Anesthesia Care of Obstetric Patients Applications and Reviews

- Annual Application Cycle: Open July to August
- Certificate: Valid for 4 years
- Information: SOAP website, talks/webinars, consultations
- Rigorous review process
- Self-reporting with no hospital visits

https://www.soap.org/centers-of-excellence_program







Anesthesia management of severe recurrent epistaxis in pregnancy

Presenting Author: Ani Chilingirian, MD Presenting Author's Institution: UCSF Co-Authors: Pamela Huang, MD - University of California, San Francisco Stephanie Lim, MD - UCSF Sherry Liou, MD, MBA - Department of Anesthesia and Perioperative Care, University of California San Francisco (UCSF) Jennifer Woodbury, MD - Department of Anesthesia and Perioperative Care, University of California San Francisco (UCSF) Peter Yeh, MD - Department of Anesthesia and Perioperative Care, University of California San Francisco (UCSF)

Epistaxis in pregnancy is common due to elevated estrogen and progesterone leading to nasal vasodilation. However, severe epistaxis is rare and can lead to both maternal and fetal compromise (1). This case report describes the peripartum management of a preterm patient with severe epistaxis through delivery and postpartum. A 27-year-old G1P0 at 31 week GA presented to a local emergency department three occasions in one week for recurrent left nasal epistaxis. She was transferred to our institution for surgical intervention. Her vitals on arrival were stable and her workup was negative for any coagulopathies but did elucidate a curious history of severe nose trauma at age 10 requiring reconstruction. She underwent a left maxillary and sphenopalatine artery ligation followed by embolization of the distal left IMAX and distal left facial artery two days later. She was discharged followed by a readmission within 24 hours for recurrent bleeding. A multidisciplinary meeting was held with obstetrics, ENT, pediatrics, and anesthesia to discuss delivery as definitive management. The plan was to induce labor at 34 week GA with an assisted 2nd stage vaginal delivery to avoid valsalva. The patient had an epidural placed 6 hours after induction and underwent an uneventful forceps assisted vaginal delivery two days later. On post delivery day 3, she underwent a left total ethmoidectomy, sphenoidotomy, frontal sinusotomy with ligation of the left anterior ethmoid artery followed by embolization of the distal bilateral IMAX and distal left facial artery for persistent bleeding on post delivery day 6. She was discharged the next day on oral tranexamic acid. Four days after her discharge, she presented to the hospital with bilateral deep vein thromboses and was treated with a heparin drip. She was discharged with lovenox and has had no recurrences of epistaxis. The presence of severe refractory epistaxis in pregnancy precipitates multiple obstetric and anesthesia considerations. No specific guidelines or case reports on anesthetic management of life-threatening epistaxis for a planned vaginal delivery have been published (2). The few case reports of severe recurrent epistaxis have all resulted in cesarean section. We demonstrate possible facilitation of vaginal delivery with emphasis on multidisciplinary discussions and management in such patients. When conservative treatment fails, and a decision for delivery is made, we recommend early placement of an epidural in case of an emergent cesarean section as well as an assisted second stage of labor if vaginal delivery is possible. The anesthesia team

should be prepared for a bleeding airway and have necessary equipment and blood products available.

## Perioperative management of a parturient with Bombay phenotype and placenta previa

Presenting Author: Emmarie Myers, MD

**Presenting Author's Institution:** Johns Hopkins University School of Medicine - Elkridge, Maryland

**Co-Authors:** Elizabeth P. Crowe, MD, PhD - Johns Hopkins University School of Medicine

Steven Frank, MD - Johns Hopkins University School of Medicine Tymoteusz Kajstura, MD, PhD - Johns Hopkins University School of Medicine Scott Mittman, MD, PhD - Johns Hopkins University School of Medicine Jamie Murphy, MD - Johns Hopkins University School of Medicine

The Bombay phenotype  $(O_h)$  is exceedingly rare. Individuals with this blood type lack an H antigen on red blood cells (RBCs) and produce an anti-H antibody. They require transfusions of  $O_h$  RBCs or risk severe, possibly fatal, immediate or delayed hemolytic transfusion reaction¹. Management is complicated in the parturient given the potential for postpartum hemorrhage, particularly in the presence of abnormal placentation such as placenta previa. We present a case of an  $O_h$  parturient at high risk for postpartum hemorrhage and limited ability to transfuse.

A 36-year-old G1P0 female presented at 36w4d for transfer of care. Her pregnancy was complicated by placenta previa, and she was scheduled for a primary cesarean section at 37w2d. On prior outside testing, she had a positive antibody screen, but no specific antibody identified. On the day prior to her scheduled surgery, a type and screen was sent, which identified Oh with anti-H. The American Red Cross and American Rare Donor program were contacted to find compatible RBC units. Hematology, Transfusion Medicine, and the Bloodless Medicine team were consulted for additional management recommendations. Two frozen O_h RBC units were located, and the cesarean section was postponed pending their arrival. Plans were made to use intraoperative cell salvage after removal of the placenta, tranexamic acid, all available uterotonics, and recombinant factor VII for severe hemorrhage. The frozen Oh RBC units would take 3-4 hours to prepare; however, the decision was made not to thaw the blood unless needed, given the scarcity of O_h units and expiration within 24 hours once thawed. The patient was consented for glutaraldehyde-polymerized bovine hemoglobin, HBOC-201, in the event of life-threatening bleeding. The patient underwent an uncomplicated cesarean section under spinal anesthesia. She received 1 L albumin and 700 mL crystalloid. Quantitative blood loss was 1175 mL, and oxytocin was the only uterotonic given. Blood salvage vielded 400 ml but did not reach sufficient volume for use. Hemoglobin was 12.6 g/dL pre-operatively and 9.9 g/dL on post-operative day 1. The patient did not require transfusion and was discharged on post-operative day 4. The combination of an extremely rare blood type and high hemorrhage risk requires pre-operative planning and an understanding of potential techniques to minimize blood loss. Prior experience with the Bloodless Medicine team, typically consulted for Jehovah's Witness parturients, allowed for plans to avoid transfusion given the scarcity

of  $O_h$  blood in the United States. If planning future pregnancies, autologous donation and cryopreservation may be a viable option to ensure blood availability.

#### **Sickle Cell Crisis and Aortic Stenosis**

**Presenting Author:** Julie-Ann Thompson, n/a **Presenting Author's Institution:** Ochsner Clinic Foundation - New Orleans, Louisiana **Co-Authors:** Colleen Martel, n/a - Ochsner Clinic Foundation Adrienne Ray, n/a - Ochsner Clinic Foundation

#### Introduction:

Sickle cell disease (SCD) is an autosomal recessive disorder that affects approximately 100,000 people in the US1. Manifestations of SCD are exacerbated by pregnancy causing a higher frequency of vaso-occlusive crises, worsening anemia and hypercoagulability2. These hematologic changes can increase metabolic demand and cardiac work exacerbating pre-existing cardiac valve abnormalities, most notably aortic stenosis [AS]3.

#### Case Presentation:

The pt is a 23 yo G1P0 at 31w4d with a PMhx of SCD, asthma, pulmonic stenosis s/p valvuloplasty moderate/severe aortic stenosis and SVC syndrome who presented with complaints of chest pain, lower extremity pain, SOB and neck swelling.

At the time of presentation, Spo2 was 85% which improved with supplemental O2. Workup was negative for pulmonary embolus and showed normal systolic and diastolic function with moderate to severe AS. Her SVC syndrome was chronic and thought to be the result of multiple central lines.

Prior to this presentation, the pt had been hospitalized five times during this pregnancy and thus the decision was made to admit her for pain control. She remained stable until 34w4d at which time, she had numerous episodes of sinus tachycardia associated with worsening SOB and chest pain. She had clinical evidence of fluid overload, however, repeat echo showed no significant changes. The decision was made to proceed with delivery at 35w via C-section and cardiology was consulted for optimization prior to surgery. On the day of surgery, one unit of prbc was transfused.

An arterial line and an epidural were placed. 20mL of 2% Lidocaine with epi was administered over 20 minutes. Pt received O2 via NC and a bare hugger was applied. After delivery of the infant, pt's HR increased to 115 which improved with esmolol, all other vital signs remained normal. The procedure concluded without incident and the patient was transferred to ICU in stable condition.

#### Discussion:

During a sickle cell crisis, treatment is targeted to decrease the rate of sickling in the vasculature2. Hypertension and tachycardia often occur during these pain crises and are poorly tolerated in stenotic cardiac lesions3. Non pharmacologic steps include aggressive hydration, supplemental oxygen and maintaining normothermia. In a patient with preexisting moderate to severe AS, this can pose a challenge as excess hydration can exacerbate the valvular pathology in conjunction with the increase in blood volume and cardiac output during pregnancy4. It can often be very difficult to discern a crisis

from worsening cardiac disease such was the case with our patient. During delivery for these patients with both pathologies, it is imperative to optimize pain control, volume status and monitor hemodynamic status closely to quickly treat any sudden variations.

### Utilization of ISTH BAT Score in a Parturient with Bleeding of Unknown Cause

Presenting Author: Lauren A. Blake, MD
Presenting Author's Institution: University of North Carolina at Chapel Hill - Chapel Hill , North Carolina
Co-Authors: Courtney R. Hood, MD - University of North Carolina
Christine P. McKenzie, MD - University of North Carolina at Chapel Hill

Bleeding of unknown cause (BUC) is the most common final diagnosis when a patient shows signs of bleeding diatheses.¹ BUC presents a challenge in pregnancy when the risks and benefits of offering neuraxial anesthesia are often being weighed, and physiologic changes of pregnancy alter the results of inherited coagulopathy testing.² To this end, the ISTH BAT score was developed which comprises 14 categories for assessing bleeding symptoms retrospectively. It has been shown that a high bleeding score ( $\geq 6$  in females) is associated with the presence of an inherited bleeding disorder.¹ Our case involves a 32-year-old G2P0010 at 38w4d who presented in early labor in the setting of BUC. Her history was significant for heavy menorrhagia, easy bruising, excessive bleeding after wisdom teeth extraction, and a maternal family history of bleeding after surgical procedures, giving her an initial BAT score of 6. The patient was followed closely by hematology throughout her pregnancy, and extensive workup was performed at 17 weeks without a definitive diagnosis. Due to a BAT score of 6, neuraxial was contraindicated and her delivery plan included administering one unit of platelets and one gram of tranexamic acid (TXA) on admission. This was maintained with one unit of platelets every 8-12 hours and TXA 1300 mg PO every 8 hours for 5-7 days. The patient was initially started on nitrous oxide for labor analgesia, but this did not effectively manage her pain and she was transitioned to a remifertanil PCA with satisfactory analgesia. The patient had a spontaneous vaginal delivery that was complicated by a postpartum hemorrhage which required methylergonovine, TXA, misoprostol, and one unit of PRBCs. Carboprost tromethamine was contraindicated due to a history of spontaneous bronchospasms. She was discharged on PPD one but was readmitted on PPD two due to vaginal bleeding secondary to retained products of conception and underwent a D&C, prior to which she received one unit of platelets and one gram of TXA. She was discharged with oral TXA to be taken for seven days postoperatively. The patient represented on PPD nine with continued heavy vaginal bleeding. She was scheduled for a uterine artery embolization and D&C at six weeks postpartum. The procedures were performed without complication. This case highlights the effective use of the BAT score in predicting a bleeding disorder and avoiding a potentially devastating epidural hematoma from neuraxial placement.

### Divergent Analgesia Outcomes After Shared Decision-making in a Patient with Complex Bleeding Diathesis Presenting Author: Kiran Shah, MD Presenting Author's Institution: Washington University in St. Louis Co-Authors:

Hermansky-Pudlak syndrome (HPS) is a rare autosomal recessive disease affecting lysosome-related organelles like melanocytes and platelet-dense granules. Patients typically present with oculocutaneous albinism and bleeding diathesis. From our literature review, there have been case reports of 29 pregnancies in 15 women with HPS, most of whom received non-neuraxial labor analgesia¹. There was only one report of epidural placement in 2004 when the diagnosis of HPS was not known until after delivery¹.

Here, we report a case of a parturient with HPS with divergent analgesia plans based on shared decision-making for two separate labor and delivery encounters. Her medical history included history of anaphylaxis to platelets, Crohn's disease on chronic immunosuppression, chronic hypertension, migraines, history of provoked PE in 2020 status post apixaban. She reported daily nosebleeds, bleeding gums and easy bruising.

**Encounter #1:** G1P0 with HPS at 36w5d with IUGR for IOL. Per hematology recommendations, prior to epidural placement, she received 2U platelets after pre-treatment with 25mg IV diphenhydramine and 1g PO acetaminophen. ROTEM was performed to check platelet function. She had a successful vaginal delivery with an estimated blood loss (EBL) of 250cc and no complications from epidural placement.

**Encounter #2:** G2P1001 at 33w2d for delivery planning. After multidisciplinary discussion with hematology, the recommendation was to administer recombinant factor seven 90mcg/kg at time of delivery due to her high bleeding risk. We had an in-depth discussion regarding risks and benefits of epidural placement during an antenatal anesthesia consultation at 33 weeks' gestation. Despite previous success with epidural analgesia, patient decided it would be safe to opt for fentanyl PCA after discussion of risks-benefits. She proceeded to have a successful vaginal delivery with fentanyl PCA, receiving only 1g tranexamic acid with an EBL of 400cc.

**Conclusion:** This unique case highlights the importance of shared decision-making when discussing options for labor analgesia. It is important to not assume that the patient will accept the bleeding risk associated with epidural analgesia, even with the history of a successful epidural experience in the past.

## Stroke and postpartum preeclampsia in a patient with hyperhemolysis syndrome

**Presenting Author:** Jasmine M. Kim, MD **Presenting Author's Institution:** University of Michigan - Ann Arbor, Michigan

## Background

Abnormal hemoglobin (Hb) formation in sickle cell disease (SCD) can cause acute sickle cell crises that necessitate packed red blood cell (pRBC) transfusions. Hyperhemolysis syndrome (HS) is a rare, but serious, delayed transfusion reaction where both autologous and transfused RBCs are destroyed.¹ HS is characterized by severe anemia with Hb levels lower than pretransfusion level. Common signs include fever, sickle cell pain, and evidence of hemolysis, such as hyperbilirubinemia, elevated lactate dehydrogenase, and hemoglobinuria.² HS typically presents around seven days post-transfusion and requires a high index of suspicion as symptoms overlap with other sickle cell crises.³ The incidence of HS is unclear though there are several cases documented in the literature, typically in patients with SCD. Moreover, recurrent HS is incredibly rare with only a few cases reported.¹ We present a case of a pregnant patient with a history of SCD and recurrent HS around the time of delivery.

## Case

The patient was a 27 year-old G1P0 at 32 weeks. She had a history of SCD requiring a splenectomy at age 2. She had two previous episodes of HS. She was admitted for a hemoglobin of 6.4 mg/dl identified on routine outpatient labs and received 2 units of pRBC. On hospital day 7, recurrent fetal variable decelerations were noted necessitating urgent cesarean delivery at 33 weeks. She was simultaneously diagnosed with HS and started treatment with IVIG and prednisone after delivery. Despite the HS diagnosis, she received two additional units of pRBCs during cesarean section with an estimated surgical blood loss of 570 milliliters. On postoperative day (POD) 2, her HS continued to worsen and her hemoglobin dropped to 4.8 mg/dl. Concurrently, she developed preeclampsia with severe features and was transferred to the intensive care unit for management of HS and blood pressure. On POD6, her course was complicated by a frontal intracerebral hemorrhage requiring emergent craniotomy. Post-craniotomy, her course remained complicated by cerebral vasospasm, tracheostomy dependence, and a lack of recovery of neurologic function.

## Conclusion

This case illustrates a rare but dangerous complication of transfusion in patients with SCD. Little is known about the association of HS with pregnancy/delivery or the association of HS with stroke. Awareness and recognition of HS is critical to the obstetric anesthesiologist. Practices such as judicious pRBC transfusion, the use of Cell Saver, early multidisciplinary consultation, and administration of immunomodulating agents⁴ in the peripartum management of patients may help improve outcomes.

### Perioperative Management of Dural Venous Sinus Thrombosis During Twin Pregnancy: A Case Report

Presenting Author: Neil Mackie, MBChB FRCA Presenting Author's Institution: BC Women's Hospital and Health Centre -Vancouver, British Columbia Co-Authors: Paul Sahota, MD FRCPC - BC Women's Hospital and Health Centre Thomas Yang, BMBS FANZCA - BC Women's Hospital

#### Introduction

The incidence of cerebral venous sinus thrombosis (CVST) in pregnancy is 12 per 100 000 with the highest risk during the puerperium[1]. CVST is a potential cause of maternal stroke and acute neurological emergency.

#### Case

A healthy 30 y.o. G2P1, with twin pregnancy and prior cesarean delivery, presented to the emergency department at 16 weeks' gestation. She reported sudden onset aphasia and right-sided hemiparesis, and a 5-day history of nausea, vomiting and headaches. MRI demonstrated extensive dural venous sinus thrombosis in the right sigmoid sinus, both transverse sinuses, the superior sagittal sinus, the torcula herophili, vein of Galen, and straight sinus. Thrombophilia screen was negative; pregnancy was thought to be the precipitant. No other risk factors for CVST were identified. The patient had received 3 doses of COVID-19 vaccine more than 4 months before her presentation. Therapeutic anticoagulation was commenced with intravenous unfractionated heparin. then switched to low molecular weight heparin due to its better safety profile in pregnancy. Symptoms resolved over the course of one week and she was discharged on dalteparin 15000 IU daily. Cesarean delivery was scheduled at 35 weeks due to fetal IUGR. Dalteparin dose was reduced to 10000 IU daily 7 days prior to CS. Pregnancy progressed without further episodes of neurological deficit. Hematology services provided a perioperative anticoagulation plan; bridging with heparin was not required as the risk of thrombosis recurrence was low in the absence of underlying thrombophilia, and interval MRI performed 5 weeks after initial diagnosis showed recanalization within the dural venous sinuses.

Cesarean delivery was completed uneventfully under spinal anesthesia with intraoperative cell salvage and an estimated blood loss of 400 ml. Post-operative anticoagulation commenced 12 hours later as planned, with prophylactic dose enoxaparin. The patient was discharged on postoperative day 3 and resumed her preoperative anticoagulation regime.

### Discussion

Extensive multidisciplinary discussion was required to coordinate this delivery as our institution is a standalone maternity hospital without onsite adult critical care or neurology services. We were able to facilitate delivery at our institution in this case as the patient's clinical condition was stable, with an improving clot burden, and an

absence of other risk factors and thrombophilias. Future recurrence of stroke is uncommon, at a rate of 1% within 1 year and 2.3% within 5 years. The main concern is in the immediate postpartum period, when stroke recurrence risk is highest.[2]

#### Life Threatening Cromer Antigen In Pregnancy Causing Consideration Of Intra-Operative IVIG

Presenting Author: Briana Kossbiel, MD Presenting Author's Institution: The Ohio State University - Columbus, Ohio Co-Authors: Jessica Merrill, MD - The Ohio State University Goran Ristev, MD - Ohio State University Wexner Medical Center

While antibody-mediated hemolysis is mainly caused by ABO incompatibility, other minor red blood cell (RBC) antigens can be clinically significant. One such system is the Cromer blood group which has ten high incidence antigens and demonstrates polymorphism (1). Antigens are on CD55, an important regulatory protein in the complement cascade with a role in hemostasis (2). While rarely encountered, Cromer antigens cause accelerated destruction of transfused RBCs and complicate the ability to find crossmatched blood products. Intravenous immunoglobulin (IVIG) should be considered among supportive therapy for urgent transfusions when antigen-matched units are not available to prevent a hemolytic transfusion reaction (HTR) (2).

A 34-year-old female (G4P3003) at term presented for a scheduled repeated cesarean delivery and bilateral salpingectomy. The patient had a history of maternal alloimmunization with anti- Cr^a and three prior cesarean sections with known dense fascial adhesions. Work-up during the patient's prior pregnancy showed a normal hemoglobin electrophoresis but no antibody titer was performed. Given her surgical history with chronic anemia that was exacerbated by pregnancy, the patient was considered high risk for hemorrhage. Consults to the blood bank, perfusion, and pharmacy were made regarding the ability to safely transfuse blood products as compatible blood was not available in the United States. After additional discussion with maternal fetal medicine and hematology, it was determined that unmatched, O negative blood would be administered with IVIG at 1g/kg to help prevent a HTR.

IVIG is a solution of IgG antibodies whose administration in conjunction with steroids has been used to both ameliorate and prevent the consequences of non-ABO incompatible transfusions (3). However, consideration must be given to stopping the medication if an adverse reaction develops such as anaphylaxis, hemolysis, and renal impairment. In these cases, the commercial preparation of IVIG should be changed, the infusion rate slowed, or a lower dose given. Titration of IVIG to the lowest effective dose is recommended to ensure adequate therapeutic effect while also decreasing the risk of such possible side effects.

For delivery, the patient received an uncomplicated combined spinal-epidural. Albumin and tranexamic acid were given prophylactically, and two units of blood and IVIG were immediately available. The patient and baby tolerated surgery without incident with APGARS of 8/9. Hemoglobin was stable after an estimated blood loss of 400ml, and no transfusion was needed (Table 1). This case demonstrates that transfusion support in the setting of rare antigens requires preparation and collaboration amongst a multidisciplinary team with careful consideration of treatment options and an algorithmic approach to the management of possible adverse reactions.

	Pre-Operative	Post-Operative
Hemoglobin (g/dL)	7.9	7.6
Hematocrit (g/dL)	24.9	23.9

Table 1: Patient's hemoglobin and hematocrit before and after CS.

Individualized management of a parturient with Factor VII deficiency

Presenting Author: Margaret E. Smith, MD
Presenting Author's Institution: University of Chicago Medical Center - Chicago, Illinois
Co-Authors: Barbara M. Scavone, MD - University of Chicago Medical Center

Background:

Factor VII (FVII) deficiency is a rare autosomal recessive bleeding disorder with a broad spectrum of clinical manifestations. No guidelines exist for management of parturients with Factor VII deficiency in labor, and limited data exist on the safety of neuraxial anesthesia.

Case:

A 40yr G2P1001 patient at 23wks gestational age with FVII deficiency was admitted for termination induction of labor due to multiple fetal anomalies. Her history was notable for a cesarean delivery performed emergently under general anesthesia for fetal bradycardia. She had no history of spontaneous or excessive bleeding, and her historical FVII levels were between 30-40% (reference range 50-140%).

On admission, coagulation studies were normal, with a FVII level of 54%. A multidisciplinary team performed an individualized risk assessment of both postpartum hemorrhage and spinal-epidural hematoma with neuraxial procedures. Given sufficient FVII levels, the team decided against the use of recombinant FVIIa (rFVIIa) for prophylaxis but agreed it could be considered in the case of hemorrhage. After a discussion of risks and benefits, the patient declined neuraxial analgesia.

Labor was induced, with utilization of intravenous hydromorphone patient-controlled analgesia. Vaginal delivery was complicated by retained placenta. The patient underwent urgent dilation and curettage (D&C) under moderate sedation. A cervical laceration was identified and repaired. A thromboelastogram drawn during D&C did not indicate coagulation deficiency. She was treated with standard uterotonics. Quantitative blood loss was 720mL. Recovery was uneventful and the patient was discharged home on postoperative day one.

### Discussion:

Limited data and guidance exist regarding the management of FVII deficiency. This patient's clinical course was notable for the complexities in evaluating her risk for bleeding. Circulating FVII levels correlate poorly with bleeding manifestations, can be slow to result, and cannot accurately predict a patient's bleeding risk (1, 2). Extremely limited data exist regarding the safety of neuraxial procedures in patients with FVII

deficiency, and there is little guidance regarding the benefit of preemptive recombinant FVIIa or plasma (3, 4).

Based on the patient's clinical history and normal coagulation studies, the contribution of her FVII deficiency to her perioperative bleeding risk was deemed to be low, and we chose not to administer prophylactic rFVIIa. Although her risk for spinal-epidural hematoma was low given her FVII levels, the patient elected to defer neuraxial analgesia.

Obstetric patients with FVII deficiency should be managed on a case-by-case basis, taking into consideration the patient's bleeding history, specific coagulation profile, obstetric risk for bleeding, and individual preferences for neuraxial analgesia.

### **APML and Pregnancy: A Clinical Dilemma**

Presenting Author: Rushi Gottimukkala, MD

**Presenting Author's Institution:** Case Western Reserve University - MetroHealth Medical Center

**Co-Authors:** Marcos Izquierdo, MD - Case Western Reserve University - Metrohealth Medical Center

#### Intro:

The diagnosis of acute promyelocytic leukemia is rare in pregnancy and requires a multidisciplinary team to coordinate care from diagnosis to delivery. Recommendations for parturients include initiation of treatment without delay unless baby can be delivered safely prior to treatment, If diagnosed in the first trimester, elective termination should be discussed as a successful pregnancy is unlikely and risky for mom, induction of labor 3 weeks post chemo to avoid fetal myelosuppression, and obtaining a CBC prior to neuraxial to rule out thrombocytopenia. APML carries medical and ethical considerations requiring multidisciplinary team management to achieve the best outcome.

### Case:

Our patient is a 26yo, G1P0 at 22wk who presented with abdominal pain. Her labs revealed hematologic derangements including DIC, anemia, neutropenia with promyelocytes and blasts, prompting a heme/onc consult. Her full workup indicated APML. Her admission was complicated by differentiation syndrome, acute hypoxic respiratory failure, and sepsis requiring MICU care.

In MICU, after discussions with OB, MFM, MICU, Heme/Onc, ethics teams and the family, the patient desired to pursue treatment regardless of pregnancy. She agreed to receive the standard chemo regiment. The patient's treatment was initiated with all-trans retinoic acid, dexamethasone, and blood products for coagulopathy. After DIC resolution, daunorubicin was added to her regimen. The patient's coagulopathy profile and hematopoiesis normalized. Induction was scheduled at 34 wks, and ultrasound indicated breech presentation. Delivery was by section under spinal. The procedure was uncomplicated and both mom and baby did well.

### **Discussion:**

This patient underwent an uncomplicated delivery due to the dedicated work of the multidisciplinary team. Pregnancy is a vulnerable time for mom and her family. The addition of a complex diagnosis with a poor prognosis can be challenging to manage. The decision to treat despite the risk to baby can be difficult for parturients to accept. When managing ethically challenging patients we recommend early discussion, understanding the patient's decision, and ensuring the patient's wish is the focal point of care. For anesthesia, every effort should be made to optimize the patient for neuraxial and should be included in the discussion of optimal delivery time.

## Hemolytic transfusion reaction in a patient with anti-Vel antibodies during a cesarean hysterectomy: A case report

**Presenting Author:** Nada Ismaiel, MD, MSc, FRCPC **Presenting Author's Institution:** Stanford University **Co-Authors:** Leziga T. Obiyo, MD, MPH - University of Chicago Pervez Sultan, MBChB, FRCA, MD - Stanford University

<u>Background:</u> The rare Vel-negative blood group with anti-Vel antibodies has been associated with hemolytic transfusion reactions. Most anti-Vel hemolytic reactions are reported in newborns. We present a case of a hemolytic transfusion reaction in a parturient with placenta accreta spectrum disorder and undiagnosed anti-Vel antibodies.

Case Presentation: A 29 year-old G10P6 female was transferred to a tertiary care hospital at 25 weeks' gestation for antepartum bleeding with a known chronic subchorionic hematoma, complete placenta previa and a high suspicion for placenta accreta spectrum disorder. The patient experienced preterm labor with contractions and vaginal bleeding, and underwent an emergency cesarean hysterectomy under general anesthesia at 25+3 weeks. Preoperatively, the patient's antibody screen was positive but still pending the specific antibodies. With the onset of significant surgical bleeding, the patient was transfused with 4 units of type-specific (but Vel-untested) packed red blood cells, 4 units of fresh frozen plasma, 1 unit of platelets and 4 g of fibrinogen. The patient demonstrated signs of an acute hemolytic transfusion reaction, marked by hemodynamic instability, a truncal and lower extremity rash, dark urine and oliguria, disseminated intravascular coagulopathy (DIC) and laboratory evidence of hemolysis. The transfusion was stopped, hemodynamic support was initiated and surgery completed with an estimated blood loss of 2000 ml. Postoperatively, the patient was transferred to intensive care intubated and ventilated for 6 days. She experienced a postpartum hemorrhage on day 2, requiring embolization of the right uterine artery. The antibody screen revealed anti-Vel antibodies, after which a nationwide search for Velnegative blood yielded only 4 available units that she later received. Her postoperative course was also complicated by acute renal failure secondary to pigment nephropathy, which required intermittent hemodialysis. The DIC and renal function resolved after receiving Vel-negative blood, and she recovered and was discharged home on day 18 postpartum. The live premature infant did not require additional support and was discharged home with no evidence of newborn hemolytic disease.

<u>Discussion:</u> This patient experienced a hemolytic reaction due to a blood transfusion with likely Vel-positive blood for an intraoperative hemorrhage during an emergency cesarean hysterectomy. An extensive case review revealed that the patient was likely sensitized following a prior transfusion. Though the antibody screen was positive, the identity of the antibody was still unknown at the time of emergent transfusion during a life-threatening hemorrhage. While the patient made a full recovery, this event highlights the importance of timely testing even for rare antibodies, potential role for cell salvage,

and clear communication between blood bank and the multidisciplinary care team during obstetric care to prevent future adverse events.

## Anesthetic Management of the Parturient with Chronic Myeloid Leukemia and Associated Splenomegaly

**Presenting Author:** Christopher Lee, MD **Presenting Author's Institution:** Stony Brook University Hospital **Co-Authors:** Tiffany Angelo, DO - Stony Brook University Hospital Bahaa Daoud, MD - Stony Brook University Hospital

Chronic myeloid leukemia (CML) is a myeloproliferative neoplasm caused by a chromosomal translocation resulting in an abnormal gene, BCR:ABL. BCR: ABL subsequently causes the bone marrow to produce an abnormal protein, tyrosine kinase, which stimulates cancer cells to proliferate. Manifestations of CML include weakness, fatigue, splenomegaly, bone pain, and night sweats. Myeloproliferative neoplasms pose various unique challenges to both the mother and fetus. This case discusses anesthetic considerations and management of a parturient with CML, splenomegaly, and its associated complications.

A 27-year-old G5P4004 at 36.1 weeks gestation presented to the labor and delivery floor for unscheduled repeat C-section x 5 secondary to oligohydramnios found on biophysical profile. Her pregnancy course was complicated by the diagnosis of chronic myeloid leukemia (CML) during the early second trimester. The patient was found to have significant leukocytosis – 60,000 during diagnosis and 90,000 at the time of current hospital admission. Additionally, the patient exhibited symptomatic splenomegaly with left upper abdominal pain/cramping. On imaging, her spleen measured 17.3 x 6.9 x 7.1 cm (upper limit of normal is 12 cm in length). To treat the CML, the patient received weekly interferon-alpha 2a infusions as prescribed by hematology and MFM. Given the massive splenomegaly and high risk for placenta accreta from multiple previous C-sections, the patient was at very high risk for maternal hemorrhage, DIC, and poor neonatal outcome.

In preparation for the C-section, 2 large bore peripheral IVs were placed. 4 units PRBC, 4 units FFP, and 2 units platelets were ordered and available on standby. A combined spinal epidural was placed without complication. The spinal dose consisted of 1.6mL of bupivacaine 0.75%/Dextrose2 mL, 0.15mg preservative-free morphine, 10 mcg fentanyl, and 0.1mg epinephrine. After uterine incision a Kiwi vacuum was used to deliver the neonatal head. This minimized the intra-abdominal fundal pressure applied in order to decrease risk of splenic rupture. The remainder of the C-section was performed without complication with a total quantitative blood loss of 663mL. Mother and baby had an uneventful postpartum course and were discharged from the hospital 3 days later.

# Acquired Thrombotic Thrombocytopenic Purpura in Pregnancy: A Case Report Presenting Author: Lindsay Tremper, MD

**Presenting Author's Institution:** McGaw Medical Center of Northwestern University **Co-Authors:** Alexander G. Samworth, MD - Northwestern University Feinberg School of Medicine

Mikayla Troughton, MD - Northwestern University

#### Introduction

Thrombocytopenia (TCP) in pregnancy is common affecting nearly 10% of women.¹ Acquired thrombotic thrombocytopenic purpura (aTTP) is a rare cause of TCP in pregnancy. Standard treatment includes plasma exchange (PLEX) and steroids with response rates between 80–90%. Recently, caplacizumab was introduced as an additional therapy with promising efficacy,² however there is minimal data on its use in pregnancy.³

#### Case

A 30-year-old G3P2002 at 28w0d presented with facial numbness and intermittent paresthesias. She was anemic, hemoglobin (Hgb) 7.0, with TCP (plts 36,000), schistocytes on peripheral smear, and an elevated LDH. Hematology suspected aTTP and PLEX and steroid therapy were initiated. She underwent 2 sessions of PLEX with excellent response (plts 354,000) and was discharged on steroids. At follow-up she had TCP (plts 70,000), so she was readmitted and restarted on PLEX and high dose steroids. By day 6 platelets remained < 10,000 and she was deemed refractory.

Testing confirmed the diagnosis of aTTP with ADAMTS13 activity < 5%, and the patient agreed to a trial of caplacizumab. By the third day of caplacizumab, platelets were 165,000 and continued to uptrend. At 33w0d non-reassuring fetal status prompted urgent cesarean delivery. Her platelet count was 418,000, but the bleeding risk associated with caplacizumab prompted us to perform general anesthesia. A radial arterial line and an additional 16G peripheral IV were placed. A vigorous female infant was delivered and taken to the neonatal ICU in stable condition. Estimated blood loss was 1100mL and 1g of tranexamic acid (TXA) was administered. The patient was extubated and transported to PACU in stable condition. She was given 1 unit packed RBCs for post-operative Hgb of 6.9g/dL and 1 unit of cryoprecipitate for fibrinogen of 193mg/dL.

### Discussion

aTTP is a rare cause of TCP in pregnancy with potentially devastating effects on maternal and fetal health.⁴ Up to 20% of patients with aTTP may be refractory to PLEX and steroid therapy.⁵ Caplacizumab is an immunoglobulin that binds to von Willebrand factor (VWF) and blocks its interaction with platelets, inducing a von Willebrand like disease state.² It is used for refractory aTPP and as initial therapy in severe disease. There is a single case report of its use in pregnancy.³ The most common adverse event with caplacizumab use is bleeding. Our patient received caplacizumab within 24 hours

of delivery, so there was concern for an increased bleeding risk. As such, general anesthesia was pursued over neuraxial techniques. VWF complex was made available during delivery and hematology recommended TXA in the event of surgical site bleeding. In this case, caplacizumab was an effective treatment of aTTP, and no deleterious effects to the mother or fetus were apparent.

A Parturient with Glanzmann's thrombasthenia : A Case Report Presenting Author: Sana Rukh, MD MPH Presenting Author's Institution: University of Arizona College of Medicine-Tucson Co-Authors: Maithili Khandekar, BS - University of Arizona College of Medicine-Tucson

#### Introduction

Glanzmann's thrombasthenia (GT), an autosomal recessive bleeding disorder defined by a qualitative or quantitative defect in integrin  $\alpha$ IIb $\beta$ 3- a protein responsible for platelet aggregation, poses risks during pregnancy such as miscarriage and hemorrhage within the antepartum and postpartum period.1 In this case study, we present a 34-year-old G1P0 woman with GT who underwent term Cesarean section (CS) after 2 failed inductions.

### Case

Our patient is a 34-year-old G1P0 woman with GT diagnosed in childhood. She had a strong family history of GT, easy bruising, and mucocutaneous bleeding with menses and dental procedures managed with OCPs and aminocaproic acid (Amicar). She was initially admitted at 23w6d with increased work of breathing, upper back pain, and fever and found to have a right pleural effusion and right middle lobe lung mass on CTA chest, presumed to be a hemothorax after a negative infectious and neoplastic workup. She underwent US-guided thoracentesis with chest tube placement and 800cc bloody fluid drained. She was started on factor 7 replacement and Amicar and continued to improve until she was discharged on 2L oxygen. She obtained necessary testing; of note, her antiplatelet antibody screen was negative; thus, no antepartum IVIG was recommended. She was admitted at 38w0d for an induction of labor (IoL) that she ultimately failed, and a decision was made to try for spontaneous labor. She was then admitted at 39w4d for a repeat IoL which she failed again, and finally, underwent CS under general anesthesia (GETA), rather than neuraxial, due to category II fetal tracings. Prior to CS, her Hgb was 11.2 and platelets were 175. She was given 2 units of platelets and 1g tranexamic acid (TXA) preoperatively as well as 1 unit of platelets and 1g TXA intraoperatively. She was observed for 5 days post-operatively without any hemorrhage requiring factor 7 replacement and was subsequently discharged.

#### Discussion

GT poses multiple threats to both mother and fetus as the mother can develop antiplatelet antibodies which, if transported over the placenta, can result in severe neonatal thrombocytopenia. Our case highlights the importance of involving anesthesiologists early in a GT patient's care in order to maximize safety; for example, the decision to undergo GETA vs neuraxial anesthesia due to the risk of hematomas and permanent neurological damage.2 Overall, we discuss the multidisciplinary approach required in the pre-operative, peri-operative, and post-operative care of patients with GT.



Asymptomatic Hypofibrinogenemia In A Primigravid Presenting Author: Tilman Chambers, MD Presenting Author's Institution: Memorial Hospital System - Ft. Lauderdale, Florida Co-Authors: Maria Frosth, MD - Envision Physician Services Benjamin T. Houseman, MD, PhD, FASA - Memorial Hospital System, Envision Physician Services Xiwen Zheng, MD - Envision Physician Services

Hypofibrinogenemia is a rare clotting disorder defined by circulating fibrinogen levels of < 150 mg/dL. In parturients, hypofibrogenemia appears to have a wide range of clinical presentations, with more severe cases being associated with early pregnancy loss or placental abruption (1-3). The mainstay of therapy is fibrinogen supplementation with cryoprecipitate. Here we describe the management of a parturient with asymptomatic hypofibrinogenemia discovered following placement of a labor epidural. A 39-week G1P0 with no prior medical history was admitted for management of labor. A

labor epidural was placed uneventfully, and subsequent laboratory assessment revealed a slightly prolonged PT/INR of 14.7/1.4. Additional testing showed a fibrinogen level < 75 mg/dL. Notably, the patient was unaware of any personal or familial coagulopathies. Viscoelastic testing was unavailable at our facility. Hematology was consulted, and two units of cryoprecipitate were administered prior to delivery. Her fibrinogenlevel remained < 75 mg/dL, and a healthy male infant with APGAR scores of 9 and 9 was delivered with blood loss of 200 mL. She received one additional unit of cryoprecipitate after delivery, and the epidural catheter was removed. Postpartum fibrinogen levels did not exceed 95 mg/dL, and she was discharged home on

postpartum day 2 with scheduled follow-up by Hematology.

General laboratory testing prior to epidural placement is not recommended in healthy parturients (4). However, as shown in this case, laboratory testing following epidural placement can reveal potential coagulopathy and lead to transfusion of blood products out of an abundance of caution. In this patient, fibrinogen levels remained < 75 mg/dL after cryoprecipitate and EBL for delivery was normal, suggesting that epidural removal and delivery might have been completed without cryoprecipitate. Viscoelastic testing would have provided confirmatory information on clot formation in this clinical scenario and guided administration of cryoprecipitate (5,6).

## Approach to Labor Analgesia in a Coagulopathic Parturient with Presumed Vitamin K Deficiency from Cholestasis of Pregnancy

**Presenting Author:** Alexander Meshel, MD **Presenting Author's Institution:** Icahn School of Medicine at Mount Sinai **Co-Authors:** Daniel Katz, MD - Icahn School of Medicine at Mount Sinai

Intrahepatic cholestasis of pregnancy (ICP) is the most common pregnancy-specific liver disease that occurs in about 0.4-1% of North American pregnancies. While the incidence of coagulopathy in patients with ICP is rare, patients can develop a coagulopathy secondary to vitamin K deficiency from impaired fat absorption and liver damage. Neuraxial anesthesia is contraindicated in patients with known or suspected coagulopathies due to the elevated risk of epidural hematoma formation that could cause paralysis.

A 26 year-old G1P0000 female at 34 weeks presented to a prenatal visit for a nonstress test. Medical history was significant for a liver transplant at 5 years old for alpha-1-antitrypsin deficiency, thrombocytopenia (baseline 80,000 mm⁻³), and cholestasis of pregnancy. Laboratory analysis at this visit showed a new coagulopathy with an INR of 3.7. Repeat INR upon arrival to the labor and delivery unit was 4.1. In collaboration with the maternal fetal medicine (MFM) and liver medicine teams, intravenous vitamin K was administered as her coagulopathy could have resulted from vitamin K deficiency from her cholestasis of pregnancy. INR the next morning was 2.1. MFM recommended delivery given her coagulation status, thrombocytopenia, and worsening transaminitis. Risks and benefits of an induction of labor without neuraxial anesthesia and a cesarean section under general anesthesia were explained. She opted for an induction of labor.

Twelve hours after the vitamin K administration, INR was 1.3. Platelets remained at baseline. There were no clinical signs of preeclampsia, HELLP syndrome, or acute fatty liver disease. Since the INR was decreasing and now within normal range, she was deemed an acceptable risk candidate for neuraxial analgesia. Rotational thromboelastometry showed normal coagulation at this time (attached). After a thorough discussion, she consented for epidural analgesia and labored for 1.5 days. She made no cervical change and the fetal heart rate tracing became consistently category II with minimal variability. A primary cesarean delivery was recommended. Her epidural was loaded with 30 mL 2% lidocaine with epinephrine administered in divided 5 mL boluses. Anesthesiologists placed an arterial line for hemodynamic monitoring and arterial blood gas analyses. Cesarean section started when an adequate surgical level of anesthesia was obtained. Surgery proceeded without any bleeding or complications. Postoperatively, INR remained in the normal range and platelets remained at baseline. She was discharged on postop day 4.

Patients with ICP rarely have a coagulopathy and it is likely very reasonable to proceed with neuraxial anesthesia. It may be reasonable to empirically treat patients with ICP

who have laboratory evidence of a coagulopathy with intravenous vitamin K and to proceed with neuraxial anesthesia if the coagulopathy resolves.



# A Case Report of Management of Homozygous Antithrombin III Deficiency for Cesarean Delivery

**Presenting Author:** Brittany N. Burton, MD, MHS, MAS **Presenting Author's Institution:** University of California, Los Angeles (UCLA) **Co-Authors:** Jordan A. Francke, MD, MPH - University of California, Los Angeles (UCLA)

### Background

The hypercoagulable state of pregnancy significantly increases the risk of venous thromboembolism (VTE).¹ Parturients have a roughly 4- to 5-fold increased risk of thromboembolism compared to nonpregnant females.¹ This is primarily due to the increase in fibrinogen and factor VII with a concomitant decrease in anticoagulants such as antithrombin III and protein S. The incidence of maternal VTE is 1 in 1000 and VTE accounts for 10% of maternal mortality.¹

#### **Case Report**

A 32-year-old G2P0 at 33 weeks of gestation with a past medical history of homozygous antithrombin III, homozygous Factor V Leiden deficiency and May-Thurner syndrome presented to L&D for a scheduled induction of labor and cesarean delivery (Figure 1). Her VTE history was extensive with a prior spontaneous abortion at 8 weeks and clots and stents in the inferior vena cava and bilateral iliac, common and deep femoral, and popliteal veins. She had several lower extremity venograms, thrombolysis, and stent procedures. Her baseline antithrombin activity was only 19%. Her admission labs revealed anemia and a slightly elevated D-dimer, but otherwise were within normal limits. Per discussion with hematology and maternal-fetal medicine teams, on the day of induction she was continued on an antithrombin III infusion (which she started outpatient), and began receiving subcutaneous heparin 5,000 units twice daily. For delivery, the goal was to maintain her antithrombin III activity at 80-120% of normal. Her last dose of enoxaparin was her therapeutic outpatient dose of 60 mg, and was less than 24 hours from spinal anesthesia. Her anti-Factor Xa levels for low molecular weight heparin were subtherapeutic, therefore, we agreed to perform spinal anesthesia with cesarean delivery. Five hours after her last dose of subcutaneous heparin, she received spinal anesthesia at the L3-L4 level with 12 mg of 0.75% bupivacaine, 15 mcg of preservative-free fentanyl, and 100 mcg of hydromorphone. Her intraoperative course was without complications and estimated blood loss was 800 milliliters. On postoperative day 1, she had moderate pain with no neurological deficits. She was discharged on postoperative day 5 with warfarin and enoxaparin with plans to follow up with hematology.

### Conclusion

Per SOAP guidelines, we waited 4-6 hours from last dose of subcutaneous heparin to start spinal anesthesia given our patient was receiving heparin 5,000 units

subcutaneously twice daily.² However, she received spinal anesthesia less than 24 hours from her last therapeutic dose of enoxaparin based on clinical judgement.²

Figure 1.pdf

### An Obstetric Symptomatic Carrier of Hemophilia A: A Multidisciplinary Approach

**Presenting Author:** Nguyen Nguyen, DO **Presenting Author's Institution:** University of Texas South

**Presenting Author's Institution:** University of Texas Southwestern - Dallas, Texas **Co-Authors:** Olutoyosi T. Ogunkua, MD - University of Texas Southwestern

Inherited bleeding disorders pose a significant risk for parturients and newborns during the antepartum, intrapartum, and postpartum periods. Managing these high-risk obstetric patients require utilizing best practices.

Hemophilia is a severe hereditary hemorrhagic disorder. Hemophilia A and B result from factors VIII and IX protein deficiency or dysfunction, respectively, and are characterized by prolonged and excessive bleeding after minor trauma or begin spontaneously. Hemophilia A is an X-linked disorder, where women are usually carriers of the mutation but approximately 30% of patients can have reduced factor levels of less than 40%. Patients who develop inhibitors against FVIII/FIX face an increased risk of bleeding.

Our patient was a 23-year-old G1P0 at 39 weeks complicated by symptomatic Hemophilia A carrier status. Her history included epistaxis requiring nasal cautery, and she failed the ddAVP challenge all prior to pregnancy. During her clinic visit, the patient was counseled on the risks and benefits of both a spontaneous vaginal delivery (SVD) versus elective cesarean delivery (CD). The patient elected to undergo an SVD. The maternal-fetal medicine service recommended a hematology service consult upon patient admission. The patient was cleared by the Anesthesia team for neuraxial placement after factor VIII transfusion with initial levels above 150% with maintenance of factor level above 80%. Factor VIII level would also be checked prior to removal of the neuraxial to ensure that her level was again above 150%.

Anesthetic management included a neuraxial placement with DPE after a scheduled Factor VIII level was checked upon admission. The initial factor level was found to be below the threshold. Thus she had an infusion of Factor VIII. DPE was placed without evidence of hematoma or motor deficits, and the patient was stable throughout the induction process. The patient never showed any sign of significant bleeding during both her neuraxial placement or during labor. The baby was delivered uneventfully by SVD, and both mom and baby were discharged home following a two day hospital stay.

Hemophilia A is rare morbidity in the obstetric patient, although management has improved over the years. Access to treatment remains challenging at many institutions due to a lack of resources and proper staff to manage these complex patients. A multidisciplinary team consisting of OB anesthesiology, Hematology, and Obstetricians are required to ensure both maternal and fetal safety to improve outcomes.

## Multidisciplinary Management for Parturient with Von Willebrand Disease Type II (vWD II)

## Presenting Author: Nguyen Nguyen, DO

**Presenting Author's Institution:** University of Texas Southwestern - Dallas, Texas **Co-Authors:** 

Introduction: Von Willebrand disease (vWD) is a common hereditary bleeding disorder in the general population and rare in the obstetric patient. VWD Type II is an incredibly rare subtype characterized by a qualitative defect. As such, complications for parturients include risk for transfusion, postpartum hemorrhage (PPH) and severe thrombocytopenia. Due to the unknown risk of epidural hematoma related to coagulopathy, limited obstetric data describes mostly avoidance of neuraxial anesthesia for both cesarean delivery (CD) and vaginal delivery (VD). To further complicate management, treatment and laboratory surveillance of vWD II are not always readily available. Given these unique challenges, a multidisciplinary team is required for vWD II parturients if neuraxial anesthesia is required or indicated. We describe a case of multidisciplinary management for a parturient with vWD II for failed induction of labor (IOL) and subsequent scheduled CD under neuraxial anesthesia.

Case: Our patient is a 23 yo, BMI of 46 kg/m2, G1P0 at 38 weeks with type 2A vWD. History is significant for epistaxis, heavy menses and spontaneous hemarthrosis prior to pregnancy. Pregnancy course was unremarkable and the OB team planned for an IOL at term, preferably with neuraxial anesthesia. In order to avoid PPH and epidural hematoma related to neuraxial anesthesia, a multidisciplinary team including OB, hematology, MFM, OB anesthesia, laboratory services and transfusion medicine was formed. A comprehensive plan including weight base administration of recombinant von Willebrand factor (rVWF) prior to epidural placement with re-dosing schedule guided by vWF peaks and toughs throughout the delivery process was devised. For PPH prophylaxis a schedule of oral transexamic acid (TXA) was planned. 24 hours into the IOL, no cervical change was noted and a CD was scheduled for the following day. On the day of CD, a weight based dose of rVWF was given. She underwent an uncomplicated CD under CSE with no PPH. 1g TXA for PPH prophylaxis was given and the epidural catheter was removed at the end of the CD. Per hematology's recommendation, a 5 day course of rVWF infusion and laboratory surveillance was followed. Mother was discharged home with no bleeding events.

Discussion: vWD II is a rare bleeding disorder in the obstetric population, with increased risk for transfusion, PPH, and severe thrombocytopenia. Due to unknown risk of epidural hematoma, neuraxial anesthesia is often avoided for delivery. Treatment and laboratory surveillance are not readily available at all institutions. Prioritization of neuraxial anesthesia for parturients with vWD II requires multidisciplinary management including OB/MFM, obstetric anesthesiologist, hematologist, transfusion medicine and

laboratory services. As demonstrated in this case, careful coordination and flexibility can ensure a successful outcome for mothers with vWD II.

## Abstract #: SAT-CR 3- Room 2– Neuraxial Labor Analgesia and Neurologic Disease-01

### A Complication of Neuraxial: The Case of a Retained Epidural Catheter

**Presenting Author:** Mariana Montes, MD, MPH **Presenting Author's Institution:** University of Chicago - Chicago, Illinois **Co-Authors:** Chad Dean, MD - University of Chicago

A 23-year-old G3P0020 with no significant past medical history presented at 40 weeks' gestation in spontaneous labor and requested neuraxial analgesia. She underwent an uncomplicated dural puncture epidural with loss of resistance at 6.5 cm. After delivery, the resident encountered resistance and stretching at the 10 cm mark when applying a slow, constant force for removal. The attending was called to the bedside and noted that the reinforced wire had come unwound. Despite multiple attempts at repositioning and light traction on the catheter, it snapped off at the 8 cm mark. The patient was immediately informed of the retained epidural catheter and neurosurgery was consulted.

A CT lumbar spine confirmed the epidural catheter fractured along the intralaminar space between L4-5, terminating within the dorsal epidural space on the inferior aspect of L4. Neurosurgery counseled the patient regarding observation versus intervention. Due to insurance issues and future back pain concerns, the patient elected for operative removal. On post-delivery day 5 she underwent removal of the epidural catheter under general anesthesia. The catheter was visually removed from within the interspinous ligament at L4. At follow up, the patient had returned to her usual state of health with a well-healing incision on her low back.

### Discussion:

Retained epidural catheters are a well-known but rare complication of neuraxial with an incidence of ~1 in 30,000.¹ Removal techniques include patient mobilization and change in position, slow traction over an extended period, injection of saline and waiting for the catheter to fall out.^{2,3} Epidural catheters can deflect off anatomic obstacles, causing the catheter to curl back on itself or to form knots, leading to catheter breakage on retraction.⁴ While there is no evidence of long-term neurologic sequelae following a sheared or retained catheter, many case reports advocate for surgical removal³/₄once neurologic problems arise, they can be challenging to reverse.³

Management of the retained epidural catheter is based on patient preference. The imaging technique of choice is CT scan as it is more accessible, quick, and has a higher resolution than MRI, which can be distorted by the ferromagnetic wire.³ If the fragment remains outside the spinal canal, easy removal may be possible with local anesthetic at the superficial incision site. If the fragment is within the spinal canal, the patient may require laminectomy³/₄ a more involved procedure. While there are no reports of infection

from a retained epidural catheter, it is reasonable to counsel patients on conservative management and red flag symptoms, including new neurologic changes, persistent back pain, difficulty with ambulation or new bladder or bowel incontinence.³

Fractured Catheter Picture.pdf
Combined spinal epidural anesthesia for cesarean delivery in the setting of T12 - L1 conus intramedullary cystic lesion

**Presenting Author:** Phillip Callihan, MD, PhD **Presenting Author's Institution:** University of Virginia Health **Co-Authors:** Sunny Chiao, MD - University of Virginia Health System Joyce Redinger, MD - University of Virginia Health

## Introduction

Effective spinal anesthesia depends upon multiple factors, a critical component being the spread of drug through the cerebrospinal fluid (CSF) in the spinal cord and cauda equina. Spinal cysts represent a possible physical barrier to successful spinal and epidural anesthesia, and based on location and character can raise safety concerns for the obstetric anesthesiologist. A recent case report details effective spinal anesthesia for elective repeat cesarean in a patient with a sacral CSF containing perineural cyst.¹ This report describes a case of successful spinal anesthesia in a patient with a T12 - L1 conus intramedullary cystic lesion.

### <u>Case</u>

50 yo G8P5025 at 36w1d with pregnancy complicated by in-vitro fertilization, preeclampsia, pseudoseizures, systemic lupus erythematosus, Sjogren's syndrome, gestational diabetes, advanced maternal age, and polyhydramnios presented for delivery planning. She notably was known to have a nonenhancing 2.0 cm x 1.1 cm intramedullary cystic lesion at the level of T12 - L1 in the left dorsal central aspect of the spinal cord. This cystic lesion was originally identified as an incidental finding in 2013 during an evaluation for sacroiliac pain. Repeat MRI showed that the lesion was stable since 2013, and Neurosurgery consultation opined that repeat neuraxial anesthesia was safe for this patient. Radiology favored terminal ventricle, with less likely considerations including epidermoid, arachnoid, or neuroenteric cyst.

She was diagnosed with preeclampsia with severe features at 36w1d and was admitted for repeat cesarean. We performed a combined spinal epidural (CSE) due to concern for a failed spinal in the setting of a potential anatomic barrier to drug spread. The spinal provided adequate analgesia for the duration of the cesarean, and she was discharged on post operative day 4 without complication.

### **Discussion**

The differential diagnosis of intramedullary cystic lesion is broad.² Despite presenting a potential physical barrier to medication spread, patients with this lesion can receive successful and safe CSE. Unfortunately, this patient was denied neuraxial anesthesia in her prior pregnancy based on the presence of the spinal cyst, resulting in an unsatisfactory birth experience and significant distress in planning for future

pregnancy. We describe a thoughtful, multidisciplinary approach to providing safe and efficacious anesthesia for an obstetric patient with a conus intramedullary cystic lesion.



## Anesthetic Management in a Parturient Recovering from Guillain-Barre Syndrome. Should we do Neuraxial?

**Presenting Author:** Julia Tollin, MD **Presenting Author's Institution:** Albany Medical Center **Co-Authors:** Manju Prasad, MD; MBBS - Albany Medical Center Matthew Tribble, DO - Albany Medical Center

Currently, there is limited research and recommendations on the anesthetic management of a laboring patient with a history of Guillain-Barre Syndrome (GB).² GB is a rare, acute demyelinating disease of the peripheral nerves resulting in progressive motor weakness.¹ Pregnant patients have a higher risk of neurological deficits, respiratory failure, and mortality rates from 10% to 35%.¹ Vaginal delivery is possible and the disease does not warrant Cesarean section or expedient delivery.³

We encountered a 30-year-old female G¹P⁰ at 37 weeks gestation with a recent history of severe GB who presented to the L&D floor for induction of labor due to fetal growth restriction. The parturient was hospitalized at 13 wga after suffering from Lyme disease and influenza, and GBS was confirmed. The patient underwent five rounds of IVIG and plasmapheresis and subsequently had a PEG and tracheostomy placed due to progressive muscle weakness and respiratory failure. During her 40-day hospital course, the Trach and PEG were decannulated.

Upon presentation to the unit, the patient was ambulatory with a walker. After a multidisciplinary meeting and in-depth sympathetic counseling, it was determined to proceed with vaginal delivery and lumbar epidural. ENT ensured airway patency. She successfully had a vacuum-assisted vaginal delivery followed by an uneventful immediate post-delivery period. The patient returned to her neurological baseline and was discharged home. Unfortunately, one week later, she presented with an unsteady gait and was admitted to the hospital due to concern for GB recurrence. Workup revealed an intracranial transverse sinus thrombosis.

Guillain-Barre is extremely rare, and no well-known strategies exist for delivery or the safest anesthetic methods.³ Normal pregnancy is associated with a shift from cellmediated to humoral immunity.⁴ There is concern that regional anesthesia may cause a re-triggering of GB. With limited case reports and evidence, the obstetric anesthesiologist must weigh all pros and cons as with any patient, particularly those with GB.

# THAT HURTS! - Anesthetic Management of a High-Risk Pregnant Patient with New-onset Allodynia - A Case Report

Presenting Author: Emily Kim, n/a Presenting Author's Institution: UTMB John Sealy School of Medicine Co-Authors: Hiram Acevedo Bonilla, MD - UTMB Department of Anesthesiology Rovnat Babazade, MD - UTMB Department of Anesthesiology Lisa Farmer, MD - UTMB Department of Anesthesiology Wilhelmina Tan - UTMB John Sealy School of Medicine Rakesh Vadhera, MD, FRCA, FFARCSI - UTMB Department of Anesthesiology

**Background**: Allodynia (pain due to a stimulus that does not usually provoke pain) is a type of neuropathic pain with unknown exact etiology.¹ It has been reported that neurological complications related to spinal epidural anesthesia occur in about 0.02% of patients.² Ropivacaine is less lipophilic than bupivacaine. This reduced lipophilicity is associated with decreased potential for central nervous system toxicity and cardiotoxicity.³ We describe a case of allodynia in a high-risk parturient following ropivacaine epidural exposure.

**Case report:** A morbidly obese 35-yo G3P1 38w5d with class B diabetes was admitted for a trial of labor after cesarean. 16 hours after epidural placement with a ropivacaine 0.2% infusion, the patient reported acute allodynia from T8 to L5 with bilateral lower extremity edema. At the time no specific cause was found, and the epidural infusion was stopped. With time, as the block resolved, so did her allodynia. After 2 hours, the patient had normal sensation and resolution of motor blockade and L1 sensory level bilaterally to ice. At this time, the patient requested a cesarean delivery, which was uneventful and done under general anesthesia. Postoperative course was uneventful.

**Discussion**: Ropivacaine is a long-acting amide local anesthetic commonly used for surgical anesthesia and analgesia. Although rare, it has the potential to cause nerve irritation or local nerve toxicity. The patient presented with acute bilateral allodynia and edema after 16 hours of plain ropivacaine epidural infusion, which fully resolved after discontinuation. Our case highlights the importance of frequent evaluation for abnormal symptoms and the discontinuation of epidural anesthetics following signs of a chemical nerve irritation or possible local toxicity.

## **Epidural Catheter Malfunction: A Case Series**

**Presenting Author:** Mariana Montes, MD, MPH **Presenting Author's Institution:** University of Chicago - Chicago, Illinois **Co-Authors:** Chad Dean, MD - University of Chicago

### Background

Epidural catheter blockage is rare.^{1,2} Problems with faulty epidural needles, loss of resistance syringes, or snaplocks are more common.^{3,4} This case series presents three epidural catheter failures due to blockage.

Case 1: A 28-year-old G1P0 patient was induced at 37 wks for intrahepatic cholestasis and underwent uncomplicated combined spinal epidural placement (CSE). No test dose was given. 30 minutes later, the CADD pump alarmed for occlusion. No kinks or tangles were found in the CADD administration tubing. Manual attempts to bolus through the catheter were unsuccessful due to high resistance, even after pulling back the catheter 1 cm. The catheter was trimmed sterilely and new snaplock applied with continued resistance. The patient elected catheter replacement. No visible flaws were seen upon removal of the catheter.

Case 2: 32-year-old G9P5 patient at 32 wks with di-di twins presented in labor at 10 cm dilation. She received emergent CSE for breech extraction of twin B. No medication could be flushed due to resistance. Nitrous oxide was utilized for breech extraction. After removal, no kinks or knots were noted but the catheter could not be flushed. Case 3: 33-year-old G5P3 patient admitted for induction at 31 wks 5 days due to HELLP (plt 81) underwent uncomplicated dural puncture epidural placement. There was high resistance and near-complete inability to administer the test dose. Even with substation of a new snaplock, the original catheter could not be flushed. The catheter was immediately replaced.

### Discussion:

Since 2013 the FDA Manufacturer and User Facility Device Experience (MAUDE) database has identified 137 reports of "blocked" epidural catheters, of which 125 were manufactured by Arrow International.⁵ Our three blocked catheters were Arrow® FlexTip Plus. The catheters and lot numbers were saved, and the risk management team and manufacturer quality representatives notified. Until new epidural kits were obtained, we instituted an immediate shift in practice to check the patency of all snaplock and catheter systems with saline hand-bolus prior to epidural insertion. Of the ~3 million deliveries in the U.S. per year, ~60% of women request neuraxial analgesia.⁶ While epidural catheter malfunction is exceedingly rare, it is a known complication that may be associated with significant morbidity if undetected. Inability to bolus an epidural catheter may be due to catheter or snaplock defect, kinked tubing, knots or migration of the catheter.² If catheter malfunction is suspected, the epidural kit lot numbers should be reported to the manufacturer and catheters saved for quality

testing. When there is a recurring issue with catheters, we recommend testing all components of the epidural kit to ensure patient safety.

## The Parturient with a Large Sacral Dimple: is Neuraxial Safe?

Presenting Author: Jennifer N. Tripi, MD
Presenting Author's Institution: University of North Carolina Hospital - DURHAM, North Carolina
Co-Authors: Courtney R. Hood, MD - University of North Carolina
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Tethered spinal cord syndrome (TCS) describes several conditions characterized by spinal cord fixation at two points, causing vulnerability to excessive spinal cord tension.¹ In adults, the conus medullaris terminates around the L1 vertebral body.² A low-lying conus medullaris can be present in TCS, increasing the risk of spinal cord injury from needle puncture, hematoma, or local anesthetic neurotoxicity during neuraxial anesthesia.^{3,4} Although TCS commonly presents in childhood, some patients are not diagnosed until adulthood when symptoms begin to manifest.^{1,5} Symptoms include nondermatomal back and pelvic pain, motor and sensory deficits of the lower extremities. bladder and bowel dysfunction, and sexual dysfunction. Physical exam may reveal a lumbosacral dermal sinus, hypertrichosis, dimple, skin tag, transverse cleft, fatty mass in subcutaneous tissue, or thoracolumbar scoliosis. We argue identification of these symptoms or physical exam findings requires a MRI of the spine to rule out TCS prior to performing neuraxial anesthesia. Our patient was a 29-year-old G2P1 who presented at 25w1d for in-utero open fetal myelomeningocele repair. Prior to placement of an epidural for perioperative pain control, a sacral dimple was found (Image 1). We aborted the procedure due to concern for an undiagnosed TCS. Postoperatively, a MRI spine demonstrated the conus medullaris terminating at T12-L1 with no evidence of a tethered cord. By ruling out TCS, our patient was able to successfully undergo a scheduled primary cesarean section at 35w1d under combined spinal epidural anesthesia without sequelae. This case highlights the importance of identifying TCS symptoms or physical exam findings prior to performing a neuraxial anesthetic to ensure its safety.

Large Sacral Dimple.pdf

Recurrent Horner's Syndrome in a Patient Presenting for Delivery

**Presenting Author:** Chandramouli Rathnam, MD, MS **Presenting Author's Institution:** Vanderbilt University Medical Center **Co-Authors:** Danial Shams, MD - Vanderbilt University Medical Center Annastacia Woytash, DO - Vanderbilt University Medical Center

## Introduction:

Horner's syndrome (HS) is an oculosympathetic palsy that can occur as a rare, unintended side effect of lumbar epidural anesthesia (LEA), reported as 1 in 10,000 (0.01%) occurrences in the aggregate literature.¹ However, the incidence of HS in the pregnant population who receive LEA for cesarean delivery has been found to be as high as 4%.^{2,3,4,5} Several theories attempt to explain the underlying etiology for this occurrence including pregnancy-related narrowing of the epidural space^{2,6,7}, accidental subdural/intrathecal catheter⁸; and presence of a dorsomedial dural fold.^{9,10} The lack of specific circumstances surrounding reported cases of HS due to LEA makes it difficult to discern clear risk factors. This may be the impetus needed for the creation of a database to track such cases and bring awareness to providers of its risks and management.

## Case Report:

We present a case of acute onset HS following LEA that spontaneously resolved and reoccurred multiple times with local anesthetic administration. A 31-year-old G1P0 with GDMA1 and gestational hypertension presented at 38w4d for induction of labor. Upon her request, a lumbar epidural was placed at L4 and analgesia was initiated using 0.125% bupivacaine 10 mL with 50 mcg fentanyl. Thirty minutes after placement, she developed symptoms consistent with HS (Figure 1). After pausing the epidural, all symptoms resolved but they developed again with bolus administration of 8 mL bupivacaine 0.0625% + fentanyl 2 mcg/mL despite withdrawing the catheter by 5 mm and replacement at a higher level. Due to non-reassuring fetal heart tracing the patient underwent cesarean delivery under epidural anesthesia. Upon bolus administration with 10mL 2% lidocaine with 1:200,000 epinephrine, the HS symptoms returned. The rest of the delivery was uneventful, and the patient's symptoms improved by skin closure. All symptoms resolved completely within two days.

### Learning Objectives:

1) Understand the incidence of Horner's syndrome following LEA in the parturient

2) Review potential etiologies for development of HS after LEA

3) Discuss management of LEA when HS occurs in a parturient

## Conclusion:

There is no consensus on management when HS does arise. Case reports describing the development of HS after both neuraxial and regional anesthesia report various

management strategies that range from discontinuation of local anesthetic administration to no change in management from the usual. The decision for management must be individualized in each situation, but in most cases epidural anesthesia can be safely continued.¹⁰

## Use of Chloroprocaine Epidural for Women with Lidocaine Allergy

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Introduction: Local anesthetics (LAs) are a frequently used, key component of neuraxial analgesia/anesthesia for both vaginal and cesarean delivery. There are two classes of LAs: amino esters and amino amides. The two classes have different molecular structures, metabolism, and byproduct formation which make them ideal for clinical use in a variety of situations. True allergy to LAs is rare, with an incidence of less than 1%. Allergic reactions to esters are more commonly seen due to the metabolic byproduct, para-amino benzoic acid. Allergic reactions to amides are less common and may be due to the preservative methylparaben propylparaben. Allergies to LAs are rare, but when these patients present for delivery, they are at increased risk of maternal and fetal morbidity and mortality if unrecognized. Obstetric providers should place early referrals to anesthesia and allergy/immunology teams as soon as this allergy is identified to provide ample time for work up and multidisciplinary management. This case series examines the anesthetic management of two patients who presented for delivery with reported anaphylactic reactions to lidocaine.

Case: The first patient presented for a scheduled cesarean delivery due to fetal anomalies. Her medical history was pertinent for a reaction to lidocaine during a dental procedure several years prior with facial swelling and difficulty breathing that ultimately required management in the emergency department. The second patient presented in labor and requested an epidural for labor analgesia. On chart review, her last delivery was complicated by a laceration managed with NSAIDs and local anesthetic. She subsequently appeared to have an anaphylactic reaction requiring transfer to the intensive care unit for treatment. Neither patient was referred to allergy and immunology for further diagnosis and management. In each case, the decision was made to attempt neuraxial using 3% 2-Chloroprocaine (CPC), an ester, rather than the typical first line agents, amides. The first patient received combined spinal epidural anesthesia using CPC, morphine, and fentanyl to achieve a T4 surgical level for cesarean delivery with redosing as needed. The second patient presented in labor and received dural puncture epidural analgesia with a CPC and fentanyl bolus. A programmed intermittent bolus of fentanyl through the catheter was initiated along with provider-administered boluses of CPC as needed until delivery. Both patients were monitored and remained stable throughout this time period without signs or symptoms of allergic reaction.

- Learning Objectives:1. Describe the epidemiology of local anesthetic allergies2. Describe options for epidural analgesia/anesthesia for patient with lidocaine allergy

### 'Crack Dancing' In Labor And Delivery

Presenting Author: Mariam Ibrahim, MD

**Presenting Author's Institution:** Metrohealth Medical Centre - Cleveland, Ohio **Co-Authors:** Matthew Sikora, DO - Case Western Reserve University - MetroHealth Medical Center

### Introduction:

In patients with cocaine abuse, chronic users can develop cocaine induced choreathroid movements or 'crack dancing.' This rare diagnosis is on the spectrum of cocaine induced disorders. Patients have severe choreiform movements affecting limbs, neck, and orolingual region. In pregnancy, these movements can complicate neuraxial placement and patient positioning for section. Premedication should be considered to subdue choreiform movements prior to neuraxial.

### Case:

Our patient is a 41y/o G6P323 who presented for elective c-section at 37 weeks for breech position. Her past medical history includes chronic cocaine abuse with use during pregnancy and choreiform movements that began 5 years ago. Her obstetric history included 1 Cesarean section and 2 successful VBACs. Her family history was unknown. On physical exam she demonstrated severe chorea of her trunk and upper extremities bilaterally, motor impersistence, and impaired luria. The patient's lab work did not indicate a metabolic derangement for her movements.

For the section, her spinal was uncomplicated despite her movements. However, she continued to have upper limb, trunk, and abdominal movements on the table and OB was concerned about proceeding. Ultrasound in the OR indicated the fetal lie was now vertex. Once the patient knew she had the option to labor, she no longer consented to section. A labor epidural was then placed. Later after the epidural was dosed, the patient experienced itchiness and was given 25 mg IV diphenhydramine. Shortly after, the fetal tracing was non-reassuring and the decision was made for an urgent section. The epidural was dosed with lidocaine and a T4 level was achieved. Of note, the patient's choreiform movements were suppressed during the section. Both mom and baby did well after the procedure.

### Discussion:

Management of choreiform movements is focused on addressing the underlying cause. For this patient, the cause of her movements is unknown, but neurology indicated the most likely cause is cocaine use as a diagnosis of exclusion. Our patient's movements improved following administration of diphenhydramine. This was unexpected, but anticholinergic medications are effective in the treatment of extrapyramidal symptoms related to anti-psychotic treatment. We recommend these patients see neurology early in pregnancy to obtain a full work up to identify the underlying pathology and treat appropriately. Ultimately, if the patient's movements are not suppressed to safely administer neuraxial, general anesthesia should be utilized.

## Successful use of epidural analgesia in a parturient with a history of transverse myelitis associated with multiple sclerosis

**Presenting Author:** Neil Mackie, MBChB FRCA **Presenting Author's Institution:** BC Women's Hospital and Health Centre -Vancouver, British Columbia **Co-Authors:** 

### Case

A 30 year-old G1P0 was referred to the antenatal anesthesia clinic at 34 weeks' gestation with a past medical history of type 1 diabetes mellitus and relapsing-remitting multiple sclerosis (MS) often triggered by pain or stress. She reported an episode of acute paraplegia 2 years previously, with a T7/T8 demyelinating lesion on MRI, that required intravenous steroids and plasma exchange. Her usual MS medication (ocrelizumab) had been stopped for family planning due to risk of fetal harm and maternal infection, with a plan to resume postpartum. A vaginal delivery was planned, and the patient had a strong preference for labor epidural analgesia. A neurological examination was not completed as the initial consultation was conducted by telephone.

At 35 weeks gestation, the patient developed worsening neuropathic pain in both legs, mildly impaired proprioception and uterine irritability. An induction of labor was undertaken to minimize time delay in restarting ocrulizumab. Lower limb neurological exam prior to epidural insertion demonstrated no motor weakness, with normal light touch and cold sensation. A shared decision was made: Although the risk of neurological exacerbation could not be quantified, the patient indicated uncontrolled pain was a known trigger for MS exacerbation and excellent labor analgesia was a high-priority goal for her. As such, standard epidural analgesia was initiated and analgesia was maintained using a programmed intermittent epidural bolus technique with 0.08% bupivacaine with 2mcg/cc fentanyl. Labor and delivery were uneventful. A live infant was delivered by forceps with Apgar scores of 2 and 6. The epidural catheter was removed after delivery and the patient's neuraxial block regressed completely within 6 hours. The patient reported no ongoing neurological symptoms at anesthesia review on postpartum day 1. Her neuropathic pain had also resolved.

#### Discussion

Successful epidural anesthesia has previously been used in other case reports of parturients with a past history of transverse myelitis[1]. In our case, the risk of MS exacerbation triggered by suboptimal labor analgesia was prioritized over the theoretical risk of transverse myelitis exacerbation from epidural anesthesia. Had this patient required cesarean delivery, neuraxial opioids would offer superior postoperative analgesia. Shared decision making with the patient is key. Our case illustrates that labor epidural analgesia can be successfully used in a patient who is motivated and informed of the relevant risks and benefits.

# Successful neuraxial anesthesia for a parturient who has a history of spinal schwannoma removal

**Presenting Author:** Yuta Kashiwagi, MD **Presenting Author's Institution:** Cleveland Clinic Foundation **Co-Authors:** Sabry Ayad, MD - Cleveland Clinic Foundation Arthur Calimaran, MD - Cleveland Clinic Foundation Valentina Lara-Erazo, MD - Cleveland Clinic Foundation

In patients with prior extradural spinal surgery, neuraxial anesthesia can be performed safely and effectively, however it is unknown if this also applies for intradural surgeries. Deeper neural space invasion and spinal canal anatomical changes and can impact procedural epidural space identification, catheter placement, and spread of local anesthetics, all which can lead to worsening of neurological symptoms, infections, unintentional dural puncture, and unsuccessful anesthesia.

We report the case of a 37-year-old G6P3 parturient presented at 38w0d for induction of labor due to chronic hypertension. Previous spontaneous vaginal deliveries received epidural anesthesia, last one 8 years ago. Medical history is limited to a L5-S1 spinal schwannoma identified 7 years ago, for which she underwent left L5 hemilaminectomy, facetectomy, and partially intradural L5 nerve root tumor removal. L5 ligament flavum was also resected and the arachnoid space after the tumor removal was closed with a large muscle graft. Changes on pre and post-resection lumbar MRIs can be seen on Figure 1. The patient had residual mild weakness and numbness of the left L5 region. Upon admission, vital signs were significant for hypertension and BMI of 36.4. Physical examination was significant for mallampati 3-4, redundant neck tissue and imbedded jewelry in her cheek, a 3cm incision scar without tenderness, decreased L5 motor function, and left L5 numbness with no ambulation difficulty or pain.

Anesthesia: Epidural anesthesia at L2/3 level with initial 10ml of 0.125% bupivacaine + fentanyl and epinephrine, followed by 10ml/hr of 0.0625% bupivacaine + fentanyl and epinephrine, covering T9 level on the right and T10 level on the left. 9 hours into labor she was prepared for a cesarean section due to fetal distress, and caregivers identified intact sensation of the left low thoracolumbar areas. Due to the patient's anxious state, inadequate anesthetic coverage and unfavorable airway if anesthesia conversion was needed, it was decided to proceed with spinal anesthesia at L3/4 level with 1.6ml 0.75% hyperbaric bupivacaine, 200ug epinephrine, and 150ug morphine, covering T5 level bilaterally. The patient underwent surgery and recovery without additional hospital problems.

### Discussion:

We chose conventional epidural analgesia without dural puncture epidural technique in order to detect inadequate epidural coverage, and believe it's occurrence was related to previous surgical invasion of her left spinal canal. Analyzing what could have been done differently to achieve better coverage, alternatives include programmed intermittent

epidural and dural puncture epidural. Spinal anesthesia might be an option too for anticipated inadequate epidural coverage due to violated neural space.

## Conclusion:

A parturient with a history of spinal schwannoma removal was safely and successfully managed with neuraxial anesthesia for her labor and extended cesarean section.



# Management of a Parturient with a Ruptured Artiovenous Malformation Requiring Ventriculostomy and Craniotomy

Presenting Author: Brian Paoletti, MD

**Presenting Author's Institution:** Vanderbilt University Medical Center - Nashville, Tennessee

**Co-Authors:** Christopher Hughes, MD - Vanderbilt University Medical Center Britany L. Raymond, MD - Vanderbilt University Medical Center

## Introduction

Pregnancy is associated with an increased risk of cerebrovascular complications, such as intraparenchymal hemorrhage ⁽¹⁾. Arteriovenous malformations (AVM) are congenital lesions with fragile, high-flow anatomy that are at risk of spontaneous rupture. Hemodynamic and endocrine changes associated with pregnancy may affect the growth of AVMs which can lead to an increased risk of bleeding ^(2,3,4). The purpose of this case is to discuss the unique challenges following rupture of an AVM in the antepartum period, including strategies for neurological protection in pregnancy, timing of invasive interventions for securing the aneurysm, and delivery planning.

## Case

A 23 y/o G3P1011 healthy female at 21w5d gestational age presented with severe headache, seizures, and altered mental status. She was intubated on arrival due to poor neurological exam. Head imaging revealed a large right frontoparietal hemorrhage in the setting of right arteriovenous malformation. An EVD was placed for intracranial hypertension and midline shift, and she was subsequently taken for emergent decompressive craniotomy. Postoperatively, her elevated intracranial pressure was treated with hypertonic saline and continued EVD management. The patient was taken to IR for digital subtraction angiography versus conventional angiography due to her pregnancy. Intervention was not deemed possible due to anatomical challenges.

Her care involved a multidisciplinary team including neurology, neurosurgery, obstetrics, and critical care. The fetus was considered pre-viable by our institution. After improvement of neurological examination and normalization of ICP, the patient was extubated and her EVD was removed. Upon discharge, she was referred to MFM for monitoring and delivery planning. She was scheduled for delivery via Cesarean. Her AVM remained unsecured with plans for cranioplasty and AVM clipping following delivery.

## Discussion

Most recent neurosurgery guidelines recommend that vaginal delivery is appropriate for patients with AVM in pregnancy, unless there is a recent hemorrhage or neurological deficit ⁽³⁾. In patients with unsecured aneurysms at time of delivery, hemodynamic stability is of the utmost importance. Early neuraxial anesthesia is recommended to

blunt the physiologic response to acute pain. The timing of surgical interventions for aneurysms is complex in this population. Additionally, common medications used to manage elevated ICP have sparse data for safety during pregnancy, as mannitol and hypertonic saline are both labeled category C for use. This case demonstrates the importance of a multi-disciplinary approach for management of a peripartum neurological complication.

# Psychogenic Non-Epileptic Seizures in the Differential Diagnosis of Peripartum Seizure

### Presenting Author: Jacob Nieb, MD

**Presenting Author's Institution:** Northwestern University Feinberg School of Medicine **Co-Authors:** Matthew G. Hire, MD - Northwestern University Feinberg School of Medicine

Seizures in the peripartum period remain a major cause of morbidity and mortality. The differential diagnosis for peripartum seizures is expansive, including pregnancy-related and unrelated conditions and exacerbation of preexisting seizure disorders. Psychogenic non-epileptic seizures (PNES) are less often considered in the diagnosis of peripartum seizure and rarely reported in the literature.¹ We present a case of PNES at the time of delivery.

Our patient was a 19-year-old G1P0 in spontaneous labor at 40w2d gestational age. Medical history was notable for a spontaneously-closed ventricular septal defect, well-controlled asthma, and anemia. She progressed through labor without complication and received a combined spinal/epidural (CSE) for labor analgesia. Four hours post epidural placement, an obstetric emergency was called for new-onset generalized tonic-clonic seizure activity. Vital signs were notable for hypertension with systolic blood pressures ranging from 140-150 mmHg and tachycardia to 140 beats per minute. The initial seizure was broken with midazolam; a subsequent seizure was treated with propofol, magnesium loading, levetiracetam. A stroke code was activated to expedite neurologic imaging, and the decision was made to deliver via forceps. Following imaging, she was transported to the neurological intensive care unit (NSICU) for further monitoring and video-electroencephalogram (v-EEG). Laboratory data and imaging were unremarkable. She continued to have these episodes in the NSICU without epileptiform activity on v-EEG, confirming the diagnosis of PNES.

The initial differential diagnosis included eclampsia, local anesthetic systemic toxicity (LAST), and amniotic fluid embolus (AFE). Despite new elevation in her blood pressure at the time of the seizure, none of her other labs were consistent with eclampsia. PNES was not initially considered due to the presentation of her first seizure and convincing post-ictal state (although possibly clouded by the administration of midazolam). The prevalence of PNES is estimated at 2-33 cases per 100,000, predominantly affecting women with average age of onset at 30.² Few cases of PNES in pregnancy have been reported in the literature, and none have been reported at the time of delivery.¹ Though the gold standard to diagnose PNES is v-EEG, other characteristics of the seizure can suggest PNES and should be known by providers.² Despite its apparent rarity, PNES should be considered in the differential diagnosis of peripartum seizure.

### Multiple Sclerosis in Pregnancy, Anesthetic Considerations: A Case Report

**Presenting Author:** Ioannis Angelidis, MD **Presenting Author's Institution:** NYU Langone **Co-Authors:** Alexander Chee, MD, NYU Langone

#### Introduction

Multiple Sclerosis (MS) is a chronic autoimmune disorder that affects the central nervous system. It is characterized by demyelination, and inflammation of nerve fibers.¹ The disease affects approximately 2.8 million people worldwide and females have a 2:1 incidence of disease compared to males. ¹ Studies have shown that pregnancy does not negatively impact the progression of disability in individuals with MS and obstetric and fetal outcomes are comparable to those in the general population.² Still, the use of obstetrical analgesia is a topic of debate due to concerns about the potential neurotoxicity of local anesthetics on demyelinated fibers and their potential relationship to subsequent relapses in individuals with MS.

#### Case Report

A 34-year-old G6P0 with MS on Ocrelizumab presented at our Institution for a scheduled cesarean delivery. During pregnancy, Ocrelizumab was held. After a detailed history and physical exam, no neurologic symptoms nor respiratory dysfunction were appreciated. As there is always a possibility of disease exacerbation, high-dose steroids were available in the operating room. The patient received a combined spinal epidural with 0.75% intrathecal bupivacaine. Delivery was uncomplicated and the baby showed appropriate APGAR scores. Her epidural was removed, and her postoperative course was uneventful.

#### Conclusion

It has been shown that patients with MS can safely become pregnant and remain well throughout pregnancy.² Hyperthermia, physical and emotional stress can lead to an exacerbation of the disease.³ The relapse can be mild or severe with the presentation of optic neuritis.³ High dose steroid therapy can effectively treat any severe exacerbation of MS. In the event of general anesthesia, succinylcholine must be avoided as it can lead to hyperkalemia and subsequent cardiac arrest. Pregnant patients undergoing cesarean delivery often undergo neuraxial analgesia. There were initial concerns that the neurotoxicity of local anesthetics could increase the risk of relapse or precipitate exacerbations.⁴ Although multiple studies have shown some patients with worsening MS after neuraxial analgesia, none show a clear causal relationship between the two events. ⁴ Therefore, a combined spinal-epidural anesthesia technique with amide-type local anesthetic agents is an effective and safe option for cesarean delivery in patients with multiple sclerosis.

# Respiratory Insufficiency in a Parturient with Myasthenia Gravis Utilizing Neuraxial Anesthesia

Presenting Author: Ashley Lewis, MD

**Presenting Author's Institution:** Vanderbilt University Medical Center - Nashville, Tennessee

**Case presentation:** 29 yo G1P0 presents for an induction of labor due to poorly controlled MG. Her prenatal course was complicated by emergency room visits, dose changes, and additions to her MG medications. The patient received an early neuraxial labor analgesia. During her labor course, she had an emergent CD for fetal heart rate deceleration. 20 cc of 3% 2-Chloroprocaine was given and a T4 sensory level was achieved. On arrival to the operating room the patient complained of difficulty breathing. Her hand strength was 5/5 despite apparent increased work of and desaturation to the mid 80's. Nasal cannula was placed, with improved saturations but ongoing difficulty with breathing. Facemask assistance of breathing was initiated, and the patient expressed understanding of the situation of temporary respiratory weakness and agreed to allow facemask assistance in lieu of general anesthesia. Surgical team was made aware of breathing difficulties and there was a multidisciplinary plan to move quickly through the CD to avoid redosing the epidural and prolonging respiratory insufficiency and anxiety. Once the anesthetic block receded, the patient required oxygen via nasal cannula which was titrated off in the PACU. She was monitored on continuous pulse oximetry for 24 hours. Postoperative pain regimen included: TAP blocks, multimodal analgesia, and oral opioids. Her hospital course was complicated by meralgia paresthetica requiring no intervention. She was discharged on POD 3. **Discussion:** Pregnant patients with MG have an unpredictable prenatal course. Prenatal counseling, antenatal symptom control, and respiratory monitoring are essential. Neuraxial anesthesia should be encouraged in MG patients to reduce the work of breathing during labor. Patients with underlying respiratory insufficiency should be assessed prior to and continually throughout labor analgesic management. Anesthetic block for CD is well-tolerated by most women despite the weakness of the abdominal wall and accessory muscles of breathing with a T4 sensory level. Patients with MG may not tolerate blockade of these accessory muscles, leading to respiratory insufficiency as illustrated by this case. Although transition to a general anesthetic to help facilitate gas exchange, is an option, it may require a postoperative ICU stay for ventilatory support and create extubation difficulty. Pregnant patients with MG and respiratory involvement need close respiratory monitoring in the setting of labor, CD and postpartum.

Accidental breakage of epidural catheter during labour analgesia : what next? A case report.

Presenting Author: Gisha V. Mathew, MD Presenting Author's Institution: Hamad Medical Corporation - Doha, Ad Dawhah Co-Authors: Ajinu Achi John, MD - Hamad Medical Corporation Mitko Kocarev, MD - Hamad Medical Corporation Biju Kurian, MD - Hamad Medical Corporation Lakshmi Ramanathan, MD - Hamad Medical Corporation

### Introduction

Fracture of epidural catheter is a rare but well-known complication of epidural anaesthesia. Strict adherence to epidural insertion and removal guidelines is vital for prevention.

### Case report

27-year-old G2P1 received epidural analgesia by a resident under consultant's supervision. The epidural space was reached at 5 cm in a smooth insertion. While fixing, the catheter was accidentally pulled out to 6 cm, which he tried pushing back in, but again it came out to 6 cm. So the same catheter was reinserted in the same space and fixed at 10 cm. After a bolus of 10 ml of 0.125% levobupivacaine with 2 mcg/ml fentanyl, the infusion was started (5 ml/hr, bolus 10 ml and lockout 20 minutes). Since there was no pain relief, another 15 ml bolus was given, which was ineffective, and a leak was found under the dressing. So to resite, the catheter was removed smoothly, but the tip was found to be sheared off at 6 cm. Meanwhile, the patient delivered. A thorough search in the room couldn't find the fragment. The patient was informed about the incident, and OVA was initiated. The neurosurgeon and radiologist were consulted. The patient didn't have any neurological deficits or other complaints. X-ray, MRI, or CT lumbar spine couldn't identify the broken tip. An MDT meeting the next day with an anaesthetist, obstetrician and neurosurgeon decided on a whole spine CT to plan further management. As the whole spine CT also couldn't trace the catheter tip, exploration was not done. The patient and her husband were reassured. She is on regular follow-up.

#### Discussion

Epidural catheters can fracture if the catheter is faulty or knotted due to the excessive length in the space and by forceful advancement or removal against resistance. Withdrawing the catheter alone through the Touhy needle, advancement of the needle over catheter, impingement of catheter tip against bone are other causes. If resistance is encountered, an attempt to remove by firm traction after saline injection through the catheter or in a flexed lateral position can be tried. Despite precautions, if epidural catheter is broken, inform the patient and document the event. The retained fragment can cause back pain, infection, migration and neurological deficits. The implications on the future neuraxial blocks are relatively unknown. The literature hasn't shown any benefit of surgery in asymptomatic patients with inert catheters and hence management is conservative.¹ As a new mother, spine surgery and its risks may be undesirable. Imaging studies, neurosurgical opinion, and regular follow-ups to identify late complications are mandatory. Symptomatic cases need exploration.

### Conclusion

All catheters should be examined for any damage each time before insertion. Avoid forceful manipulations of the catheter in or out. Ensure adequate supervision for residents.



### Unexpected High Epidural Anesthesia in a Patient With Epidural Placed in Head-Down, Knee Chest Prone Position.

#### Presenting Author: Bhakti Chourasia, MD

Presenting Author's Institution: University Of Florida College of Medicine Jacksonville - Jacksonville, Florida

**Co-Authors:** Igor Ianov, MD - University Of Florida College of Medicine Jacksonville

A 29 year old, G6P2123 at 40 weeks gestation presented in labor and was admitted for TOLAC. Patient did not have any comorbidity except history of gestational thrombocytopenia and one prior cesarean section. Patient was in knee chest position due to fetal heart decelerations. Patient requested epidural. All hematological values were normal. Patient was in head down, knee chest position, epidural space was identified by 'loss of resistance to saline' technique at the L3-L4 intervertebral space without any difficulty, 20 G catheter inserted and after negative aspiration catheter fixed at 10 cm. Following a negative test dose an infusion of 0.125% Bupivacaine with fentanyl 2mcg/ml was started at the rate of 10 ml/hr.

After 15 minutes the patient required emergency cesarean delivery, due to fetal decelerations. After checking her epidural level which was at T8, 10 ml of 3% Chloroprocaine was given through the epidural catheter, after 5 minutes level was at T6 and another 5 ml of 3% Chloroprocaine given. Patient was in knee chest head-down position and then turned to the supine position in OR. 10 minutes later the patient started complaining of difficulty speaking and breathing. Hand grip assessment was 4/5. Assisted bag mask ventilation with 100 percent oxygen started immediately and aspiration through epidural catheter returned only 3 ml of injected drug. Patient's blood pressure was maintained with intravenous phenylephrine. Patient was very anxious so 2 mg of midazolam were given intravenously. After 30 minutes she regained her upper extremities strength and voice back and was happy to see her healthy baby. Patient was stable and transferred to the PACU on oxygen through nasal cannula. 2 days later she was discharged without any problems.

### Conclusion:

Performing epidural analgesia in the knee-chest prone position served as an innovative solution for placement of neuraxial anesthetic in this case and the knee-chest position may become necessary in labor to mitigate fetal heart rate decelerations. Both left lateral and knee chest are compatible for neuraxial anesthesia. Decision should be based on fetal heart rate and placental blood flow.

The incidence of high epidural block associated with obstetric anesthesia is not known. It may be very rare but can have an expected side effect in certain positions.

# Anesthetic Management of an Urgent Cesarean Delivery in a Patient with a Recent History of Cauda Equina Syndrome: A Case Report

#### Presenting Author: Jacob Nieb, MD

**Presenting Author's Institution:** Northwestern University Feinberg School of Medicine **Co-Authors:** Taylor Pruis, MD - Northwestern University Feinberg School of Medicine Mikayla Troughton, MD - Northwestern University

Background: Pre-existing neurologic impairments or past spinal surgery are often relative contraindications to neuraxial anesthesia.¹ Parturients with neurologic deficits pose a specific challenge as the risks of general anesthesia may be increased for these patients. We present a parturient with a recent history of surgical decompression for cauda equina syndrome who underwent urgent cesarean delivery under general anesthesia.

Case: A nulliparous 31 year old woman at 31 weeks and 3 days estimated gestational age presented to labor and delivery with preterm premature rupture of membranes and uterine contractions, with fetal breech presentation. Her history was notable for class 3 obesity and cauda equina syndrome diagnosed 6 weeks prior with subsequent emergent L4-5 hemilaminectomy and discectomy. Her initial symptoms were severe lower back pain with radiation down the right lower extremity with associated numbness and weakness as well as bowel and bladder incontinence and saddle anesthesia. Upon presentation to labor and delivery, her residual symptoms included right foot drop, urinary incontinence and decreased sensation of the lateral right lower extremity. In addition, her lumbosacral incision appeared to be only partially healed. Shortly after admission the patient's contraction pain increased and fetal parts were palpable in her vagina. After a discussion with the patient about the risks and benefits of general versus spinal anesthesia given her recent surgery with residual symptoms, the decision was made to proceed with urgent cesarean delivery under general anesthesia. Her delivery was notable only for a postpartum hemorrhage of 1.2 liters, and she was discharged on post-operative day 3 after passing a urinary voiding trial with no changes to her neurologic exam.

Discussion: Hebl et al. showed a slightly increased complication rate of neuraxial anesthesia in patients with spinal stenosis, lumbar disc disease or past spine surgery,² and epidural placement may be more difficult and spread of local anesthetic is less predictable. However, spinal anesthesia is generally reliable with low rates of block failure in patients with past spinal surgery. In the setting of a pregnant patient with pre-existing spinal pathology requiring cesarean delivery, general anesthesia should not be considered absolutely contraindicated. A detailed risk/benefit discussion should take place with the patient, who may choose to undergo neuraxial anesthesia with the understanding that they may have an increased, albeit unquantifiable, risk of neurologic

complications. In this patient, the recency of spine surgery with persistent symptoms and an unhealed incision contributed to the decision to perform general anesthesia.

# Femoral Vessel Access for Potential ECMO Sheath Cannulation in Three Patients with Cardiopulmonary Disease

### Presenting Author: Connor B. Funsch, MD

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Extracorporeal membrane oxygenation (ECMO) has been effective in treating obstetric patients during acute respiratory distress syndrome, cardiogenic shock, and cardiac arrest (1). Venovenous and venoarterial ECMO are the two most employed therapeutic modes.

We would like to describe three parturients who underwent CD and were evaluated for potential ECMO support pre-operatively. Each mother had venous and arterial sheaths placed prior to CD to provide easy cannulation for the ECMO team if their service was needed.

Case 1 describes a 27 year-old female now G2P2002 who was scheduled for her second Cesarean delivery with a history of hypertension, non-ischemic cardiomyopathy with reduced ejection fraction of 30-35% with left ventricular moderate global hypokinesis and mild to moderate mitral regurgitation. The patient's first pregnancy was complicated by severe post-partum cardiomyopathy. During her second pregnancy, the patient re-developed cardiomyopathy with an ejection fraction of 30-35%, and intermittent ventricular tachycardia.

Case 2 describes a 31 year-old female now G1P1 who was scheduled for a Cesarean delivery in the setting of repaired Tetralogy of Fallot with resultant moderate pulmonary hypertension. She additionally had bilateral pulmonary atresia that resulted in her left lung with approximately 15% perfusion relative to her right lung. The patient additionally suffered cardiac arrest approximately one year prior to her Cesarean delivery with subsequent AICD placement.

Case 3 describes a 21 year-old female now G1P1 with cystic fibrosis (CF) with severe lung disease, chronic hypoxic respiratory failure and associated pancreatic insufficiency. The patient had recurrent bouts of pulmonary infections, required oxygen during nighttime, and was on chronic prednisone therapy. Pre-partum serial pulmonary evaluation showed an FEV1 of 21%-27% (baseline 33%). Transthoracic echocardiography was notable for an elevated right ventricular systolic pressure of approximately 26mmHg.

In conclusion, we have described three separate cases with the potential of cardiopulmonaryh collapse during Cesarean delivery from placental autotransfusion. Femoral sheath placement proved to be a safe and an accessible pathway for either VA or VA ECMO cannulation without the risks associated with initial ECMO cannulation, such as arterial and venous injury, clot formation, and hemorrhage.

## Anesthetic Management of Spontaneous Coronary Artery Dissection in an Anticoagulated Parturient

### **Presenting Author:** Andrew Hallmark, MD **Presenting Author's Institution:** University of Michigan - Ann Arbor, Michigan **Co-Authors:**

A 32-year-old G1P0 female at 30w1d with a history of mild asthma presented to an outside ED after developing acute central chest pain. Her presentation was notable for hypertension, ST changes in the anterior leads on EKG, and elevated Troponin I; TTE revealed hypokinesis of the mid and distal anterior wall with preserved function. She was diagnosed with an NSTEMI, received 81 mg of aspirin and 150 mg of clopidogrel prior to LHC which revealed 50% stenosis of the LAD with normal antegrade flow to the distal vessel concerning for spontaneous coronary artery dissection (SCAD). She received betamethasone for fetal lung maturity prior to transfer to our tertiary care facility. She was admitted to the cardiac ICU for hemodynamic monitoring, requiring escalating doses of antihypertensives. MFM recommended cesarean delivery in the setting of SCAD complicated by pre-eclampsia with severe features and treatment-resistant hypertension remote from delivery. Neuraxial anesthesia was contraindicated given the recent administration of clopidogrel and prophylactic enoxaparin. She underwent an uncomplicated cesarean delivery under GA with TIVA (propofol and remiferitanil) with a pre-induction arterial line. A slow, controlled induction was used to optimize hemodynamic stability. She recovered from anesthesia in the cardiac critical care unit for hemodynamic monitoring through POD 1 before transfer to L&D. She was discharged on POD 4 and continued to do well at follow-up.

SCAD is a nonatherosclerotic, nontraumatic cause of acute coronary syndrome (ACS) that is likely influenced by a combination of factors including sex, hormonal fluctuations, and underlying arteriopathies.¹ Up to 43% of ACS in the peri-partum population can be attributed to SCAD, making SCAD an important component of the differential diagnosis when a parturient presents with chest pain.² Only 2%-8% of SCAD occurs during pregnancy, with the remaining cases occurring in the post-partum period.² Medical management is recommended in the absence of ongoing MI or hemodynamic instability.¹ Interventions can include either PCI or CABG. Close consultation with MFM, cardiology, and cardiothoracic surgery should take place when SCAD is suspected in a parturient, with transfer to centers capable of treating potentially severe ventricular dysfunction. Due to the low incidence of SCAD during pregnancy, few case reports exist describing the anesthetic management of a parturient with SCAD. While a vaginal delivery with neuraxial analgesia would typically be preferred in a parturient with SCAD, our case demonstrates the safe use of general anesthesia in a patient with complex cardiac disease where cesarean delivery was necessary for obstetric indications and neuraxial anesthesia was contraindicated secondary to anticoagulation.

## The Conundrum of Pulmonary Hypertension: Safe Delivery of Anesthesia when Pregnancy is Contraindicated

### **Presenting Author:** Andrew Hallmark, MD **Presenting Author's Institution:** University of Michigan - Ann Arbor, Michigan **Co-Authors:**

A 27 year-old G3P0 at 19 weeks gestational age presented with persistent chest pain, shortness of breath, and severe palpitations. She had no contributory medical history other than intermittent shortness of breath, chest pain, and left jaw and arm pain initially attributed to occupational exposures, which all worsened as she progressed in her pregnancy. A transthoracic echocardiogram revealed moderate-to-severe right ventricular dysfunction and severe tricuspid regurgitation. Right heart catheterization confirmed elevated PA pressures of 130/50 with pre-capillary etiology and no response to vasodilators. Cardiac MRI revealed a 2 cm secundum atrial septal defect with Qp/Qs of 1.3-1.6, confirming intracardiac right-to-left shunting. Following extensive counseling, the patient chose to terminate the pregnancy. Treatment with a phosphodiesterase inhibitor was initiated five days prior to anesthetic evaluation, at which time she was no longer requiring supplemental oxygen and she could tolerate lying flat without shortness of breath. She presented for dilation and evacuation following cervical ripening. An L2/L3 epidural was placed followed by a 3 mL dose of 1.5% lidocaine and 1:200,000 epinephrine. She was slowly placed in lithotomy position and a radial arterial line was placed. The epidural was incrementally dosed with 2% lidocaine until a bilateral T10 level was achieved with sacral coverage. Light sedation with a propofol infusion was started and she tolerated uncomplicated dilation and evacuation well. She returned to the ICU and had an uneventful recovery from anesthesia.

Pulmonary hypertension (pHTN) is a modified WHO class IV condition.¹ Due to the substantial maternal and fetal morbidity and mortality, termination of pregnancy is recommended to patients with pHTN.¹ While termination can be a lifesaving procedure, a second-trimester surgical termination can present perioperative challenges among pregnant patients with coexisting cardiac disease. This procedure was performed at a tertiary medical center, after MFM consulted with cardiac and thoracic surgery, pulmonology, cardiology, cardiac anesthesiology, and ECMO specialists to plan for contingencies in the event of periprocedural cardiopulmonary collapse. In the absence of consensus guidelines managing pregnant patients with cardiac disease, expert opinion favors neuraxial anesthesia for these patients, reserving general anesthesia for cases in which heart failure or hypoxia preclude supine or lithotomy positioning or cases which patients would not tolerate being awake.² We present a case of severe pHTN with Eisenmenger physiology who safely underwent a dilation and evacuation under epidural anesthesia with light sedation and invasive blood pressure monitoring.

### Repeat Cesarean Delivery Number 12: A World Record!

Presenting Author: Amy J. Bingham, MD

**Presenting Author's Institution:** University of North Carolina - Durham, North Carolina **Co-Authors:** Kathleen A. Smith, MD - University of North Carolina

Higher order cesarean delivery presents a unique challenge to the anesthesiologist due to increased complications from formation of adhesions, higher incidence of bladder or bowel injury, increased rates of blood transfusion, abnormal placentation, and higher potential need for a hysterectomy (1,2). We present a 38-year-old G14 P9-2-2-11 with a past medical history of obesity who presented for her 12th cesarean delivery at 37w1d, in the setting of a known uterine window. According to the Guiness Book of World Records, this is the world record for number of cesarean deliveries, with the previous record being 11.

When planning for delivery our biggest concern was perioperative hemorrhage. Rates of placenta accreta, as well as the need for hysterectomy increase exponentially with increased number of previous cesarean deliveries (2). The prenatal growth ultrasound for this patient showed no evidence of placenta accreta spectrum findings, but maternal BMI somewhat limited evaluation of the placenta. Anesthetic management included two large bore peripheral IVs, an arterial line available in the event of instability, a combined spinal epidural, cell saver for intraoperative blood salvage, and a type and cross for two units of packed red blood cells. Her delivery proceeded without complication. She received an oxytocin infusion and 1 gram of tranexamic acid for hemostasis. Hgb decreased from 11.4 to 10.5 after a Quantitative Blood Loss (QBL) of 773mL. Operative time was 72 minutes. Due to a history of severe pruritis, intrathecal morphine was not given. A Tranversus Abdominus Plane (TAP) block was performed postoperatively for pain control.

## Peripartum anesthetic management of a patient with dilated cardiomyopathy secondary to pathogenic RNA-binding motif protein 20 variant

**Presenting Author:** Courtney R. Hood, MD **Presenting Author's Institution:** University of North Carolina - San Antonio, Texas **Co-Authors:** David C. Mayer, MD - University of North Carolina

Dilated cardiomyopathy (DCM) is a disease of the myocardium that causes ventricular dilation and systolic dysfunction. Most cases of DCM are idiopathic. However, a small share can be linked to hereditary mutations. As the number of women with congenital heart disease are surviving to adulthood due to advancements in treatment, it is important to understand how these patients offer a unique challenge to labor analgesia and intraoperative management in cesarean deliveries.

The purpose of this abstract is to discuss the peripartum anesthetic management of a 32-year-old G1P0 at 32 weeks and 6 days gestation, who presented for an induction of labor for worsening orthopnea. She was a mWHO class IV, NYHA class II secondary to non-ischemic DCM, believed to be due to a pathogenic variant of RNA-binding motif protein 20 causing cardiac fibrosis. She was diagnosed at age 19 with serial transthoracic echocardiograms (TTE) showing a left ventricular ejection fraction (LVEF) of 45% without right heart strain. Her first trimester cardiac MRI revealed severely dilated with mild-moderately reduced LV systolic function. Third trimester TTE showed a LVEF of 40% and moderate mitral valve regurgitation.

A slow induction of labor was planned and initiated with a foley balloon and vaginal misoprostol. This unfortunately caused tachysystole, fetal variable decelerations, and a sustained three-minute deceleration. The foley bulb was removed and vaginal lavage improved her strip, but a cesarean section was offered at this time. Pre-operative radial arterial and epidural lines were placed. The epidural loaded nicely to a T4 level using plain 2% lidocaine without epinephrine and the case proceeded uneventfully.

Special considerations for this case included point of care ultrasound (POCUS) use for fluid guidance and pressor choice. Her end of case POCUS was notable for a severely dilated and hypokinetic left ventricle despite her receiving only 300 mL of IV crystalloid. She received 10 mg IV furosemide and her cardiac function improved. We also dosed her with 10 mg IM oxytocin after fetal delivery rather than IV oxytocin which requires 500 mL of crystalloid administration. Finally, a lower extremity arterial duplex study was performed pre-operatively to assist in femoral access if ECMO was required.

Post-partum, she was transferred to the cardiovascular intensive care unit for 24-hours of monitoring and had an uneventful recovery. The patient was discharged home on post-operative day five in stable condition and back on goal-directed therapy consisting of spironolactone, enalapril, and metoprolol succinate. This case illustrates an example

of favorable outcomes after primary cesarean section under neuraxial anesthesia in a patient with severe systolic dysfunction secondary to DCM.



# How low can you (and your ejection fraction) go? Management of advanced heart failure in pregnancy

**Presenting Author:** Colette M. Ciresi, MD **Presenting Author's Institution:** Vanderbilt University Medical Center - Nashville, Tennessee **Co-Authors:** Annastacia Woytash, DO - Vanderbilt University Medical Center

**Introduction:** Parturients with advanced heart failure require a multidisciplinary team for management. As their body adapts to the physiologic changes of pregnancy, they are prone to decompensation, including cardiogenic shock and arrythmias. The management of heart failure in pregnancy focuses on preventing decompensation, reducing afterload, and the use of inotropes when necessary. Transthoracic echocardiography (TTE) is a valuable tool and should be done at regular intervals during pregnancy.1 Arrythmia is a common complication and may be either atrial or ventricular. Treatment of ventricular tachycardia (VT) in particular requires management of underlying etiologies, which may include aberrant impulses, QT prolongation, and catecholaminergic activity.2 Patients with advanced heart failure may present with automatic internal cardiac defibrillators (AICD) in place for primary prevention of cardiac arrest. This case report reviews the anesthetic management of a parturient with decompensated heart failure and VT.

**Case:** A 36 year old G1P0 with a past medical history significant for combined systolic and diastolic heart failure (LVEF 15-20%, grade II diastolic dysfunction), hypertension, smoking, and AICD presented for induction at 34w4d gestation in decompensated heart failure due to lack of access to home medications. Due to a history of inappropriate shock, VT therapy on her AICD was disabled. An epidural was placed, as well as a pre-epidural arterial line, early in her labor course to minimize sympathetic stimulation. During epidural placement, telemetry revealed 20-25 beats of VT that was non-perfusing on her arterial line but resolved without intervention. She went on to have many bursts of VT during her labor. Her course was complicated by nonreassuring fetal heart tones and urgent cesarean delivery, which was accomplished under neuraxial anesthesia. Continuous telemetry and invasive blood pressure (BP) monitoring was continued for 48 hours PP. She was discharged home on PPD 5.

**Discussion:** This patient presented in a decompensated state with markedly decreased LVEF, making her mWHO class IV and at high risk of an adverse cardiac event. Key management strategies for this population includes: volume optimization prior to induction, avoidance of excess fluid administration, invasive BP monitoring, and neuraxial labor analgesia. These patients are at very high risk of decompensation if an emergent delivery is needed. Their risk continues in the immediate postpartum period, and they should recover in the hospital for at least 72 hours PP. It is imperative for the obstetric anesthesiologist to know the exact settings and antitachyarrhythmia therapies if an AICD is present.

## Learning Objectives:

1. What is the management strategy of heart failure and ventricular arrhythmias in pregnancy?

2. How do we stratify maternal cardiovascular risk?

3. What is the role of POCUS in peripartum fluid management?

# Suspected venous air embolism as the cause of cardiovascular collapse during cesarean section under general anesthesia: a case report.

Presenting Author: Thomas Yang, BMBS FANZCA Presenting Author's Institution: BC Women's Hospital - Vancouver, British Columbia

**Co-Authors:** Elise Hindle, MBChB BSc(med sci) FRCA - BC Women's Hospital Helen Parker, MBChB FRCA FRCPC - BC Women's Hospital

**Background:** Venous air embolism is the entrainment of air into the venous circulation and this can occur during surgery whenever the surgical field is above the level of the heart.[1] Between 200 and 300ml or 3-5 ml/kg of air has been reported as the adult lethal dose.[2]

**Case report:** A healthy 42 y.o. G3P2 presented in spontaneous labor at 40 week's gestation. During intrapartum assessment, a prolapsed umbilical cord was recognized and emergency cesarean section ensued. Rapid sequence induction of general anesthesia and intubation carried out without complication. A live newborn was delivered with Apgar 9,9. Post-delivery, while the surgeons were suturing the uterine wound, the patient's systolic blood pressure dropped to 50mmHg. Oxygen saturation decreased to 83% despite 100% oxygen and end-tidal carbon dioxide (EtCO2) decreased to 11mmHg. There were no clinical features to suggest endotracheal tube misplacement, pneumothorax or anaphylaxis, or excessive bleeding in the surgical field. The blood pressure responded well with small doses of phenylephrine 50 mcg and ephedrine 5mg while the oxygen saturation and EtCO2 recovered to baseline after a 12-minute period. The patient remained hemodynamically stable and was extubated at the end of the surgery. Given the transient nature of the cardiorespiratory derangements, an air embolism was suspected to be the cause, although point of care cardiac ultrasound was not performed intraoperatively to assess for right ventricular strain.

Postoperative investigations revealed electrocardiogram changes consisting of T wave anomalies in V1 to V4 and inferior leads, and an elevated high sensitivity troponin I of 366 ng/L (normal < 51 ng/L) at 6 hours, decreasing to 167 ng/L after a further 9 hours. These changes were thought to reflect demand ischemia from the period of severe hypotension. A formal transthoracic echocardiogram revealed a structurally normal heart with no evidence of intracardiac shunts or decreased cardiac function. The patient made a full recovery and was discharged on postoperative day 2.

**Discussion:** In analysis of a possible cause, we speculated that air entrainment had occurred via the surgical incision due to a slight Trendelenburg positioning of the patient. The patient had been positioned on the operating table in the routine manner with her legs on a foam wedge which is designed to flex the hips and knees and reduce abdominal muscle tone, potentially resulting in a slight downward gradient from the operative field to the level of the heart and this was thought to contribute to the entrainment of air.(see Fig 1) <u>Suspected venous air embolism as the cause of cardiovascular collapse during cesarean section under general anesthesia a case report. YANG.pdf</u>

## Interstitial lung disease and high flow nasal cannula oxygen during cesarean delivery: a case report

**Presenting Author:** Maria Lima, MD **Presenting Author's Institution:** University of Washington **Co-Authors:** Vickie Hau, MD - University of Washington

Interstitial lung disease (ILD) is a rare disease occurring in approximately 219 per 100,000 women with increasing incidence and prevalence.¹ For exacerbation of ILD, high-flow nasal cannula (HFNC) can provide superior and reliable O2 delivery compared to standard nasal cannula (NC) or non-rebreather masks. With peak flows of 50-60 L/min, a HFNC will also decrease work of breathing, flush out dead airway space, generate PEEP, and increase patient comfort.² We present a case of a 30-year-old G1P0 at 31 weeks who underwent cesarean delivery due to rapid progression of autoimmune ILD requiring heated HFNC at 80-100% FiO2 with flows of 50-60 L/min to maintain SpO2 >88%.

She was 91 kg, 165 cm, and Mallampati I. TTE prior to increased oxygen need showed EF 60-65%, PAP 32-37 mmHg, and normal valvular function. PMH included multiple ICU stays with prolonged mechanical ventilation. We planned a slow titration of neuraxial anesthesia, escalating to GA with nitric oxide and ECMO if needed.

Bedside TTE showed mild RV dysfunction grossly unchanged. She was transported to the OR with a nonrebreather mask because HFNCs require a wall source of oxygen and electrical power to operate. HFNC was resumed upon arrival to the OR. A CSE was placed with 20 mcg fentanyl. The epidural was dosed with 2% lidocaine and epinephrine in 3-4 mL increments every 5-7 min. Infusion with 0.4 mcg/kg/min phenylephrine was started immediately after the spinal dose. The baby was delivered with APGAR scores of 7 and 8.

At delivery she was hemodynamically labile requiring vasopressin boluses and infusion. MAPs decreased precipitously from 70-80 to 45-55 mmHg with HR decreasing from 130 to 80. Within ten minutes we established a new baseline with MAPs > 65 and HR 90. She remained asymptomatic and maintained SpO2 >92%. Oxytocin infusion of 5 units/hr was started. Case finished uneventfully. She had a complicated postop course requiring two ICU readmissions for respiratory distress and intubation; however, she was discharged after a month on her baseline 10-12 L O2 via NC.

In this case we showed it is possible to proceed safely with neuraxial anesthesia despite profound oxygen needs. In the OR we were cognizant to limit IV fluids and gave furosemide to prevent worsening respiratory status from volume overload. We optimized positioning with a ramp and left uterine displacement to avoid decreasing FRC and alleviate aortocaval compression. We avoided spinal bupivacaine to prevent sudden sympathetic blockade and hypotension and instead slowly titrated epidural lidocaine.
We carefully selected vasopressors to support SVR and cardiac output without increasing PVR.³ We were fully prepared for GA with additional monitors, nitric oxide, ECMO, and cardiac anesthesiologists on standby.

## Anesthesia for Cesarean Delivery in a Patient with Congenitally Corrected Transposition of the Great Arteries

**Presenting Author:** A. Taylor Thomas, MD, M.P.H. **Presenting Author's Institution:** Massachusetts General Hospital

Congenitally corrected transposition of the great arteries (CCTGA) is a rare congenital heart disease that may confer high risk of maternal morbidity and mortality and requires specialized cardiac, obstetric and anesthesia care.

The patient was a 31 year old G4P0 with situs inversus totalis, ventricular inversion, double outlet RV with PA stenosis, VSD, ASD, cyanosis and spontaneous abortions in this setting. At age 26, she had an ASD and VSD patch repair, pulmonary outflow tract repair and LV to PA conduit placement with postoperative complete heart block requiring a pacemaker. Figure 1 shows her cardiac anatomy pre- and post-repair. After repair, she developed severe TR and RV dysfunction with admissions for hypervolemia and dysrhythmia prior to pregnancy. She was WHO Risk Class III for pregnancy(1).

At 31 weeks, she presented in fluid overload and TTE showed a dilated, hypertrophic RV with an EF of 47%, LV with moderate systolic dysfunction, severe TR, and mild MR. Multidisciplinary planning involved adult congenital cardiology, maternal fetal medicine, and obstetric and cardiac anesthesia. Fetal presentation was transverse, daily nonstress tests were reassuring and betamethasone was given. She was managed with IV bumetanide and metolazone, and concern for worsening heart failure prompted a planned cesarean delivery in a cardiac OR. Her pacemaker was DDD-R, 100% Vpacing and left unchanged. Central and arterial lines were placed; a PA catheter was avoided given her anatomy and risk of dysrhythmia with placement. TTE was available for hemodynamic management(2). Cardiac surgery and ECMO teams were on standby. Bumetanide infusion and electrolyte repletion was continued for ongoing ectopy, and milrinone was started on arrival to the OR. A combined spinal epidural was placed with 0.5mL intrathecal 0.75% hyperbaric bupivacaine, 150µg morphine and 15µg fentanyl. Once the patient was positioned with defibrillator pads in right uterine displacement with right precordial ECG leads, the epidural was dosed to a T4 sensory level with 2% lidocaine with epinephrine. At uterine incision, epinephrine was started for inotropic support. The neonate was delivered with Apgar scores of 8 and 9 and moved to the NICU for CPAP. A bumetanide bolus, IM oxytocin and nitroglycerin were given in anticipation of autotransfusion and increased vascular resistance. Uterine tone was strong and the epidural was removed at the end of the case. Postoperatively, she was weaned off inotropic support and diuresed in the cardiac ICU over 2 days, and discharged from the hospital on day 8.

Patients with CCTGA have complex congenital lesions that increase the risk of cardiac complications during pregnancy, labor, and delivery. As isolated lesions are rare, an

individualized, interdisciplinary approach is crucial for safe delivery(3). <u>CCTGA Figure</u> <u>1_Thomas.pdf</u>

## Echocardiographic strain analysis during vaginal delivery and third stage of labor: A case series

### Presenting Author: Margaret E. Smith, MD

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### Background:

The peripartum period is characterized by acute and profound hemodynamic changes, which may predispose even young healthy parturients to changes in myocardial function (1, 2). Recent investigations have utilized transthoracic echocardiography (TTE) during labor to characterize cardiac changes and strain abnormalities in the first stage of labor and during the immediate postpartum period (3, 4), but few data exist about cardiac changes during parturition. In this series of three healthy parturients, we obtained serial TTE images during the early second stage, maternal pushing, immediately following fetal delivery, and immediately after placental delivery. Echocardiographic parameters evaluated included cardiac output (CO) assessed by pulse wave doppler velocity time integral, diastology assessed by mitral inflow and tissue doppler, and left ventricular circumferential strain assessed by two-dimensional speckle tracking segmental strain analysis.

Case 1: 37yo G1P0 at 41w admitted for labor with epidural labor analgesia (ELA). Images sufficient for assessment of CO, diastology, and speckle tracking were obtained at all four time points. Abnormal diastology was seen during maternal pushing (Table 1). Segmental stain analysis was abnormal in three segments post-fetal delivery (Figure 1). Her labor was notable for a prolonged second stage, necessitating forceps delivery after two hours of pushing.

Case 2: 30yo G2P1 at 39w admitted for labor with ELA. Images sufficient for assessment of speckle tracking were obtained at all timepoints. The images were insufficient for CO and diastology analysis during the late second and third stages of labor because the patient delivered in the hands-and-knees position. No abnormal strain values were seen.

Case 3: 30yo G8P6016 at 36w admitted for labor with ELA. Her course was notable for rapid progression of labor; only two sets of images could be completed in second and third stages. Diastology obtained during delivery was markedly abnormal and strain analysis was abnormal in one segment. There were no complications.

Discussion:

This case series represents a novel use of serial TTE exams during the second and third stage of labor to characterize diastology and strain parameters. Images of sufficient quality for diastology and strain analysis were identified in the majority of patients, but changes in position during maternal pushing and rapid progression limited image acquisition. Abnormal diastology was noted in two of three patients during maternal pushing and delivery. Future investigations will aim to determine normative strain values during parturition and whether abnormalities are more significant in women with hypertensive diseases of pregnancy.

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### Aortic Root Aneurysm in a Parturient with Loeys-Dietz Syndrome: A Case Report

**Presenting Author:** Mariana Montes, MD, MPH **Presenting Author's Institution:** University of Chicago - Chicago, Illinois **Co-Authors:** Chad Dean, MD - University of Chicago

Background: Loeys-Dietz Syndrome (LDS) is an autosomal dominant connective tissue disorder that is associated with preterm premature rupture of membranes, weakened vascular adventitia including aortic aneurysms and dissections, as well as tears to the vagina, perineum, and increased risk of uterine rupture.^{1,2} Parturients with LDS have an increased risk of aortic dissection (4%) and peripartum mortality rate of 1%.¹ We present the case of a parturient with LDS requiring cesarean delivery.

Case: A 35 year-old G5P1 patient with a known family history of LDS secondary to a pathogenic variant in the gene coding for TGFbR1 presented at 38 wks for scheduled repeat cesarean delivery. Her history was significant for a previous uneventful cesarean delivery under neuraxial anesthesia, however she was noted to have an increase in her aortic root diameter from 3.7 cm to 4.0 cm postpartum. During this pregnancy, the aortic root diameter at the sinus of Valsalva remained stable at 4.1 cm with a normal LVEF of 65% on metoprolol. Given the degree of dilation, she was recommended for repeat cesarean delivery. A dural puncture epidural was placed and slowly dosed with standard medications to maintain hemodynamic stability and avoid tachycardia. Despite normotension, she became tachycardic to the 120s necessitating esmolol boluses. Throughout delivery, there were no signs of aortic dissection and her course was otherwise uncomplicated. The patient remained on telemetry for 24 hours postpartum and was closely followed by cardiology prior to transfer to the mother-baby unit on POD#2. The patient was subsequently lost to follow-up and failed to return for six week postpartum echocardiogram.

Discussion: LDS is an important connective tissue disorder distinct from Marfan and Ehlers-Danlos syndromes requiring thorough multi-disciplinary care prior to, during, and after pregnancy. Delivery is most common by cesarean due to a poor understanding of the progression of the aortic root dilation and lack of consensus on the optimum management of LDS during pregnancy.^{3,4} These pregnancies should be considered high risk regarding aortic dissection, particularly in the third trimester and postpartum period. Anesthestic goals include early epidural placement, possible need for invasive hemodynamic monitoring, and avoidance of large hemodynamic changes, including tachycardia and hypertension, Shared decision-making between the patient and the multidisciplinary team is highly encouraged to consider the cardiovascular risks of pregnancy, mode of delivery, and the thresholds for prophylactic aortic surgery. Identifying women with LDS that have a predisposition to aortic dissection, counseling them prior to conception, and initiating aortic monitoring throughout pregnancy and in the immediate postpartum period may lessen risk and significantly improve outcomes for these patients.

### Anesthetic Considerations for Management of a Parturient Undergoing Cesarean Delivery After Mechanical Mitral Valve Replacement

Presenting Author: Mary Kay Kujak, MD

**Presenting Author's Institution:** Vanderbilt University Medical Center **Co-Authors:** Ashley Lewis, MD - Vanderbilt University Medical Center Britany L. Raymond, MD - Vanderbilt University Medical Center Annastacia Woytash, DO - Vanderbilt University Medical Center

### Introduction:

Women with mechanical heart valves (MHV) have a higher incidence of pregnancy loss, preterm delivery, maternal mortality, thromboembolic complications, and bleeding.¹ The hypercoagulable state induced by pregnancy further increases the risk of valve thrombosis and there is no consensus on the optimal anticoagulation regimen in the peripartum period.^{1,2} Anticoagulation in pregnancy presents its own risks to both the parturient and the fetus, leading to increased morbidity and mortality.¹ Many of these parturients will present for cesarean delivery (CD).

### Case Report:

A 32 year old G4P1 with a history of congenital mitral valve (MV) disease leading to severe mitral valve regurgitation was initially managed with MV repair at age 21. This failed, and she underwent mechanical replacement (MVR) in 2011. Her first delivery was an elective CD under general anesthesia. She presented to our facility for prenatal care and expressed a strong interest in neuraxial anesthesia. Prior to pregnancy, she was anticoagulated with warfarin, which was switched to low-molecular weight heparin (LMWH) during pregnancy. Echocardiography revealed a well seated MVR with normal washing jets and a mean gradient of 13, which is elevated. At 36 weeks gestation the patient presented for repeat CD. She was admitted 48 hours prior to allow for transition to an unfractionated heparin (UFH) infusion. Neuraxial anesthesia was planned for her CD. Criteria used for safe neuraxial placement included: > 24 hours since the last dose of LMWH, > 6 hours since discontinuation of UFH infusion, and normal activated partial thromboplastin time. A combined spinal and epidural was placed, with 12mg of 0.75% hyperbaric bupivacaine, 15mcg of fentanyl, and 150mcg of morphine. The patient did not experience post-partum hemorrhage, and received the customary dose of oxytocin for our institution. Following delivery, her epidural catheter was removed, UFH infusion was restarted 12 hours post CD, and her LMWH was reinitiated 24 hours thereafter. She was bridged to warfarin and discharged on post-partum day 4.

### Discussion:

Anesthesiologists providing care for parturients with MHV, especially in the mitral position, must work with a multidisciplinary team to discuss the delivery plan in advance of patient presentation. This should include feasibility of neuraxial anesthesia, anticoagulant use and discontinuation, and timing of re-initiation of anticoagulation in

the postpartum period. It is reasonable to offer most parturients with a MVR neuraxial analgesia for labor and neuraxial anesthesia for CD.

Learning Objectives:

- 1. Determine and discuss the essential components of the delivery plan in a parturient with mechanical valve replacement
- 2. Discuss complex anticoagulation management during pregnancy
- 3. Identify the recommended time interval for anticoagulation cessation and initiation to allow for safe neuraxial anesthesia



Fig 1: Transthoracic echocardiogram, parasternal long axis, showing mechanical valve in mitral position with washing jets evident.

## Anesthesia Management of caesarean section in patient with Pericardial effusion

**Presenting Author:** manjusha kuraganti, MD

**Presenting Author's Institution:** NYP Brooklyn Methodist Hospital - Brooklyn, New York

Co-Authors: joel yarmush, MD - NYP Brooklyn Methodist Hospital

We report a case of a parturient with a symptomatic pericardial effusion scheduled for a C-section.

Small subclinical pericardial effusions are common and have been reported to be present in 15 to 20 percent of all pregnancies in the first and second trimester and approximately 40 percent in the third trimester (1). These effusions are asymptomatic and usually resolve spontaneously. In the absence of signs or symptoms of acute pericarditis or cardiac tamponade, neither diagnostic testing nor specific treatment is required. However, cardiac tamponade may be partially masked during pregnancy due to the physiologic increase in circulating blood volume. This may lead to a larger pericardial effusion being present before signs or symptoms are detected. Our patient is a 25-year-old woman with SLE. She had a previous pregnancy only complicated by preeclampsia necessitating a C-section.

This pregnancy was remarkable for a symptomatic pericardial effusion during the first trimester requiring pericardiocentesis. The reminder of her pregnancy was uncomplicated until 37 weeks gestation when a repeat echo for planned C Section showed LVEF of 55-60% with a large primarily posterior directed pericardial effusion similar to her previous effusion. The patient denied any chest pain, palpitations or dyspnea. There was no evidence of tamponade. Her vital signs and labs including chest x-ray and EKG were normal.

A multidisciplinary meeting was convened with obstetrics, anesthesia, cardiology, hematology and rheumatology teams to discuss her planned elective C-section. A sequential combined spinal-epidural (CSE) with careful fluid management to maintain preload, afterload and heart rate was agreed upon in view of her heart condition. Standard monitoring along with invasive arterial pressure monitoring was established. An epidural catheter was inserted via the L₃₋₄ interspace using an 18 G Tuohy needle. Lumbar puncture was performed at L₃₋₄ interspace and 1 ml (7.5 mg) hyperbaric bupivacaine along with 15 mcg fentanyl and 0.15 mg morphine was given intrathecally, after confirming free flow of cerebrospinal fluid. Sensory level was achieved till T₆. Simultaneously, the patient was given 750 cc of 5% Albumin and a norepinephrine drip was started. Crystalloid was titrated throughout for a total of 1500 ccs. A slow intravenous oxytocin infusion (30 units in 500 ml of 0.9% saline) was started soon after delivery of baby. Patient was comfortable and asymptomatic throughout. Careful co-loading of fluids and a norepinephrine drip allowed for an uneventful C-section with regional anesthesia.

Anesthesia Management of caesarean section in patient with Pericardial effusion.pdf

## Perioperative and Obstetric Management of a Parturient with Peripartum Cardiomyopathy for Emergent Cesarian Section

**Presenting Author:** Courtney Singleton, MD, PhD **Presenting Author's Institution:** Thomas Jefferson University Hospital - Sharon Hill, Pennsylvania **Co-Authors:** 

Introduction: Peripartum cardiomyopathy (PPCM) is a rare left-sided heart failure that develops in the late stages of pregnancy or early postpartum months. This condition increases the risk of death and thromboembolic events during pregnancy and can result in permanent cardiomyopathy. Although rare, since 1990, incidence has nearly quadrupled in the United States to nearly 1:1000 parturient in 2003-2011, largely due to increased maternal age, chronic hypertension, and improved disease awareness. However, there remain limited examples of anesthetic management for parturients with PPCM. In this case report, we describe the perioperative course and anesthetic used for a primipara with PPCM complicated by signs of allergic reaction, severe preeclampsia, chorioamnionitis, obesity, and fetal distress requiring a cesarian section.

<u>Presenting Illness:</u> The patient is a 29-year-old female with a history of class 3 obesity who presented with tongue swelling, sore throat, tachycardia, and hypertension that began 2-3 hours after consuming over-the-counter decongestants. After prompt treatment for possible angioedema or anaphylaxis, tongue swelling improved, but a new wheeze was noted. Urine HCG was elevated and transvaginal ultrasound confirmed an intrauterine pregnancy at 36 weeks gestation, but no fetal heart tones were initially detected. Laboratory tests demonstrated profound leukocytosis, moderate lactic acidosis, transaminitis, hypercoagulability, and cardiac stress with elevated troponins and proBNP. Echocardiogram revealed severely reduced left ventricle ejection function of 15-20% without dilation, concerning for Kounis syndrome or PPCM. Upon admission to the cardiac intensive care unit (ICU), the patient was diagnosed with preeclampsia with severe features and chorioamnionitis given worsening abdominal pain and oliguria. Fetal heart tones were detected but a category II tracing with labile heart rates between 60 and 160 bpm and late decelerations was observed, prompting an emergent cesarian section.

<u>Perioperative Management:</u> We describe early interdisciplinary PPCM management by anesthesia, obstetric, and cardiac ICU physicians, resulting in timely arterial line placement, nasal pharyngeal laryngoscopy confirming patent glottic opening with resolution of previous swelling, and pre-incision diuresis to combat the stress of post-delivery autotransfusion. Additionally, we highlight the anesthetic decisions made in the delivery of effective epidural anesthesia for a cesarian section in a parturient with PPCM while taking into consideration the possibility of progressive heart failure, circulatory arrest, respiratory compromise, and worsening sepsis in the perioperative period.

### **Aortic Aneurysm & Dissection Peripartum**

**Presenting Author:** Ben Schmitt, DO **Presenting Author's Institution:** Medical College of Wisconsin, Wisconsin **Co-Authors:** Ayse Kula, MD - Medical College of Wisconsin

**Case**: A 42F with history of hemi-arch replacement and chronic type B aortic dissection with associated 5.2cm thoracic aneurysm became pregnant. She was placed on labetalol and had serial MRIs at 14w1d, 18w1d, 26w0d, & 30w6d gestation showing stable descending aorta dimensions of 5.0 x 5.2cm. After several episodes of unexplained hypotension (80s/40s) and her history of placenta previa, it was decided to deliver via cesarean after antenatal steroids at 31w0d gestation. After extensive consent, pre-op left radial arterial line was placed reading 30mmHg higher than right arm blood pressures (BP). Initial BP of 191/67 prompted IV nitroglycerin boluses and initiation of esmolol & nicardipine drips. Once normo-tensive a combined spinal epidural with 1.5cc of 0.5% bupivacaine was performed. Esmolol & Nicardipine were prophylactically paused, but despite this the BP fell to 89/40, and the patient had to be temporized with a total of 200mg phenylephrine & 10mg ephedrine. 4 boluses of 40mcg of IV nitroglycerin were required to facilitate fetal delivery. The patient recovered in the cardiac ICU, where blood pressure was tightly controlled for another 2 weeks. On post-partum day 14 the patient went back to the OR and had her open distal arch and descending aorta repaired under deep hypothermic circulatory arrest.

**Discussion**: C-section should be the preferred mode of delivery in patients with chronic dissection or ascending aorta/root > 4.5cm per 2022 American Heart Association guidelines. Pregnancy associated aortic dissections typically occur from third trimester to 12 weeks post-partum, with hypertension & advanced maternal age as known risk factors. Beta blockers are shown to slow rate of aortic dilation and diminish wall stress, even in patients without hypertension. The European Society of Cardiology's Registry Of Pregnancy And Cardiac disease (ROPAC) has shown no difference in birth weight or rates of preterm labor when patients take beta blockers throughout pregnancy. At risk patients include those with Marfan's, Loey-Dietz, Turner's, bicuspid aortic valve, vascular Ehler-Danlos, and other hereditary aortopathies.



### A Case of Tricuspid Stenosis Presenting for Cesarean Delivery

### **Presenting Author:** Tyler R. King, MD **Presenting Author's Institution:** UTMCK Anesthesiology Residency **Co-Authors:**

Case: A 34-year-old female G3P2 patient at 35.1 weeks presented for a cesarean delivery due to severe fetal growth restriction with absent end diastolic flow on uterine artery dopplers. The patient's past medical history included a history of endocarditis with bioprosthetic valve replacement four years ago. During this pregnancy, she was hospitalized at 19 weeks gestation for exertional chest pain, shortness of breath, and increase in lower extremity edema. At that visit, a transthoracic echo (TTE) showed moderate to severe tricuspid stenosis with estimated right ventricular systolic pressure (RVSP) at 19.2 mmHg and peak tricuspid velocity of 164cm/s. On the day of the cesarean delivery, cardiology was consulted and a repeat TTE was obtained. The tricuspid valve was determined to be moderately stenosed with a mean gradient of 6 mmHg and a peak tricuspid velocity of 168 cm/s. The decision was made to place a combined spinal and epidural with a reduced dose of intrathecal bupivacaine to decrease the risk of sudden hemodynamic changes. The patient developed a T12 level of anesthesia to pinprick following intrathecal administration of 6mg of hyperbaric bupivacaine with 0.15mg morphine and 15mcg fentanyl. Additional lidocaine was administered through the epidural to achieve a T4 level of anesthesia. She was coloaded with 1L of lactated ringers at the time of spinal placement to maintain preload and started on a phenylephrine infusion to maintain her blood pressure at baseline levels. Post-surgery, the patient was taken to the intensive care unit for cardiac monitoring and was successfully discharged from the hospital two days later.

Discussion: Tricuspid Stenosis is a rare valvular heart condition that accounts for less than 1% of valvular heart disease. There are very few case reports of tricuspid stenosis in pregnancy due to the rarity of the primary lesion. The situation is complicated by the patient having underwent tricuspid valve replacement surgery 4 years prior. Due to no concise guidelines on tricuspid stenosis gradients with a bioprosthetic valve, the decision was made to perform a combined spinal and epidural. The preferred route of vaginal birth, which would have allowed the patient's cardiac output to slowly increase and compensate during the stages of labor, was unable to be done due to the complications with the fetus. During this case, halving the intrathecal dose, while slowly titrating up the epidural allowed for a T4 level of anesthesia to be obtained while minimizing hemodynamic changes in the patient.

# Management of Pericardial Effusion in a Parturient Presenting with Hypertensive Crisis and Respiratory Failure

**Presenting Author:** Anjana Sekaran, MD **Presenting Author's Institution:** The Johns Hopkins Hospital **Co-Authors:** Tessie Allan, MD - The Johns Hopkins Hospital

Pericardial effusions affect 40% of pregnant women in the third trimester.¹ While the majority of these are asymptomatic and spontaneously regress,¹ they have the potential to progress to cardiac tamponade with rapid increases in volume. In the parturient with a pericardial effusion presenting with impending respiratory failure, early diagnosis and preoperative optimization are crucial due to the possibility of an emergency delivery. A 32-year-old morbidly obese G2P1 with unknown pregnancy presented at 35w with elevated blood pressures concerning for superimposed preeclampsia with severe features and increased work of breathing in the setting of COVID-19. CXR showed pulmonary edema, and serial TTEs revealed a moderate pericardial effusion with early signs of tamponade such as interventricular dependence and right atrial inversion. Despite aggressive management with a nicardipine drip, diuresis, and targeted antimicrobial therapy for both COVID and bacterial pneumonia, her respiratory status continued to deteriorate. She required emergent cesarean section for fetal concerns the following day.

General anesthesia was induced with 100 mg propofol and 160 mg succinylcholine and maintained with propofol TIVA. Hemodynamics were maintained with small boluses of phenylephrine and ephedrine. Positive pressure ventilation was provided with lung-protective ventilation strategies. The patient returned to the CCU intubated postoperatively. She was extubated on postpartum day 6 after treatment for ARDS, presumably COVID-related, and was discharged on postpartum day 12. She continues to undergo a workup for secondary hypertension with a normal renal ultrasound and negative urine metanephrines so far.

This case demonstrates the importance of preoperative workup as well as a multidisciplinary approach in a parturient with a complex multisystem condition of unclear etiology with impending respiratory failure. Early diagnosis of pericardial effusion was established through TTE. Careful multidisciplinary coordination among cardiology, obstetrics, and anesthesiology followed to manage the patient's respiratory distress and hypertension prior to surgery. Intraoperatively, the anesthesiology team ensured adequate preload, heart rate, and contractility through careful titration of propofol and vasopressors. Care was taken to avoid large tidal volumes and inspiratory pressures to maintain venous return given the concern for evolving tamponade. She was delivered in a cardiac OR with TEE and ECMO immediately available in the event of hemodynamic shifts. The patient was delivered safely due to strong communication and preparation in a multidisciplinary fashion.

## Peripartum management of patient with remote orthotopic heart transplant and severe diastolic dysfunction

Presenting Author: Daniel Conti, MD Presenting Author's Institution: Stanford University - San Jose, California Co-Authors: Brendan Carvalho, MBBCh, FRCA, MDCH - Stanford University School of Medicine, USA Hayley Miller, MD - Stanford University Pervez Sultan, MBChB, FRCA, MD - Stanford University

Case: A 39 year old G2P1 at 37+3 who underwent heart transplant (HT) 25 years prior. Her past medical history included chronic hypertension and pulmonary embolus (PE) at 23w gestation resulting in the administration of therapeutic Enoxaparin. She was admitted for new onset lower extremity edema refractory to outpatient diuresis for 2 weeks, although she remained with NYHA Class 1 symptoms. Outpatient Transthoracic echocardiography (TTE) had a trend of increasing Right Ventricular Systolic Pressure (RVSP) up to 50mmHg, increased Right Ventricular size and Tricuspid Regurgitation (TR) progressing from mild to moderate. Upon admission, she had a TTE demonstrated mild to moderate TR, RVSP 36mmHg, and LVEF 66%, with no concern for PAH but significant evidence of diastolic dysfunction (DD) with E/e' of 30.

She underwent Cesarean Section the following day at 37w4d for maternal cardiac disease and breech presentation under a neuraxial anesthetic. TTE by her anesthetic team redemonstrated normal Biventricular function but IVC dilated >2cm with minimal respiratory variation and persistent tissue doppler evidence of DD (E/e' >14). She had an estimated blood loss of 500 mL and received 700 mL of Normosol. In PACU she could not be weaned from oxygen via nasal cannula. POCUS revealed increased B-lines throughout bilateral lung fields and stable cardiac assessment. She was admitted to the cardiac stepdown unit for IV diuresis and monitoring. After 24 hr, 40 mg of furosemide, urine output of 4.1L (net negative 2.3L), and weaning from supplemental oxygen, she was deemed stable enough to transfer to a postpartum unit. She was discharged home on day 3 postoperatively with no standing diuretics.

Discussion: Retrospective analyses have demonstrated that HT patients have increased risk for hypertensive disorders of pregnancy and induction of labor. Our case illustrates that even well optimized HT recipients are at risk for significant peripartum complications, such as our patient's intolerance of minimal fluid shifts due to DD. DD after HT is common, especially exercise induced. There is significant variation in practice patterns of pregnancy management after HT. Future multicenter prospective studies are needed to determine peripartum outcomes and optimal peripartum cardiac management of parturients with HT.

# Cesarean delivery in a patient with acute cerebral venous sinus thrombosis, cerebral infarcts and a recent COVID 19 infection

### Presenting Author: Liuda Nolan, MD

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Co-Authors: Mohammed Idris, MD - John R. Oishei Children's Hospital

### Introduction

Cerebral venous sinus thrombosis (CVST) occurs in the context of a hypercoagulable state with incidence of about 2–5 cases per million in general population and 1:10,000 - 1:25,000 in pregnancy(1). Risks factors include pregnancy, pre-eclampsia, anti-phospholipid syndrome, factor V Leiden, protein C and S deficiency, prothrombin mutation, COVID illness. We report a case of a pregnant patient with CVST undergoing successful administration of neuraxial anesthesia for cesarean delivery.

### **Case report**

T.M. is a 28 year old G5P4 female with past medical history of smoking, obesity, four cesarean sections and postpartum hemorrhage, COVID illness one month prior, now admitted to the hospital at 36 weeks gestation due to 3-day history of progressively worsening frontal headache, right monocular blurriness and "red spots" in the right visual field. Her neurological exam and HELLP labs were negative. MRI brain, showed 15mm left posterior temporal occipital cortical hyperintense lesion representing a venous infarct in the setting of dural venous sinus thrombosis, a small infarct of the medial right adjacent parietal lobe and complete thrombosis of the parasagittal and transverse sinuses. She was started on a heparin drip for anti-coagulation. She was deemed at high risk of uterine rupture and delivery was planned for 37-38 weeks. On the day of surgery heparin was stopped and coagulation panel was checked. Spinal anesthesia was performed at L4-L5, using 25G Pencan needle, 1.6ml of hyperbaric bupivacaine, 200mcg of epinephrine, 150mcg of morphine and 25mcg of fentanyl given intrathecally. Phenylephrine drip was started at 0.5mcg/kg/min. Vital signs remained stable throughout the case and blood loss was 460ml. Heparin drip was restarted 8 hrs after surgery. Post - operative MRI of the brain was comparable with pre-operative study but with evidence of minor posterior parietal-occipital subarachnoid hemorrhage. She was started on enoxaparin, transitioned to warfarin and discharged home.

### Discussion

Management of our patient was complicated due to concern for neuraxial anesthesia resulting in extension of the thrombosis and misdiagnosis of worsening CVST (with PDPH) after delivery. General anesthesia had the potential for increase in intracranial pressure with airway manipulation. There is a theoretical association between accidental dural puncture during neuraxial procedures and CVST(2). Together with prothrombotic state of pregnancy and history of COVID illness these processes can theoretically potentiate formation of CVST(3). After considering the risks and benefits of

both neuraxial and general anesthesia, we proceeded with spinal anesthesia. Our patient tolerated the procedure well and recovered without any further complications from her CVST.



### Axonal Polyneuropathy in a Patient with Hyperemesis Gravidarum

**Presenting Author:** Alnesha Banks, MD **Presenting Author's Institution:** UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL - Durham, North Carolina **Co-Authors:** Kathleen A. Smith, MD - University of North Carolina

Hyperemesis gravidarum (HG), which complicates up to 3% of pregnancies, is defined as severe nausea and intractable vomiting during pregnancy. Historically, thought to be a diagnosis of psychological origin, current research has linked HG and genetic variation to placental proteins.¹ Severe, HG can cause electrolyte disturbances and vitamin deficiencies leading to subacute limb weakness.¹ The literature contains many reports describing a Wernicke's encephalopathy in patients with severe HG.^{1x} Given an increased risk of further neurologic sequelae following neuraxial anesthesia, anesthesiologists should exercise caution when developing and implementing a regional anesthetic care plan for these high-risk patients.²

Our case involves a 24 y.o G2P0 at 38⁶ weeks with past medical history of chronic HTN, Type II DM and asthma presenting for primary cesarean delivery (CD) in the setting of multiple fetal central nervous system (CNS) anomalies. Five months prior to delivery, she presented with new onset ascending limb weakness, nystagmus and altered mental status following a diagnosis of HG at 16 weeks gestation. The patient underwent extensive neurologic work-up, including brain/spine MRI and lumbar puncture, which was negative for intrinsic CNS pathology. EMG showed diffuse axonal loss. Differential included Acute Motor Axonal Neuropathy (AMAN), a variant type of Guillain-Barre Syndrome as well as axonal polyneuropathy secondary to vitamin deficiency. Electrolyte replacement and thiamine supplementation resulted in symptomatic improvement. On preoperative examination, the patient was noted to have 4.5/5 strength in her lower extremities bilaterally. She underwent an uncomplicated CD under neuraxial anesthesia with epidural anesthesia. The epidural catheter was removed on post operative day (POD) 0 and the patient endorsed return to baseline on POD 1. She recovered well and was discharged home on POD 4. The patient continued to follow up with Neurology following discharge and has now returned to her pre-pregnancy baseline neurological function. This case illustrates severe neurological complications associated with HG, the importance of correcting vitamin deficiencies in these patients, and utilization of epidural anesthesia in a patient with a pre-existing neurological deficit.

## Management of a Parturient with Cerebral Palsy and a Ventriculoperitoneal Shunt with Seizure Immediately following Spinal Anesthesia for Cesarean Delivery

**Presenting Author:** Brittni Lanoux, MD **Presenting Author's Institution:** LSUHSC New Orleans - Metairie, Louisiana **Co-Authors:** 

**Introduction:** Cerebral Palsy (CP) represents a range of symptoms usually stemming from peripartum injury to the brain. Sequelae includes seizures, neuromuscular dysfunction, paralysis, swallowing impairment, scoliosis, chronic lung disease and cognitive impairment. Thorough pre-op assessment is essential. Hydrocephalus is common and is treated with a ventriculoperitoneal shunt. Prior to delivery, the VP shunt should be evaluated for appropriate function; otherwise, spinal anesthesia carries minimal risk when carried out with a 25-gauge pencil point needle (1). Though neuraxial would be ideal, general anesthesia may be necessary (2). We describe a 33yo G1P0 at 37wks with CP and multiple medical co-morbidities with rapid desaturation after completion of neuraxial necessitating general anesthesia and emergent c/s.

**Case Presentation:** A 33yo G1P0 at 37wks presented for scheduled c/s due to fetal macrosomia and maternal comorbidities including CP, HTN, asthma, OSA, and epilepsy (last seizure 3 months prior). At baseline, patient is legally blind, uses a walker, and has moderate mental slowing. She had a functioning VP shunt for hydrocephalus with appropriate neurology and NSGY follow up and clearance for neuraxial anesthesia. On presentation the patient was at her neurologic baseline and a spinal was subsequently performed in the OR with OB at bedside. During the procedure, vitals remained stable with blood pressure 150/90, HR 110s and SPO2 99%. After laying supine, SPO2 decreased to 90% and she became unresponsive. Bag mask ventilation attempted while preparing for intubation with little improvement and noted clenched jaw. SPO2 declined to 85% and FHTs dropped into 60s. Emergent c/s of a live infant ensued after immediate intubation and GETA. Throughout this time, vitals remained stable with BP 130s/60s, HR 110s and SPO2 100% after intubation. She was subsequently extubated and transported to PACU in stable condition. Confusion prompted neurology consult in PACU, but her neuro status began improving. In 24 hours she returned to baseline with EEG without epileptiform activity and a CT head unchanged. Per neurology, the event was likely seizure versus psychogenic event. Patient was also diagnosed with atypical Pre-E POD 1 and started on magnesium.

**Discussion:** Cerebral palsy envelops a wide range of sequelae, all of which effect the anesthetic plan and can increase case complexity. Spinal anesthesia can be safe in these patients with a functioning VP shunt with minimal concern of increased ICP as spinal dosing does not exceed the critical volume of 5mL (1). Though neuraxial is ideal, medical co-morbidities, clinical acuity, propensity for neurologic changes, seizures, and eclampsia can necessitate general anesthesia (3). Prompt recognition and efficient

multidisciplinary communication in these complex patients are critical for optimal maternal and neonatal outcomes.

## Amyotrophic lateral sclerosis (ALS) and Anesthesia in an Obstetric Patient - Case Report

**Presenting Author:** Grant Chambers, MD, MPH **Presenting Author's Institution:** University of Arkansas for Medical Sciences - Little Rock, Arkansas **Co-Authors:** Waseem Athar, MD - UAMS

#### Background:

Amyotrophic lateral sclerosis (ALS) is a degenerative motor neuron disease that is uncommon in the obstetric population.

### Case:

We present a case of 27-year-old primigravida at 34 weeks and 3 days gestation with a background of ALS. Her ALS was originally manifested as bilateral shoulder weakness 10 months prior. She had a percutaneous endoscopic gastrostomy for feeding and a tracheostomy to allow ventilatory support. Her pregnancy was complicated by a pulmonary embolism for which she received anticoagulation. She was admitted due to acute on chronic respiratory failure with multifocal pneumonia and hemoptysis. Despite escalating inpatient therapy, her hypoxia worsened with associated late decelerations on fetal heart tracings (FHT). Emergent bronchoscopy revealed thrombus in the right main bronchus that was extracted, and hemostasis was achieved with cryoablation. FHT remained non reassuring and were minimally responsive to maternal repositioning and fluid bolus. The decision was made to proceed with cesarean delivery. On pre-operative evaluation, she was anxious, heart rate was 105 beats per minute (bpm) and regular, blood pressure (BP) 140/82 mmHg. She had a cuffed tracheostomy and oxygen saturations were 100% on 40% oxygen. Her hemoglobin was 7.5 g/dL for which she was being actively transfused. We proceeded with inhalational induction of anesthesia and placed an arterial line for hemodynamic monitoring. After uterotomy she became hemodynamically unstable, likely due to poor uterine tone and hemorrhage. This was treated with a further unit of blood, oxytocin and methylergonovine administration. The baby was delivered with APGARs of 2, 2 and 5 at 1, 5 and 10 minutes respectively. She spent a further 2 days in the intensive care unit for management of her respiratory failure and discharged on day 5 on home ventilator settings.

### Discussion:

The main problem during pregnancy is respiratory compromise. The mode and timing of delivery are affected by the severity of the disease and associated comorbidities. The choice of anesthesia is complicated. Neuraxial anesthesia has many advantages, however anesthesia of the intercostal muscles may impede expiratory flow and exacerbate respiratory failure. Our patient was receiving anticoagulation and therefore neuraxial anesthesia was not an option.

# Intracranial Hemorrhage in a Viable Parturient with Cesarean Section Delayed 33 Days

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### Introduction:

Intraventricular hemorrhage (IVH) in a viable parturient creates challenges for timing of delivery and maternal and fetal safety. We present a parturient who experienced devastating IVH and underwent emergency cesarean section 33 days later.

### **Case Report:**

A 29 year old G1P0 woman at 27 weeks presented to the emergency department following acute onset of headache, nausea and vomiting. She became bradycardic, hypertensive and unresponsive with GCS 3 upon arrival requiring intubation. CT scan demonstrated moderate IVH with a space occupying lesion in the posterior fossa with brainstem compression (Figure 1). Emergent treatment included extraventricular drain, hypertonic saline, angiogram and embolization for ruptured PICA aneurysm followed by suboccipital decompressive craniectomy on POD 1 and repeat embolization on POD 4.

Her neurologic examination improved but she developed seizures requiring burst suppression. Co-management by neurosurgery and maternal fetal medicine ruled out eclampsia. Fetal non stress tests and biophysical profiles were reassuring. Cesarean delivery was delayed given her critical status and gestational age. She was treated with magnesium and betamethasone for fetal neuroprotection and lung maturity, intermittent mannitol and hypertonic boluses to assist with intracranial pressures, and tracheostomy.

On POD 33 at 31 weeks 5 days, she went into preterm labor. Breech presentation, thin lower uterine segment, and fetal intolerance prompted emergent cesarean section. The case proceeded uneventfully with general anesthesia through existing tracheostomy and she returned to the ICU with GCS 8. Five days later, repeat angiogram demonstrated stable and complete occlusion of her dissecting aneurysms. Her course was further complicated by ongoing seizures and myoclonic status. Neurologic status improved with stabilization of seizure burden.

Her tracheostomy was decannulated, gastrostomy tube placed, and she was discharged on POD 86 from initial embolization. She is wheelchair bound with hypophonia and speech ataxia but continues to work with physical, occupational and

speech therapy with improvement. Five week surveillance angiogram shows right vertebral artery slight blush and she will undergo further interventional treatment.

### **Discussion:**

Timing of delivery in maternal IVH is complicated and requires a multidisciplinary team to balance fetal and maternal considerations. IVH treatment exposes the fetus to radiation, induced hypotension, hyperventilation, heparinization, and antiepileptics while the physiologic changes of pregnancy may worsen aneurysmal bleeding. Due to maternal instability, high intracranial pressures and poor clinical status, emergent ventricular drainage, embolization and surgery were pursued while maintaining pregnancy. These scenarios must also include discussions of intraoperative fetal monitoring and decisions regarding suspending an intracranial procedure for emergent delivery.



### A Case of an Awake Craniotomy in a Pregnant Patient

### Presenting Author: Carmen Lopez, MD

**Presenting Author's Institution:** Northwestern University Feinberg School of Medicine **Co-Authors:** John Bebawy, MD - Northwestern University Feinberg School of Medicine Jasmine Capellan, MD - Northwestern University Feinberg School of Medicine Introduction:

Brain tumors in pregnant patients occur with the same incidence as their nonpregnant counterparts, however, the hormonal and physiological changes of pregnancy may hasten presentation and diagnosis (1). The most common intracranial neoplasms include gliomas (39%), meningiomas (35%), and pituitary adenomas (7%) (2). Management of intracranial tumors during pregnancy will be determined by type of tumor, presence of symptoms, and mass effect.

### Case Presentation:

A 36-year-old G3P2 at 18 weeks and 2 days gestational age presented with symptoms of headaches, language deficits, and confusion. On imaging, she was found to have a left temporal lobe mass suspicious for a glioblastoma multiforme necessitating an awake craniotomy with utilization of intraoperative language and sensory mapping. In the OR, after aspiration prophylaxis was given, large bore IV access was obtained and patient was started on an infusion of propofol, dexmedetomidine, and remifentanil. Arterial line was placed for close blood pressure monitoring. Scalp blocks were performed using 0.5% bupivacaine with 1:200,000 epinephrine. The patient was positioned in way that optimized both uteroplacental perfusion and surgical exposure and head was pinned using a Mayfield device. For intracranial pressure (ICP) management, dexamethasone was administered while mannitol was deferred given the potential harmful effects on the fetus. Levetiracetam was given for seizure prophylaxis. During tumor resection, the patient was awoken to allow for neuropsychology testing. Intra-operative fetal heart rate monitoring (FHT) was deferred given that this was a previable pregnancy. After a brief ICU stay, she was discharged with outpatient radiation therapy.

### Discussion:

Anesthetic management during an awake craniotomy should take into account the many physiological alterations of pregnancy including gastrointestinal, respiratory, hemodynamic, and metabolic changes. Management of ICP is an important component of neurosurgery and care must be taken to avoid potential consequences of altering maternal-fetal physiology. Mannitol should be used with caution and at lower doses as there is potential for accumulation in the fetus resulting in hyperosmolality, reduced fetal lung fluid production, and diminished renal blood flow (3). Hypertonic saline may be more physiologic, however, its safety profile has not been well studied (4). Normotension should be maintained in order to preserve both uteroplacental blood flow as well as cerebral perfusion(4). While intra-operative FHT monitoring may be helpful in

assessing fetal well-being, its utility will be determined by fetal viability, patient preference, and the feasibility of converting from surgical procedure to a cesarean delivery.

### Management of Moyamoya Disease in Pregnancy after Intracranial Bypass Grafting: A Case Report and Literature Review

**Presenting Author:** Dennerd Ovando, Jr., MD **Presenting Author's Institution:** Rutgers New Jersey Medical School - Jersey City, New Jersey **Co-Authors:** 

**Introduction:** Moyamoya disease (MD) is a chronic idiopathic vasculopathy characterized by bilateral stenosis of the distal internal carotid arteries with subsequent formation of abnormal collateral vessels. The underlying etiology is unknown. Patients with MD are predisposed to intracranial hemorrhage or cerebral ischemia given the fragile nature of the collateral circulation. Although there is no curative treatment for MD, there are surgical palliative procedures that can augment cerebral blood flow to areas of impaired perfusion and circumvent the abnormal collateral circulation. Medical management exists for patients who are not surgical candidates. Because the incidence of MD peaks during the second and third decades of life, it can potentially affect women of childbearing age¹. However, the optimal medical and surgical management of the parturient with MD remains controversial. We present a case of a primigravida with a history of MD who underwent intracranial bypass grafting prior to conception and subsequently had a successful cesarean delivery that was complicated by transient ischemic attacks (TIA) in the postpartum period.

**Case Report:** A 28-year-old female with a past medical history of MD status-post intracranial bypass grafting presented to the hospital at 39 weeks for a scheduled caesarean section. She underwent an uneventful cesarean section under spinal anesthesia with subsequent delivery of a healthy female infant. 24 hours after delivery, the patient experienced two brief episodes of "numbness and tingling" to her left cheek, lips, and tongue. There was concern she was having TIAs. Brain MRI/MRA did not reveal any acute lesions. She was then started on Aspirin 325 mg daily. The rest of her post-operative course was unremarkable.

**Discussion:** There are currently no clear guidelines or standard recommendations as to management of MD in the pregnant patient. The core of MD medical management consists of maintaining the fine balance between cerebral blood flow (CBF) and oxygen consumption (i.e. CMRO₂) in order to minimize the risk of cerebrovascular events. This can be achieved by avoiding hypotension and hypertension, maintaining euvolemia and normothermia, and minimizing pain and hyperventilation. Each of these variables can disrupt the CBF-CMRO₂ balance and precipitate an ischemic or hemorrhagic stroke. Surgical intervention is usually reserved for patients that have symptomatic MD or for asymptomatic patients with findings on neuroimaging showing severe limitations in resting blood flow².



### Ventriculoperitoneal Shunt Malfunction in a Complex Parturient

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### Introduction:

Ventriculoperitoneal (VP) shunts are commonly used to treat hydrocephalus by draining excessive cerebrospinal fluid (CSF) into the peritoneal cavity. In patients with untreated hydrocephalus or shunt malfunction, increased intracranial pressure begins to develop and can lead to adverse outcomes such as cerebral edema, neuronal death, and ultimately cerebral herniation. We present a case detailing the management and challenges of a parturient with acute hydrocephalus secondary to shunt malfunction.

### Case

A 41-year-old at 30 weeks monochorionic-diamniotic twin gestation with congenital hydrocephalus presented with lethargy, nausea, and vomiting. She has a history of multiple shunt revisions and her comorbidities included cerebral palsy, chronic hypertension, pulmonary dysplasia, asthma, malignant hyperthermia (MH), and scoliosis. During the initial hospitalization, her lethargy worsened, and she became unresponsive. A head computed tomography scan was performed and demonstrated acute hydrocephalus suggestive of VP shunt malfunction. She underwent an emergent shunt tap, removing excessive cerebrospinal fluid with immediate improvement in her symptoms. The VP shunt was externalized just distal to the clavicle and the proximal ventricular shunt was attached to an external ventricular drain to allow continuous CSF drainage.

A multidisciplinary team consisting of neurointensivist, neurosurgery, perinatologists, obstetricians, obstetric anesthesiologists, and neonatologists were formed to develop an appropriate course of management. The major concerns included the severity of the patient's hydrocephalus and the infection risk of the exposed ventricular shunt. The decision was made to proceed with a cesarean delivery (CD) at 32 weeks and 4 days of gestation. MH precautions were taken and a lumbar combined spinal epidural was performed. The CD was uncomplicated with successful deliveries of both neonates. She underwent a VP shunt revision on postpartum day 7 and was discharged on the following day.

### Conclusion:

In the setting of pregnancy, the increased intraabdominal pressure can lead to VP shunt malfunction and become a medical emergency. Our case highlights the necessity of an interdisciplinary approach to a complex parturient and the unique considerations to ensure optimal maternal and fetal outcomes.

## Ruptured Recurrent AVM and Intraventricular Hemorrhage in the Third Trimester: Perioperative Anesthetic Considerations for Cesarean Section

Presenting Author: Taylor Leathers, MD

**Presenting Author's Institution:** University of Kansas Medical Center - Kansas City, Missouri

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Cerebral arteriovenous malformation (AVM) in pregnancy is a complex situation that requires collaboration between neurosurgical (NSGY), critical care, maternal fetal medicine (MFM) and anesthesiology teams to coordinate the best care for the patient and their fetus. We present a 38-year-old G1P0 female at 31w2d gestation with history of ruptured AVM status post clipping in 2009. She was lost to follow up for definitive treatment with stereotactic radiosurgery (SRS). She presented to an outside hospital with headache, aphasia and right hemiparesis. She was found to have interventricular and intracerebral hemorrhage (ICH) secondary to recurrent ruptured venous aneurysm in the left frontal region. She was transferred to our center and admitted to the neuro intensive care unit (NEICU) and an external ventricular drain was placed. MFM was consulted and agreed with need for angiogram. Angiogram revealed a Martin Spetzler grade 4 AVM (3.2cm) and a venous aneurysm with prior clipping. Due to its location, NSGY agreed that resection would be high risk and SRS would be superior for definitive treatment following delivery. While in the NEICU, she eventually met criteria for preeclampsia. Due to pre-eclampsia and risk of developing severe hypertension, MFM and NSGY teams agreed that delivery at 34w5d via cesarean section (CS) would be safest as labor is contraindicated with active AVM. A multidisciplinary discussion between anesthesia, NSGY and MFM teams occurred regarding anesthetic plan. Since her neurological status had stabilized and ICP was not elevated, there was no contraindication to neuraxial anesthesia. This technique is preferred to general, especially with the ability to have a constant neurological exam throughout the CS. Arterial line was considered for strict hemodynamic control; however, arterial line was not achieved due to technical complications. CSE was placed using 1ml hyperbaric 0.75% bupivacaine with 10mcg fentanyl and 100mcg morphine. The block was tested and adequate. Surgery was uncomplicated. Patient was taken to the L&D PACU and signed out to the postpartum unit a few hours later. Unfortunately, her postoperative course was complicated by vasospasm, likely secondary to postpartum reversible cerebral vasoconstrictive syndrome (RCVS). She required interventional radiology for intra-arterial verapamil and later had an angiogram with partial AVM embolization. She was discharged home after 6 weeks in the hospital. She then received staged SRS and is doing well clinically.

Literature is mixed in terms of AVM rupture risk in pregnancy. While most agree that pregnancy does not confer a higher risk for rupture, a recent cohort study found pregnancy and puerperium were associated with a greater than 3-fold risk of ICH¹. However, RCVS is another complication to consider as prevalence is relatively high in the postpartum patient².



## Interdisciplinary Management of a Parturient with Type II Spinal Muscular Atrophy

Presenting Author: Mikayla Troughton, MD Presenting Author's Institution: Northwestern University, Illinois Co-Authors: Mahesh Vaidyanathan, MD, MBA - Northwestern University

### Introduction

Spinal muscular atrophy (SMA) is an autosomal recessive disorder of the SMN1 gene, characterized by muscle weakness and atrophy, resulting from progressive degeneration and loss of the anterior horn cells in the spinal cord¹. Treatments such as nusinersen are allowing women with severe forms of SMA to survive into their reproductive years. We report the complex multidisciplinary prenatal care and the anesthetic plan for cesarean delivery in a patient with type II SMA.

### Case

A 29 year old G1P0 with estimated date of delivery 03/21/2023 presents for prenatal care. Her past medical history is significant for type II SMA. Surgical history includes spinal surgery with Harrington rod placement from sacrum to high thoracic level at the age of 10. She is wheelchair bound, has severe kyphoscoliosis with 0/5 strength in bilateral lower extremities and 2-3/5 strength in bilateral upper extremities. She has hip contractures preventing her ability to lay supine and her partner provides complete care for activities of daily living. Airway exam demonstrates a Mallampati II with hyomental distance of 3cm, normal mouth opening, limited neck extension, and tongue fasciculations indicating SMA bulbar involvement. Swallow evaluation recommended soft diet due to recurrent aspiration and secretions requiring suctioning. PFTs demonstrated severe restrictive lung disease with FVC 23% and FEV1 25% of predicted values. She wears BiPAP for 10 hours per day and recent ECHO was normal.

Cesarean delivery with general anesthesia (GA) and postoperative ICU transfer is planned for controlled extubation to non-invasive ventilation. The patient is amendable to awake fiberoptic intubation and total intravenous anesthesia (TIVA) will be used for maintenance. Enhanced recovery protocol including an abdominal wall block is planned for postoperative pain control.

### Discussion

Pregnant patients with SMA are more likely to have chronic back pain and respiratory compromise often resulting in preterm delivery². Although regional anesthesia has been successfully used for cesarean delivery, we are planning GA due to our patients severe respiratory compromise, anticipated difficulty with positioning, history of Harrington rod placement and the inability to predict spread of neuraxial anesthetics. Awake fiberoptic intubation is planned to preserve airway reflexes with known high

aspiration risk, short hyomental distance and limited neck extension. Depolarizing muscle relaxants are contraindicated for use in SMA patients, and increased sensitivity to non-depolarizing agents has been reported². Reassuringly, volatile anesthetics are not contraindicated in SMA patients, although TIVA is planned. We are aiming to avoid neuromuscular blockade altogether, while providing multimodal pain control and limiting long acting opioids to facilitate extubation.



# Positioning Super Morbidly Obese Patients for Cesarean Section Utilizing the Safe Patient Handling and Mobility Team and Devices

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Super-super morbid obesity (body mass index, BMI,  $\geq$  60) in pregnancy presents many challenges in obstetric care, and with cesarean delivery (CD) rates being higher in these patients¹, patient positioning is a unique consideration. Healthcare workers are prone to develop musculoskeletal and back injuries while positioning persons of size². Based on the evidence that use of a Safe Patient Handling and Mobility (SPHM) team and equipment can decrease employee injuries by 38%³, our institution has implemented a SPHM team (SPHMT).

We present 2 cases where we successfully utilized the SPHMT and changed our practice pattern. The SPHM program coordinator, labor and delivery nurses, and anesthesiologists debriefed prior to each procedure and the patient was counseled on the plan. The OR was confirmed to have a table with sufficient weight-bearing capacity, working ceiling lifts, bariatric bed extenders, and a ramped intubation pillow. The first patient was a 28-year-old G4P1021 at 36w1d, BMI 69, with a history of gestational diabetes, preeclampsia, and obstructive sleep apnea presenting for an elective primary CD for dichorionic diamniotic twins in breech presentation. The second was a 24-year-old G4P2102 at 36w6d with a BMI of 82, mild asthma, obstructive sleep apnea, chronic hypertension, and history of 1 prior CD presenting for repeat CD.

In both cases, the SPHMT placed a specialty size XXXL universal high-back sling under the patient prior to neuraxial placement. The bottom edge of the sling was aligned with the patient's coccyx and leg straps crossed through each other, then were attached to the opposite side of the lift (Image 1A). For the anesthetic, each patient underwent an uncomplicated combined spinal epidural (CSE), using ultrasound guidance to locate the space. Following CSE, a ceiling lift was utilized to pivot the patient with the sling (Image 1B) and place her in the supine position with left uterine tilt; this was completed within 6minutes for both patients.

Positioning this population after a spinal block is difficult as the patient loses the muscle tone to participate. This can increase the time to reestablish electronic fetal monitoring and attain left uterine displacement to alleviate hypotension. Utilizing the SPHMT and devices helps minimize these times and protect placental perfusion, while improving staff and patient safety and satisfaction. <u>Scharf Obesity Abstract Image 1.pdf</u>

### Epidural Test Dose: Yet another Indication in Morbidly Obese Parturients

**Presenting Author:** Julie Chedister, MD **Presenting Author's Institution:** Medical University of South Carolina - Mount Pleasant, South Carolina **Co-Authors:** Taylor R. Ouellette, DO - Medical University of South Carolina

Introduction: Providing optimal epidural labor analgesia in morbidly obese parturients can be challenging due to suboptimal patient positioning, lack of identifiable anatomical landmarks, higher incidences of false loss of resistance (LOR) and catheter replacement. While the intent of an epidural test dose with lidocaine and epinephrine is to avoid inadvertent injection of large volumes of local anesthetic intrathecally and/or intravascularly with adverse maternal and fetal consequences, we describe two cases in which the test dose resulted in an immediate posterior lumbar plexus block (LPB) indicating false loss of resistance, establishing yet another indication for using the test dose to identify misplaced catheters particularly in this patient population.

<u>Case 1</u>: Perceived successful LOR to saline was noted and an epidural catheter for labor analgesia was sited in a 26y.o G2P0 at 39 1/7 weeks, BMI 58. Following negative aspiration for CSF and blood, an epidural test dose of 45 mg lidocaine with 15 mcg epinephrine was administered. Immediate numbness and motor weakness in her right leg. Repeat aspiration for CSF was negative. Following full recovery of motor strength and sensation 3-4 hours later, an epidural catheter was successfully placed.

<u>Case 2:</u> 29y.o G2P0 at 39 2/7 weeks, BMI 40, requested epidural analgesia. The epidural catheter was 'successfully' placed with LOR to saline, following negative aspiration of CSF and blood, the test dose was administered. The patient developed immediate significant motor weakness in one leg more than the other. CSF aspiration via catheter was negative. Following a reduced bolus dose, she developed hypotension and an uneven sensory level in her legs. No additional boluses were administered, and the catheter was subsequently replaced after regression of the predominantly unilateral block.

<u>Discussion:</u> Epidural administration of 45mg lidocaine and 15 mcg of epinephrine is considered the ideal test dose to detect intrathecal and intravascular misplacement of an epidural catheter. Although routine use of a test dose for labor epidurals is controversial, it provides integral information for safely placing and dosing epidural catheters. We report 2 cases of posterior LPB in obese parturient during the placement of a labor epidural which was rapidly brought to light by the epidural test dose. Super morbidly obese parturients present challenges for the obstetric anesthesiologist. The higher incidence of operative delivery together with airway related morbidity makes epidurals the ideal analgesic method for this population, and it is imperative that a functioning labor epidural be sited from a patient safety perspective. <u>Conclusion:</u> Posterior LPB could be a complication of a misplaced epidural catheter in super morbid

obese patients. The epidural test dose helps in an early diagnosis of this block and further demonstrates the importance of a test dose in this patient population.

# Continuous Intra-thecal catheter use for repeat C section in previous difficult general anesthetic with a BMI greater than 100.

### Presenting Author: John Mitchell, MD

**Presenting Author's Institution:** Stritch School of Medicine-Assistant Professor - clarendon hills, Illinois

### **Case Report:**

#### History

39-year-old female at 36/0 for repeat c-section. PMH includes obesity, chronic HTN, OSA, and DM. Her previous c- section required an urgent awake difficult intubation after a failed epidural catheter. This resulted in recall and a four-day difficult wean off a ventilator in the intensive care unit. Previous record from outside hospital were reviewed and her difficulty with her ventilator care was attributed to her restrictive disease and/or an aspiration event or pulmonary edema.

#### Pre-operative investigation

In pre-operative clinic, Mallampati 2 with good extension and mouth opening. Thyromental distance > 5 cm. Clinically, otherwise asymptomatic except profound fear of her anesthesia.

Previously at BMI 85, she received an epidural early in her labor and was inadequate for her c-section which then required an urgent awake intubation in which she had total recall. She would like to avoid this experience at all costs considering her last experience. Her difficult epidural placement was also discussed. An option of an indwelling spinal catheter was introduced, including the risks involved. General anesthesia as a secondary method was also discussed.

A 17-gauge Tuohy needle was used for a blind intra-thecal insertion with a fenestrated 20-gauge catheter. A single attempt was made with identification of lamina and then spinous process which resulted in a paramedian approach into the space. The catheter was placed 4 cm. in the intra-thecal canal at L2-L3. CSF was aspirated through the catheter to assure patency. 1 cc of 0.75% bupivacaine with dextrose was given in the sitting position and the patient was then placed supine. She also received 200ug of morphine and 25 ug of fentanyl with an epinephrine wash in the syringe. Two more doses of the bupivacaine were given at hour 2 and 3 with 0.5 cc of same with adequate surgical levels. The catheter was removed after the procedure. She was evaluated for post dural puncture headache on P.O. Day 0, 1, 2. She was discharged on P.O. day 2.

### **Discussion:**

With the increase acceptance of using an inadvertent Dural puncture catheter for labor to prevent headaches safely, the idea of using this technique as a primary anesthetic was explored. It is also commonly used for chronic pain with success.
The likelihood of a failed intra-thecal catheter with positive aspiration is probably nearing zero. The failed epidural rate, if found, would be significantly higher @ 20%. Our goal was to avoid general anesthesia at the patients request as well to decrease morbidity especially considering her poor out come from her previous general anesthesia.

She had a poor outcome from a previous c section. We documented a successful anesthetic for a c section with intra-thecal regional anesthesia. In addition, avoidance of an emergent need for general anesthesia, recall, post-operative ventilation, and other complication were avoided. The patient was also able to be awake for the birth her of son with no complications.

# Spontaneous rupture of an Invasive Nonresectable Buccal AVM during Pregnancy: Prenatal Management and Anesthetic Implications

Presenting Author: Ashley Lewis, MD
Presenting Author's Institution: Vanderbilt University Medical Center - Nashville, Tennessee
Co-Authors: Kaitlyn Brennan, DO MPH - Vanderbilt University
Britany L. Raymond, MD - Vanderbilt University Medical Center

**Case Review**: 22 yo G1P0 presented to the emergency department at 16w0d with profuse oral bleeding. Upon arrival, PRBC transfusion was in process and her mouth was packed to tamponade the brisk oral bleeding. Imaging revealed facial and buccal arterial venous malformations (AVMs). The patient was admitted for monitoring and assessed for possible intervention. On hospital day one, she had a large volume oral hemorrhage requiring awake nasal fiberoptic intubation, activation of the massive transfusion protocol, and an emergent n-Butyl Cyanoacrylate embolization of the internal maxillary artery. Her early postoperative course was complicated by a rebleed and hemorrhagic shock, prompting a stage II n-Butyl Cyanoacrylate embolization of left Internal maxillary artery. Her AVM lesions were determined to be surgically unresectable. Therefore, several options were explored, including further interventional radiology procedures, radiation therapy, palliative care, and abortion.

**Discussion:** AVMs are a rare congenital type of vascular malformation resulting from developmental vascular defects. They often grow with hormonal changes, making pregnancy a potential risk factor for expansion or bleeding. The physiologic changes of pregnancy are also thought to increase bleeding risk. Neuraxial analgesia is considered the standard of care for superior labor analgesia; however, it should be pursued with caution in patients with a history of AVMs due to possible occurrences around the spine. Disruption of an AVM while performing a neuraxial technique could cause a spinal hematoma leading to catastrophic neurologic deficit. Rupture can also happen spontaneously, likely exacerbated by pregnancy, as it did in our patient. The extent of morbidity after a rupture is determined mostly by the location and degree of AVM. For this discussion, we will focus on prenatal management of head, neck, and face AVMs during pregnancy, as well as potential neuraxial concerns.

#### Learning Points to Explore:

Which syndromes are most often associated with AVMs?

What are some strategies to help improve visibility and secure the airway of a patient with massive oral hemorrhage?

Review recent prenatal work-up/guidelines regarding imaging and genetic testing What is the management of an AVM in the obstetric population?

Is this patient allowed to Valsalva?

Are there recommended hemodynamic goals?

How does the vascular steal phenomena of AVMs affect the obstetric population?



# Neuraxial technique placement in the parturient with history of multiple back surgeries: A Case Report

**Presenting Author:** Dan Drzymalski, MD **Presenting Author's Institution:** Tufts Medical Center Department of Anesthesiology **Co-Authors:** Mahmoud Abdelghaffar, MD - Tufts Medical Center Department of Anesthesiology Chloe Savino, BS - Tufts University School of Medicine

**Background:** In patients with a history of spinal fusion procedures involving the lumbar region, neuraxial techniques are particularly challenging and may fail.1,2 We describe the case of a parturient with challenging back anatomy but successful placement of a spinal catheter.

**Case:** A 22-year-old G1P0 parturient with a history of kyphoscoliosis, restrictive lung disease, and asthma, was admitted in labor requesting epidural analgesia. The patient had an extensive back surgical history, including T2-L5 spinal pedicle screw instrumentation, T8-T10 discectomy, and L4-L5 posterior osteotomy, followed by spinal fusion. Physical exam of the back revealed a continuous rock-solid piece from the scapula down to the lower lumbar region, with only two small (1"x1") soft areas around L2/3 and L4/5 (see figure 1a). The patient requested that we attempt a neuraxial technique, although we explained that there was a high risk of inability to successfully place the technique. First attempt at L4/5 and second attempt at L2/3 were unsuccessful. Finally, returning to L4/5 we encountered loss of resistance, but upon removal of the syringe we found brisk fluid flowing back. The decision was made to thread a spinal catheter at this location (see figure 1b). The spinal catheter provided adequate labor analgesia and was eventually converted for cesarean anesthesia. The catheter was removed post-procedure without issue. One day after delivery the patient had postdural puncture headache and received an epidural blood patch after two attempts. Symptoms resolved and the patient returned home.

**Conclusion:** Patients with extensive back surgery pose a particular challenge when it comes to placing a neuraxial technique. In this particular case, avoiding the risk of general anesthesia was of particular importance given the patient's history of restrictive lung disease and asthma. Despite the challenging back anatomy, successful placement of a neuraxial technique was possible. Although the patient had inadvertent dural puncture, treatment was also possible using standard approaches. Patients with challenging back anatomy and surgical history should not be excluded from attempt of neuraxial techniques.³

Figure 1 Neuraxial technique placement in the parturient with history of multiple back surgeries: A Case Report.pdf

# Diagnosis and Management of Nephrolithiasis in Active Labor using POCUS and Epidural Analgesia

#### Presenting Author: Shalonda Cook, MD

**Presenting Author's Institution:** Rutgers-Robert Wood Johnson Medical School - Piscataway, New Jersey

A 38 year old at 39 weeks gestation presented for induction of labor of an uncomplicated pregnancy. Prior to initiation of oxytocin, she reported episodes of sharp left-sided lower back pain radiating to the flank and groin. Her pain was out of proportion to typical uterine contractions, and she endorsed urinary frequency. The patient and obstetrician requested an epidural for management of suspected labor pain prior to escalating oxytocin dose and to facilitate amniotomy.

The anesthesia team performed a bedside renal ultrasound and a FAST exam to rule out any more ominous pathologies. A 5 Hz curvilinear probe placed over the left flank revealed several hyperechoic structures in the medulla, pelvis, and ureteropelvic junction of the left kidney consistent with nephrolithiasis.

The patient was adequately hydrated and we placed an epidural catheter in the L4-L5 interspace. Epidural analgesia was induced with 8 mL of a fentanyl 2 mcg/mL-bupivacaine 0.125% in NaCl 0.9% solution which was then maintained at a continuous rate of 8 mL/hr and PCEA dose 5 mL with a 15 minute lockout interval. A Foley catheter was inserted and IV hydration with an isotonic solution at 125 mL/hr was continued.

She reported resolution of renal colic and labor pain soon after achieving a bilateral T9 sensory level. Labor proceeded uneventfully with eventual vaginal delivery. She had no complaint of renal colic postpartum as the stones had presumably passed.

The physiologic changes of pregnancy and labor pain can obscure the diagnosis of kidney stones in the parturient.

Given potential teratogenic effects associated with CT scan, alternative imaging is often sought for pregnant patients. A well-trained operator with reasonable clinical suspicion can use Point-of-care ultrasound (POCUS) to diagnose suspected renal colic in the parturient and to rule out impending obstetric or surgical emergencies.

Epidural analgesia to treat renal colic in the parturient has been described in a previous case report, but not specifically in the setting of active labor. Using a thorough history and physical as well as POCUS, we diagnosed unilateral

Using a thorough history and physical as well as POCUS, we diagnosed unilateral nephrolithiasis and subsequently managed both renal colic and labor pain via epidural analgesia.

This case demonstrates that the value of the anesthesiologist's expertise on Labor and Delivery extends beyond labor analgesia. With POCUS to offer a correct diagnosis, avoid delays in treatment, guide management, and minimize unnecessary resource

utilization, the anesthesia team was able to optimize patient satisfaction, quality of care, and cost effectiveness.

# Point-of-Care Ultrasound by Anesthesiology for Assistance with Care of a Hemodynamically Unstable Patient Requiring Emergent Exploratory Laparotomy.

#### Presenting Author: Claudia Rosso, MS3

**Presenting Author's Institution:** University of California Irvine School of Medicine - Irvine, California

A 37-year-old female at 38 weeks gestation presented to the hospital for induction of labor for chronic hypertension. Cesarean section was later performed under epidural anesthesia due to fetal intolerance of labor. On post-operative day (POD) 2, a bowel regimen was started in the setting of inability to pass gas. On POD 3, a rapid response was called twice for hypotension, tachycardia, and hypoxia. Concern at the time was for sepsis given newly elevated lactic acid and acute kidney injury, with bladder or ureteral injury as possible sources. Formal abdominal ultrasound revealed small volume ascites. The patient was booked for emergent exploratory laparotomy. The anesthesiologist performed point-of-care ultrasound (POCUS) of the heart, lungs, and abdomen. The heart and lungs were unremarkable, but the abdomen demonstrated a large amount of free fluid. Abdominal washout and small bowel resection were performed under general anesthesia. Bowel perforation, as indicated by POCUS, was diagnosed intraoperatively. POCUS helped narrow the differential diagnosis for this patient and assisted in rapid, safe care. The patient's hospital course was complicated by multiple follow-up procedures, before eventual resolution of symptoms.

POCUS is increasingly being utilized by physicians representing a wide variety of specialties, including emergency medicine, obstetrics/gynecology, and other non-radiology professions, for rapid bedside diagnosis. Although POCUS is routinely used by anesthesiologists to help guide regional anesthesia and other procedures, they rarely use it as a diagnostic tool in the acute care setting. This case highlights the potential use of POCUS by anesthesiologists to aid in diagnosis and management. They are often faced with sudden changes in patient hemodynamics requiring prompt identification of etiology that may be achieved with real-time ultrasound imaging. One study of 188 patients found that ultrasound had a sensitivity of 92 percent in diagnosing pneumoperitoneum, a condition that strongly indicates intraoperative bowel perforation.¹ Other uses for POCUS by anesthesiologists in the peripartum period include gastric, airway, and cardiac ultrasound for the evaluation of aspiration risk, airway dimension changes during prolonged labor, and peripartum cardiomyopathy, respectively.²

# Apparent local anesthetic systemic toxicity after activation of a labor epidural catheter for cesarean delivery treated successfully with lipid emulsion

#### Presenting Author: Angelica Hatfield, MD

**Presenting Author's Institution:** Baylor Scott & White Medical Center-Temple **Co-Authors:** Russell McAllister, MD - Baylor Scott & White Medical Center-Temple Guy Weinberg, MD - University of Illinois at Chicago

#### Introduction

We present a patient who had activation of an epidural catheter after failed spinal anesthesia and subsequently developed apparent local anesthetic systemic toxicity (LAST).

#### Methods

Our hospital's institutional review board exempts single-patient case reports from review. The patient provided written authorization for publication of her case.

#### **Case description**

A 25-year-old G2P1001 woman with a history of a prior CD presented at 38 weeks in active labor but with decreased fetal movement. The patient was 150 cm, with a body mass index of 41 kg/m² and a calculated ideal body weight of 40 kg. A combined spinal epidural (CSE) was placed at the L4/L5 interspace without difficulty and 1.2 ml of 0.75% hyperbaric bupivacaine with 15 mcg fentanyl and 0.2 mg preservative free morphine was administered into the intrathecal space. The patient was positioned supine with left uterine displacement and the block level was assessed to be at the L2 dermatome and not adequate for CD. Subsequently, we administered a total of 15 ml of 2% lidocaine in 5 ml divided doses over eight minutes and a T4 dermatome level was achieved. The delivery proceeded uneventfully. However, after closure of the fascia, patient began to exhibit altered mental status with dysconjugate gaze, decreased responsiveness, and slurred speech. The electrocardiogram displayed normal sinus rhythm without acute changes. Nevertheless, we made a presumptive diagnosis of LAST and administered 60 ml (1.5 ml/kg) of 20% lipid emulsion. Over the next five minutes, the patient gradually regained consciousness, was able to speak in clear sentences, and subsequently had an uneventful recovery.

#### Discussion

A previous case report described an obstetric patient who developed signs and symptoms consistent with LAST following placement of a CSE for labor analgesia and the presenting signs were tinnitus, metallic taste, and narrow complex sinus tachycardia.¹ In our case, the patient developed LAST after epidural administration of lidocaine and the presenting sign was altered mental status. The maximum recommended dose of lidocaine without epinephrine is 4.5 mg/kg based on ideal body weight² and our patient should not have received more than 180 mg. We have modified our practice to be more deliberate in dosing local anesthetic based on ideal body weight

when activating epidural catheters for CD. It is important to recall that signs and symptoms of LAST may vary in presentation between cardiac and neurologic in nature and are frequently significantly delayed following local anesthetic injection. It is important to consider LAST in all circumstances where large doses of local anesthetic have been administered.

# Anesthetic management of obstetric patient with large parieto-occipital meningioma: a case report

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Ana Lisa Ramirez-Chapman, MD - The University of Texas Health Science Center in Houston

Incidence of brain tumors in pregnancy is similar to that in nonpregnant women of the same age. However, previously asymptomatic neoplasms may enlarge during pregnancy and become symptomatic, with multiple potential implications for the anesthesiologist. This case report describes the successful use of general anesthesia with endotracheal intubation for C-section in 40-year-old parturient who presented in her third trimester with 10-day history of worsening headache, visual changes, memory dysfunction, gait disturbance and was subsequently found to have large extra-axial meningioma.

Basic principles for GA in parturients with brain masses are similar as non-pregnant patients: avoid increasing ICP and maintain adequate CPP. These goals are best achieved with appropriately dosed induction medications, judicious management of fluid administration, and careful attention to blood pressure. In this case, a pre-induction right radial arterial line was placed for blood pressure monitoring and tight blood pressure control with PRN phenylephrine and nicardipine boluses to maintain MAP goals. To avoid increasing ICP during endotracheal intubation, the patient was given 200mg propofol bolus and 100 mg of rocuronium while a remifentanil infusion of 0.2 mcg/kg/min was running. The decision to use remifentanil was made after considering risks and benefits to both mother and fetus. Although it can result in brief neonatal respiratory depression, potentially requiring intubation or naloxone, its rapid onset and short duration of action was deemed safest for mother to facilitate rapid emergence and smooth extubation.

Delivery of healthy baby was achieved without complications, APGARs 1, 6, 8. Postoperative bilateral quadratus lumborum blocks with 0.25% bupivacaine were administered in the OR prior to extubation for post-op analgesia.

To conclude, in cases of space-occupying intracranial lesions in pregnant women, the implications for delivery include higher likelihood of cesarean delivery with general anesthesia in order to decrease risk of increased ICP during labor and risk of herniation from neuraxial anesthesia. Therefore, these cases require more communication, consideration, and planning on the part of the obstetric anesthesiologist. It is imperative to seek advice from neurologists and neurosurgeons in each case, as there is

insufficient data to make general recommendations regarding delivery and anesthesia plans.



# Emergency cesarean delivery in a patient with acute fatty liver of pregnancy: A case report

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**Background:** Acute fatty liver of pregnancy (AFLP) may develop as an obstetric emergency and potentially fatal. We report an AFLP case who was successfully managed.

**Case Report:** A 32-year-old women, G2P0, was emergently admitted into our hospital at 37-week gestation with decreased fetal movement. She also suffered diarrhea for 2 days. She denied headache, epigastric pain, visual impairment or pruritus. Prenatal medical screening was normal without any comorbidities. On admission, the patient complained of slight abdominal pain with blood pressure of 129/73 mmHg. Admitting laboratory study showed significant abnormalities in hepatic and renal function and coagulation test (Day 0 on Table 1). Repeated non-stress tests indicated non-reactive fetus. A multidisciplinary consultation was conducted. A presumptive diagnosis of acute fatty liver of pregnancy with fetal distress was made and urgent cesarean delivery was booked. Preoperatively, fresh frozen plasma and fibrinogen was initiated. Patient underwent general anesthesia with central line, and invasive blood pressure monitoring. The newborn male, weighing 3,275 g, with Apgar scores of 8, 9, 10 respectively at the 1st, 5th and 10th minute after birth. EBL was 1,200 ml. The patient was extubated in the operation room and transferred to the Intensive Care Unit for continued treatment and stabilization of acute hepatic and renal insufficiency and disseminated intravascular coagulation. Postoperative analgesia was provided by intravenous patient-controlled analgesia sufentanil. At 16th hour postoperatively, patient exhibited signs of analgesic medication accumulation because of her compromised hepatic and renal function; PCA was subsequently stopped. All the laboratory indexes returned to normal on the 5th day postoperatively. The patient was discharged on the 7th postnatal day with no complication.

**Conclusion:** AFLP progress rapidly to acute liver failure. Early recognition and timely intervention play a critical role in decreasing maternal and fetal mortality.

(NA ZHAO) Table 1 Evolution of liver & renal function, coagulation tests and routine blood tests.pdf

#### Anesthetic Management of a Parturient with Situs Ambiguus

Presenting Author: Emiley Tou, MD Presenting Author's Institution: Cedars-Sinai Medical Center Co-Authors: Susan Cosgrove, MD - Cedars-Sinai Medical Center Katherine Gelber, MD - Cedars-Sinai Medical Center Jessica Murphy, MD - Cedars-Sinai Medical Center Michael Sanchez, MD - Cedars-Sinai Medical Center

Introduction: The incidence of congenital heart disease (CHD) in the parturient is ~1% of U.S. births per year [1]. Situs or heterotaxy anomalies are among the least common maternal congenital lesions in pregnancy, with sparse case reports in the literature. Heterotaxy syndrome is estimated at 380 births per year in U.S. [2]. We describe the anesthetic considerations in a rare case of a parturient with situs ambiguus undergoing cesarean delivery.

Case: A 35y.o. G2P1 at 38weeks gestational age presented in latent labor with breech presentation. Due to a recent transfer of care to our ACOG Level IV hospital, the patient had no electronic medical records available on admission. PMH included cardiac surgery at 3-years-old and uneventful cesarean delivery 8 years ago. Patient was unsure about the specifics of her CHD and was not currently followed by cardiologist. We ordered a TTE, EKG, and a congenital cardiology consult. Significant findings included situs ambiguus, interrupted left inferior vena cava with left azygous continuation, bilateral superior vena cava with left superior vena cava draining into coronary sinus, superior sinus venosus defect with PAPVR of both right-sided pulmonary veins into right atrium and muscular subpulmonary stenosis, and a perforated cor triatriatum sinister status post intracardiac baffle and rerouting of right pulmonary veins and RVOT myectomy. EKG revealed accelerated junctional rhythm with frequent PVCs at 80bpm suggesting 2 sinus nodes with the implication that we may not be able to easily increase her heart rate if needed, e.g. in the setting of hypotension. Patient underwent a repeat cesarean delivery under combined spinal-epidural analgesia with a narcotic-only spinal (morphine 0.15 mcg/fentanyl 20 mcg IT) and slow loading of Lidocaine 2%/epi 5 mcg/ml via epidural to minimize chance of hypotension. Due to her CHD and situs ambiguus, we used right uterine displacement and had multiple classes of vasopressors on standby. The cesarean was uncomplicated.

Discussion: Parturients with history of CHD, even after repair, require thorough evaluation and multidisciplinary care to understand their physiology and anatomy. Transfer to an appropriate higher level of care hospital and multidisciplinary care is needed. Heterotaxy syndrome is rare, complex, and has many different subtypes and presentations which makes every case unique. Anesthetic considerations will ultimately depend on the type of heterotaxy syndrome, and specialized/rare lesions benefit from a physiologic discussion with cardiology.

#### Mediastinal Mass with Critical Right Ventricle Compression in Pregnancy

Presenting Author: Zhaoyi Tang, MD Presenting Author's Institution: Cedars-Sinai Medical Center Co-Authors: Katherine Gelber, MD - Cedars-Sinai Medical Center Andrew Geller, MD - Cedars-Sinai Medical Center Milad Javaherian, MD - Cedars-Sinai Medical Center Emiley Tou, MD - Cedars-Sinai Medical Center

**Introduction**: Mediastinal masses incur a risk of cardiopulmonary complications, further elevated in pregnancy due to increased cardiac demand and decreased respiratory reserve. Symptomatic mediastinal mass in pregnancy is a rare condition with a unique set of anesthetic challenges. We discuss a patient presenting in the second trimester with progressive dyspnea from a large mediastinal mass and CV decompensation.

**Case**: A 35 y.o. G1P0 at 25-weeks presented to ED with one month of progressive dyspnea and palpitations. TTE showed cardiac tamponade and left pleural effusion, treated with pericardiocentesis and chest tube. MRI showed 5.5 x 13.0 x 1.0 cm anterior mediastinal mass from the thoracic inlet to the right cardiophrenic angle, encasing vascular structures with compression of pulmonary artery, with no evidence of tracheobronchial compression. CT-guided biopsy was primary mediastinal B-cell lymphoma (PMBCL). Prior to a staging PET scan, patient had an unprovoked acute episode with BP70/30 HR170, with bedside TTE - critical RV compression, which responded to fluid boluses. Multidisciplinary team decided to start R-CHOP chemotherapy with dexamethasone in ICU setting and monitor for tumor lysis syndrome with a 3rd trimester delivery goal. Femoral vascular access obtained on transfer to ICU in case of cardiac decompensation and need for urgent ECMO. Initial chemotherapy uneventful and she was discharged. Chemotherapy x3 rounds produced significant mass reduction with tumor still adjacent to pericardium. Cesarean delivery at 36 weeks timed between rounds of chemo, but on morning of surgery, patient opted for induction of labor. PMBCL not present in lumbar spine, labor epidural uneventful. Due to arrest of dilation at 5 cm and patient preference, she underwent an uneventful C-section under epidural anesthesia with gradual dosing of lidocaine 2%/epinephrine 5 mcg/ml and continual BP by ClearSight®.

**Discussion:** PMBCL is a rare subtype of Non-Hodgkin's Lymphoma, most commonly in reproductive age women. PMBCL often presents as a bulky mediastinal tumor, with compressive symptoms like SVC syndrome and dyspnea from tracheobronchial compression. Pleural or pericardial effusions are found in up to 50%. PMBCL responds well to R-CHOP chemotherapy, with a good fetal safety profile in the 2nd and 3rd trimesters. Neuraxial anesthesia/analgesia is preferred in patients with a mediastinal mass. General anesthesia may increase morbidity and mortality from mediastinal mass syndrome when positive pressure ventilation results in vascular compression and right

heart failure. If general anesthesia were needed in this case, our plan was for delivery in a cardiac OR with ECMO lines in place and CPB on standby. This case illustrates the need for a multidisciplinary approach and careful planning to optimize the outcome of both mother and fetus.

# Cesarean section with epidural anesthesia in a morbidly obese parturient who survived long-term intubation and tracheostomy after severe COVID-19 infection

**Presenting Author:** Yuta Kashiwagi, MD **Presenting Author's Institution:** Cleveland Clinic Foundation **Co-Authors:** Sabry Ayad, MD - Cleveland Clinic Foundation Monica Cheriyan, MD - Cleveland Clinic Foundation Valentina Lara-Erazo, MD - Cleveland Clinic Foundation

#### Introduction

Both pregnancy and obesity are high-risk factors for worsening COVID-19 infection. Parturients that face severe COVID-19 have been managed with mechanical ventilation or extracorporeal membrane oxygenation. Those who overcome the severe infection can experience residual lung fibrotic changes, and are at risk of placental and fetal hypoxia. There is no literature detailing the management of cesarean section with neuraxial anesthesia for parturients who have post-COVID pulmonary fibrosis. Case description

We report the case of a 22-year-old 37w4d primigravida scheduled for a cesarean section due to morbid obesity and pulmonary fibrosis. Medical history is significant for severe COVID-19 infection one year before managed with prolonged mechanical ventilation and temporary tracheostomy, with residual pulmonary fibrosis and tachycardia. Pharmacological therapy includes rate control medication and home oxygen through nasal cannula at 3L/minutes to maintain a SpO2 of 95%. Prenatal care was significant for dyspnea and palpitations with increased activity that didn't interfere with daily life activities. Given her cardiopulmonary complication and the body habitus, she was scheduled for cesarean delivery early in the third trimester to avoid a further decrease in lung capacity. She had no CPAP use or a history of sleep apnea but endorsed using a couple of pillows at night. Preoperative transthoracic echocardiogram was within normal ranges.

Admission physical examination: Height 180.3cm, weight 148.6kg, BMI 45.7, Blood pressure 110/74mmHg, Pulse 118 bpm, sinus rhythm, and SpO2 95%. Head and neck: thick and short neck, anterior cervical scar of pervious tracheostomy, no difficulty swallowing, no voice changes, no obstructive sensation while breathing. Mallampati score of 2.

Anesthesia management: We proceeded with epidural anesthesia to avoid accidental high spinal which could lead to respiratory failure and advanced airway management. Anesthesia was done at T12/L1 level with a needle depth of 7cm, the catheter left 13 cm from the skin, and a test dose of 1.5% lidocaine + epinephrine. The negative test was followed by total 20ml of four doses of 2% lidocaine, + epinephrine and bicarbonate, achieving a T5 level bilateral block. Blood pressure was maintained with continuous phenylephrine at 50-100ug/kg/min and fluid infusion. The surgery was done successfully, and she was discharged without complications two days later.

## Discussion

Pulmonary fibrosis after the infection decreases lung capacity and diminishes diffusion capacity of the lungs. Epidural anesthesia was considered a safer method to avoid unintentionally high block levels that can deteriorate her restrictive respiratory function and be harmful for the fetus.

Conclusion

We conclude that scheduled cesarean section for morbidly obese parturient with post-COVID-19 pulmonary fibrosis was successfully managed with epidural anesthesia.

# Marfan Syndrome Parturient with Thoracic Aorta Dilatation and Lumbar Dural Ectasias

#### Presenting Author: Joe Salloum, MD

Presenting Author's Institution: Northwestern University Feinberg School of Medicine

#### Introduction:

Pregnant women with Marfan syndrome have unique anesthetic considerations due to the presence of arched palates, scoliosis, dural ectasias, and aortic root dilatations. Women with an aortic root dilatation of < 40 mm usually tolerate pregnancy well, while those with a dilatation > 45 mm are at very high risk for cardiovascular complications.¹ Dural ectasias are believed to occur in 63-92% of Marfan patients and can make neuraxial procedures more difficult and less efficacious.²⁻³

#### Case:

A 39-year-old G3P0020 with Marfan syndrome with a dilated aortic root to 41 mm was seen as an anesthesia consult at 26w5d. The patient had a severe headache 14 years prior with MRI revealing significant dural ectasia (L3-S1). A dural tear was suspected and she underwent successful epidural blood patch under fluoroscopy. The delivery plan was an assisted vaginal delivery (VD) with limited pushing with epidural analgesia. The patient underwent another MRI to evaluate for a lumbar level free of ectasia prior to administering epidural analgesia, and it revealed significant dural ectasia with the thecal sac completely effacing the L4-L5 and L5-S1 dorsal epidural spaces and higher lumbar levels. Because of the high risk of unintended dural puncture and the unreliability of a spinal anesthetic in this patient, the delivery plan was changed to a cesarean delivery (CD) under general anesthesia because of concern of VD without epidural analgesia. The patient presented a week prior to her scheduled CD at 38w4d in active labor and rapidly progressed to 9 cm dilation. The patient had eaten a full meal on her way to the hospital, and the risk of aspiration with general anesthesia was a concern. Instead, the decision was made to deliver the patient vaginally in the operating room, and the patient underwent a successful VD without epidural analgesia. In order to prevent further dilation of her aorta during pushing, the anesthesiologist monitored the patient throughout entire delivery and controlled the blood pressure with esmolol boluses.

#### Discussion:

Parturients with Marfan syndrome are at risk for aortic dissection and cardiovascular complications especially in patients with aortic root >40 mm. This patient's plan for scheduled CD was influenced by the anesthesiology team's reluctance to administer neuraxial analgesia because of her history of dural ectasias and by the concern that an assisted VD with potentially uncontrolled analgesia could lead to increased blood pressure and risk of aortic dissection. Despite the plan, this patient presented with new clinical circumstances and was able to safely complete a VD.

# Cesarean Delivery in a Parturient with Bilateral Pheochromocytoma Complicated by Left Ventricular Outflow Tract Obstruction: A Case Report

**Presenting Author:** Teshi Kaushik, MD **Presenting Author's Institution:** Emory University - Decatur, Georgia **Co-Authors:** Stuart Brooker, MD - Emory school of Medicine Background

Pheochromocytoma is a rare endocrine tumor in pregnancy with maternal and fetal mortality of 40-50% when untreated. Accompanying chronic catecholamine surge can be associated with various cardiomyopathies. Hemodynamic management of pheochromocytoma in pregnancy has the added challenge of avoiding hypertensive crisis while maintaining uteroplacental transfusion.

#### Case description

A 29-year-old G1P0 female at 29.2 presented to outside emergency room with anxiety, palpitations, nausea and vomiting, tachycardia 130 and hypertension140/100. A CTPE performed to rule out pulmonary embolism revealed abdominal mass. MRI abdomen (Figure 1) showed bilateral adrenal tumors with possible invasion to liver confirmed with positive urine metanephrines to be pheochromocytomas. The patient was transferred for tertiary care. Given patient history concerning for chronic catecholamine surges, a TTE was performed which revealed a left ventricular outflow tract obstruction with systolic anterior motion of the mitral valve and mean gradient of 69mmHg, concentric left ventricular hypertrophy with an ejection fraction of 75%. Alpha blockade with doxazosin and subsequent beta blockade with labetalol aided in improved gradient of 57mmHg on repeat echo. Cesarean delivery was planned at 34 weeks with interval resection of the endocrine tumors 6 weeks postpartum.

At 33.4weeks the patient experienced signs of preterm labor, rescue steroids were administered with resultant diabetic ketoacidosis (glucose 450, anion gap of 20). Once the patient was treated with insulin and IV fluids, urgent cesarean delivery was performed. Anesthetic management included arterial line placement, large bore IV access, slow-dosed Dural puncture epidural with crystalloid co-load. Formal test dose was avoided given risk of tachycardia, catheter placement was confirmed with negative aspiration and small initial bolus of local anesthetic. Epidural anesthesia was slowly titrated to a T4 sensory level over 20 minutes. Patient remained hemodynamically stable with use of a prophylactic phenylephrine infusion. At the time of delivery, patient became tachycardic to the 140s and hypertensive 160/90, presumably due to compression of the neuroendocrine tumor. Patients vital signs returned to baseline with administration of esmolol and nicardipine. The remainder of the case was unremarkable and the patient was admitted to the cardiac care unit postoperatively for further monitoring.

#### Discussion

Definitive treatment of pheochromocytomas during pregnancy consists of complete surgical resection of the tumor, however after 23 weeks gestation increased size of the uterus precludes resection. Perioperative goals include preventing hypertensive crises due to excessive catecholamine release during intraoperative manipulation and addressing volume contraction resulting from chronic vasoconstriction. Cardiomyopathy secondary to over production of catecholamines is usually reversible after resection.



# Parturient With New Diagnosis of Takayasu Arteritis and Severe Coarctation of Aorta at 34weeks Gestation: A Case Report

**Presenting Author:** Teshi Kaushik, MD **Presenting Author's Institution:** Emory University - Decatur, Georgia **Co-Authors:** 

#### Background

Takayasu's arteritis is a rare idiopathic large-vessel vasculitis with an incidence as high as 40 per million. Antepartum and peripartum complications may include coronary artery aneurysm, common carotid artery stenosis, aortic aneurysm, and subclavian artery stenosis. The most common presentation during pregnancy is hypertension.

#### **Clinical case**

A 32-year-old G2P0 at 33.5 presented with asymptomatic severe hypertension with discrepant blood pressures in the upper extremities (R:120/83, L: 208/97) after transfer of care for refractory hypertension. She first became hypertensive at 24 weeks and failed medical management. Echocardiography revealed diastolic dysfunction. Cardiac MRI and MRA unveiled a discrete severe mid-thoracic aortic coarctation (Figure 1) (0.6 cm at the level of T10), diffusely calcified aortic wall, and interrupted right subclavian artery proximally. Labetalol 200mg BID and Nifedipine XL 60mg were started. Due to her sustained hypertension despite medical management and risk of dissection, decision was made to proceed with urgent cesarean delivery at 36 weeks in the cardiac operating rooms. Pre and post coarctation blood pressures were monitored with a left radial arterial line and a noninvasive blood pressure cuff on the right lower extremity. Left arterial pressure was 300/180, lower extremity pressure was 160/90 with HR of 95 without symptoms of hypertensive crisis. A nicardipine infusion was titrated to decrease the left arterial pressure to 200/80. Dural puncture epidural catheter was placed with alternative test dose of fentanyl 100mcg. Epidural catheter was dosed over 10 min with 10mL 2% lidocaine with 1:200K epinephrine and bicarbonate with a resultant T4 sensory level. Nicardipine was weened and phenylephrine and norepinephrine infusions were initiated to maintain a left arterial blood pressure greater than 180, as the patient symptomatically hypotensive below this. External fetal monitoring was performed throughout without issue. The cesarean delivery was uncomplicated, EBL was 700mL, IVF 500cc, oxytocin was administered for postpartum hemorrhage and the patient was taken to the cardiac ICU where her arterial line systolic pressures remained in the 200s and she was again placed on nicardipine infusion. Discussion

The major adverse events in the parturient with uncorrected coarctation of the aorta peripartum are severe hypertension or acute heart failure. Unlike other hypertensive disorders of pregnancy, hypertension in this context primarily affects the expectant mother and spares fetal-placental circulation. Blood pressure monitoring at different sites and careful titration of vasopressors and vasodilators are needed to

prevent end organ damage from severe hypertension pre-coarctation as well as to maintain uterine, renal, and gut perfusion post-coarctation.



#### Neuraxial vs General Anaesthesia in a Parturient with Chronic Myeloid Leukaemia: A Challenging Decision

### Presenting Author: Maria Herincs, MBBS, PhD

**Presenting Author's Institution:** Guy's and St Thomas' NHS Foundation Trust - London

**Introduction**: Chronic myeloid leukemia (CML) is a myeloproliferative neoplasm characterized by the production of large numbers of myeloid cells at various stages of maturation in peripheral blood. CML in pregnancy is rare, with an estimated occurrence of 1 in 75,000 pregnancies. Treatment is aimed at myelosupression in the chronic stage delaying the accelerated or blastocystic phase. Tyrosine kinase inhibitors (TKIs) are effective but can be teratogenic so are often discontinued during pregnancy, this can put women at higher risk of developing blast crisis(1). Immature blast cells entering the circulation (blast cell crisis) is one of the most dangerous complications associated with rapid clinical deterioration and poor survival rates. A central nervous system blast crisis can also be induced by inadvertent intrathecal seeding of circulating blast cells when performing spinal or epidural anaesthesia. There is poor recognition of this amongst obstetricians and obstetric anaesthetists and very little guidance or consensus on the acceptable percentage of circulating blast cells when performing regional anaesthesia.

**Case report:** A 30-year-old lady, gravida 1, para 0, presented to the obstetric ward at 38 weeks of gestation for induction of labour. Her past medical history revealed that she had been diagnosed with CML a year before conception and had been on TKI treatment, which was changed to interferon- $\alpha$  for the duration of her pregnancy. She unfortunately had not been referred antenatally by an anaesthetist and requested an epidural for labour analgesia out of hours. After discussion with the haematology and obstetric medicine team, we decided it was safe to perform regional anaesthesia given she had 1% circulating blast cells with normal full blood count and normal coagulation results. Uneventful epidural insertion was performed and she went on to have an uncomplicated forceps delivery.

**Discussion:** This case highlights the significant challenge an anaesthetist encounters when formulating the anaesthetic plan and consenting a pregnant lady with CML. There is limited and very controversial published data on the safety of regional techniques in this rare patient group, originating from only a handful of case reports, the majority of which opting for a general anaesthetic over a regional blockade even in cases with very low percentage of circulating blast cells (less than 5%). There are no published case reports or guidelines on epidural analgesia for the labouring CML patient. It is clear, that a multi-disciplinary approach to assist with anaesthetic planning in the prenatal period is vital in this patient group. Further research is necessary to generate a clear consensus on the acceptable percentage of circulating blast cells that is safe for regional anaesthesia.

#### Management of a Symptomatic Parturient with a Compressive Thyroid Mass

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Thyroid goiters with tracheal compression can pose a challenge for anesthesiologists. Awake fiberoptic intubation is often performed for patients with compressive symptoms given concern for loss of the airway with induction of general anesthesia. However, some studies suggest large benign goiters can often be intubated without difficulty even with airway compression¹. In the parturient with clinical and imaging evidence of tracheal compression, additional planning is needed given the possibility of emergent delivery. We present a case of a parturient with a large substernal (presumed thyroid) mass during cesarean delivery.

A 31-year-old G1P0 female with BMI 45 was admitted at 37w1d for a newly diagnosed mediastinal mass. CT imaging showed a soft tissue mass arising from the thyroid bed and extending into the upper mediastinum, with a minimum tracheal caliber of 5x14mm.

The mass was felt likely to be a substernal thyroid, and thyroid function tests were normal. On exam, the patient endorsed dyspnea when lying flat or on her right side. ENT performed flexible nasal laryngoscopy which showed a patent upper airway without deviation. Primary cesarean section was scheduled given concerns for potential difficult airway, particularly if emergent delivery was required. Initially, an awake fiberoptic intubation was planned due to anticipated difficulty with lying flat for delivery.

On the day of delivery, she tolerated a nearly supine position without dyspnea and chose to proceed under neuraxial. Prior to the case, a multi-disciplinary huddle was held to discuss key points including positioning slightly head up, avoiding carboprost, and availability of emergency airway equipment and personnel including a video laryngoscope, fiberoptic bronchoscope, multiple sizes of reinforced endotracheal tubes, and ENT on backup. Combined spinal-epidural was performed with low dose spinal (9mg hyperbaric bupivacaine) to minimize risk of high spinal. She remained stable during the case with SpO2 above 98% and no complaints of dyspnea. Post-operative pain control was provided via epidural, and morphine sulfate was deferred given concerns for respiratory depression. She was discharged on postpartum day 4 with plans for future thyroidectomy.

This case demonstrates the importance of multidisciplinary planning in patients with potentially difficult airways, such as from an airway mass, undergoing delivery. A thorough preoperative examination, along with communication between the anesthesiology, obstetric and ENT teams prior to delivery, was essential for safe

planning of this complex case. Neuraxial anesthesia with careful monitoring of the patient's airway and symptoms allowed her to be awake during delivery and avoid airway instrumentation.



# First Reported Epidural Placement in Patient with Factor V Deficiency - A Surprise During Preoperative Evaluation for Placenta Accreta Spectrum

**Presenting Author:** Dan Hoang, DO **Presenting Author's Institution:** Kaiser Permanente Santa Clara **Co-Authors:** Christa Solis, DNP - Kaiser Permanente Santa Clara Megan Stephenson, MD - Kaiser Permanente Santa Clara Wenting Tong, MD - Kaiser Permanente Santa Clara Alexander Vayner, MD - Kaiser Permanente Santa Clara

Congenital Factor V deficiency, also called Owren's Disease and Parahemophilia, is a very rare hematologic disorder with an estimated incidence of one in a million. (1) We report on a patient presenting for Cesarean hysterectomy for placenta accreta spectrum with no medical issues and no history of menorrhagia, epistaxis, or easy bruising. She had one prior delivery at our medical center two years ago. Initially she presented for induction of labor for post-dates pregnancy and received a labor epidural by dural puncture epidural technique. She eventually delivered by Cesarean section due to failure to progress via epidural anesthesia. Postpartum hemorrhage was noted due to uterine atony with QBL of 1010mL. No neurological deficits were noted in the postpartum period and no coagulation labs have been drawn prior to her current encounter.

On routine preoperative labs the day before surgery, a coagulation panel revealed an INR of 2.0 with elevated PT (23.1) and aPTT (49.9). These labs were repeated on day of surgery with similar findings. The surgery was postponed for two days for further optimization and a stat hematology consult was obtained. Further labs were obtained which revealed an underlying congenital Factor V deficiency with Factor V activity levels < 11%. After discussion with hematology, we transfused two units of FFP preoperatively prior to proceeding with surgery with a post-transfusion INR of 1.5. Large bore intravenous access was obtained, an arterial line was placed, and a full massive transfusion protocol equivalent was prepared in the room (6 units of PRBC, 6 units of FFP, and 1 unit of platelets). The patient received general anesthesia with an endotracheal tube. The fetus was delivered atraumatically at 36w1d with Apgar scores of 8 and 9. The placenta was confirmed to be morbidly adherent and the team proceeded with hysterectomy. Pathology with histology confirmed placenta increta. Final EBL was 3500mL and the patient received 4 units of PRBC, 4 additional units of FFP, pooled cryoprecipitate (10 units), tranexamic acid, and methylergonovine. During massive transfusion, the INR was maintained between 1.3-1.5. Prior to extubation, an ultrasound-guided transversus abdominis plane block was performed using liposomal bupivacaine. Her postoperative pain was well controlled with primarily scheduled acetaminophen and ibuprofen.

Her repeat labs one month postpartum have confirmed a diagnosis of congenital Factor V deficiency. Further genetics workup is pending. Although we did not have coagulation

labs at the time of her prior delivery, we assume that she had a Factor V deficiency at that time as well and received a labor epidural without any adverse events.

	12/6/2022 (baseline)	12/7/2022	12/9/2022 (pre-op, 2u FFP)	12/9/22 (during MTP)	12/9/22 postoperative (6hr postpartum)	12/11/22 (discharge)
APTT	49.9	47.8	26.3	25.9	26.4	40.3
РТ	23.1	23.5	17.9	16.8	15.8	19
INR	2	2.2	1.5	1.4	1.3	1.6
Fibrinogen	440			267	410	334

# Tuberous Sclerosis Complex and Candidacy for Neuraxial Anesthesia in Parturients

Presenting Author: Ina T. Du, MD, MPH

**Presenting Author's Institution:** Louisiana State University Health Science Center Department of Anesthesiology - New Orleans, Louisiana **Co-Authors:** Corrine Weinstein, MD - Louisiana State University Health Science Center Department of Anesthesiology

#### Introduction:

Tuberous sclerosis complex (TSC) is a rare condition that is characterized by presence of hamartomas, benign lesions that develop in multiple organs, most commonly within the brain, kidneys, and skin. There are two reports of parturients with TSC that underwent anesthesia for medical termination of pregnancy and cesarean section, respectively (1). Due to the disease rarity, no guidelines are in place for neuraxial management for patients with TSC.

#### **Case Presentation:**

Patient was a 19 y/o, G1P0 with PMH of TSC associated with focal onset epilepsy managed on Levetiracetam. She reported intermittent neurology follow up over the years and compliance with Levetiracetam for 5 months, however she had breakthrough seizures three weeks prior to presentation for spontaneous labor 2/2 running out of her medication. The patient did not have any recent intracranial imaging, the only imaging on file was an MRI Brain from three years prior, which noted multiple scattered areas of subcortical white matter hyperintensity, and several questionable subependymal nodules. Unfortunately, since the patient did not have recent intracranial imaging, the presence or progression of intracranial or spinal involvement of TSC could not be ruled out, especially in the context of breakthrough seizures despite medication compliance. These factors made the patient not an ideal candidate for neuraxial anesthesia. We recommended intravenous labor analgesia and counseled the patient on plan for general anesthesia if cesarean delivery was required.

#### **Discussion:**

Parturients with known intracranial lesions require increased consideration regarding the safety and candidacy of neuraxial anesthesia due to the risk of increased intracranial pressure and herniation. At baseline, the gravid uterus results in decreased lumbar CSF volume, and injection of medication in the epidural space compresses the dural sac displacing CSF toward the cranium (2). This phenomenon is inconsequential with normal parturients, however in patients with intracranial pathologies this can result in greater increase of ICP and other brain tissue shifts. It is therefore important to have a multi-disciplinary discussion with neurology and obstetrics with early anesthesia consultation in order to optimize patients prior to delivery.

# Anesthetic Management in Parturients Susceptible to Malignant Hyperthermia

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#### Introduction

Malignant hyperthermia (MH) is an autosomal dominant condition due to mutations in the RYR1 gene coding for the ryanodine receptor. Symptoms of MH are caused by an unregulated release of calcium ions in skeletal muscle¹. The clinical and biological signs in MH crisis secondary to triggering anesthetics such as succinylcholine and volatile anesthetics can be life threatening. Great caution in anesthesia care should be taken in parturients who have a past medical or family history of MH.

# **Case Presentation**

A 41 y/o G4P3003 at 37+7 WGA with PMH of seizure disorder and obesity was admitted for IOL 2/2 gestational HTN and fetal macrosomia. On admission, patient was found to be COVID positive and complained of headache and sinus congestion. Prior to admission, patient had a pre-operative appointment with OB anesthesia to discuss her goal of natural delivery and her family history of malignant hyperthermia (maternal grandfather and uncle). The patient had prior anesthetics in which MH precautions were taken. For this pregnancy, the patient requested a trial of labor after cesarean delivery with minimal intervention from anesthesia personnel unless necessary for emergency purposes. On the date of her delivery, one of the L&D operating rooms was reserved during her labor and underwent preparation with malignant hyperthermia precautions in case the patient were to require an emergent cesarean delivery with general anesthesia. The patient underwent normal spontaneous vaginal delivery without any complications or the requirement of services from anesthesia.

#### Discussion

Providing a safe anesthetic for malignant hyperthermia susceptible parturients is essential. Operating rooms should be adequately prepared, and precautions should be taken to provide trigger-free anesthetic care for this patient population. MH susceptible patients should meet with OB Anesthesia to discuss risks and benefits of anesthetic plans, particularly risks with the use of general anesthesia. Non-triggering anesthetics such as neuraxial block (epidural or spinal), local, and total intravenous general anesthetic should be administered if indicated. It is vital for specific measures to be taken in pregnant women susceptible to MH as there are increased risks with management of labor and emergent cesarean section. Parturients susceptible to MH should deliver their newborn at a hospital with specialist obstetric and anesthesia staff².

# Anesthetic Management of Acute Fatty Liver of Pregnancy: A Case Report

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**Co-Authors:** Logan Mauney, MD - Massachusetts General Hospital, Department of Obstetrics and Gynecology, Maternal-Fetal Medicine Program

#### Introduction

Acute fatty liver of pregnancy (AFLP) is an uncommon complication of pregnancy with the potential for severe morbidity. The presentation can vary and share similarities with other pathologies. Laboratory studies are often notable for elevated liver function tests, coagulopathy, and renal impairment. Treatment involves delivery and supportive care¹.

#### **Case Report**

The patient was an otherwise healthy 37-year-old gravida two, para one who presented in active labor at term. A combined spinal epidural was placed, and she had an uncomplicated vaginal delivery. Prior to delivery, she had mildly elevated blood pressures and laboratory studies were notable for a leukocytosis, normal platelet count, elevated liver function tests, elevated bilirubin, elevated creatinine, mild hypoglycemia, and an absence of proteinuria (Table). She was treated for preeclampsia with severe features and received a magnesium infusion. She subsequently developed a postpartum hemorrhage two hours after delivery. She received uterotonic agents and a bimanual exam was performed. Tranexamic acid was given for ongoing bleeding. Total estimated blood loss was approximately 1.5 liters. Laboratory studies at that time were notable for an elevated international normalized ratio (INR) and a low fibrinogen (Table). She received two units of fresh frozen plasma and one unit of cryoprecipitate with improvement in her coagulopathy. She later received vitamin K intravenously.

Ultrasound demonstrated normal liver parenchymal echogenicity, no bile duct dilation, patent vasculature, and moderate ascites. Hepatitis serology was negative. She underwent a therapeutic paracentesis due to persistent abdominal distension and pain.

She was counseled about the risks of epidural hematoma in the setting of her coagulopathy, and the epidural catheter was left in place. The catheter was removed four days post-delivery. She was monitored with serial neurologic exams and did not develop any deficits.

Her liver synthetic function improved postpartum, and she was discharged on postpartum day six. Two weeks after, her INR normalized and her liver function tests improved.

#### Conclusion

Here we report a case of AFLP that was not recognized until postpartum, as her hypertension and laboratory findings were also suggestive of preeclampsia. The hemorrhage and coagulopathy were managed with uterotonic agents, tranexamic acid, and blood product transfusion. Coagulopathy was not discovered until after epidural placement, and catheter removal was delayed given the risk of hematoma formation. While acute management of AFLP and preeclampsia are similar, prognosis and anesthetic implications can differ. Understanding AFLP is critical for anesthesiologists to safely manage these patients in the peripartum period.

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# Anesthetic Management for Delivery in a Patient With Severe Pulmonary Hypertension

**Presenting Author:** Patrice A. Vinsard, Fellow **Presenting Author's Institution:** Mayo Clinic, Minnesota **Co-Authors:** Katherine W. Arendt, Professor of Anesthesiology - Mayo Clinic

Pulmonary Hypertension in Pregnancy

Pulmonary hypertension (PH) is the result of endothelial dysfunction and remodeling causing an increased pulmonary vascular resistance and Right Ventricular (RV) failure. Pregnancy increases plasma volume, cardiac output, and induces a hypercoagulable state elevating the risk of morbidity and mortality in PH [1]. We present a case of a 31-year-old G1P0 with severe PH secondary to Hereditary Hemorrhagic Telangiectasias (HHT) with pulmonary Arterio-Venous Malformations (AVM) who underwent a successful cesarean section at 36 weeks gestation.

#### Case

Prior to pregnancy the patient was diagnosed with pulmonary AVM that caused her shortness of breath and hypoxia. She had a right lower lobectomy leaving a small AVM on the left lung. She remained symptomatic and genetic testing revealed she had HHT. Cardiac workup showed RV, pulmonary artery, and wedge pressures of 60/19, 60/35, and 19 mmHg respectively. Vasodilator therapy was held for concern of worsening shunt and hypoxia due to her residual AVM.

A non-contrast lumbar spine MRI was negative for any neuraxial AVM. Repeat ECHO at 34 weeks showed a mildly reduced RV systolic function, a RV Systolic Pressure (RVSP) of 75 mmHg (68% of systemic BP) and a right to left shunt through a patent foramen ovale.

For delivery, the patient had a radial arterial line and external defibrillator pad placed prior to an intrathecal catheter insertion. This was titrated to a surgical anesthetic level using 0.5% Bupivacaine with intrathecal Morphine and Fentanyl. Peripheral IV Norepinephrine was used to maintain hemodynamics and Ephedrine was administered during uterine incision to support RV function. An Oxytocin infusion was used for uterine tone. Patient tolerated the procedure well and was directly admitted to the Cardiac Intensive Care Unit (CICU). She was discharged on POD3 with no issues. Follow up echo showed an enlarged RV with a moderate reduction in systolic function, a RVSP of 68 mmHg and a preserved left ventricular function. There has not been further follow up.

#### Discussion

PH poses significant morbidity and mortality to parturients throughout all stages of pregnancy. The anesthetic management should focus on optimization of the RV perfusion

and function considering the changes in pregnancy and critical times of delivery to avoid acute RV failure [2]. General anesthesia and neuraxial techniques can be used, but the latter allows slow titration for hemodynamic stability and optimized respiratory parameters. CICU monitoring is necessary since acute heart failure can occur after delivery and follow up is critical as maternal deaths are seen months after a successful delivery.

#### Neuraxial Anesthesia for Cesarean Delivery in a Patient with Tethered Cord, Syrinx, and Spina Bifida with a Neural Placode-Lipoma Interface

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#### Introduction:

Neural tube defects are the second-most-common major congenital anomaly. With advances in medical care, many patients that have undergone surgical repair of these defects are surviving into adulthood. We present a patient with a history of spina bifida repair who desired to be awake for Cesarean delivery after previously being denied that opportunity due to her pathology.

#### **Case Report:**

A 36 year-old G3P2002 woman with a history of a repaired open neural tube defect presented to clinic ahead of planned repeat Cesarean delivery. The patient had a history of spina bifida and had undergone surgical repair as an infant. Her prior Cesarean delivery had been performed under general anesthesia as neuraxial anesthesia was thought to be contraindicated.

The patient strongly desired to be awake for this delivery. An MRI was obtained (Figure 1). Spinal anesthesia was contraindicated, and lumbar epidural placement was deemed too high-risk. Given the patient's history of prior Cesarean delivery, there was potential for adhesive disease requiring increased operative time. As such, neuraxial anesthesia for this patient would need to be safe as it pertained to her anatomy and effective in achieving appropriate dermatomal spread for the duration of her surgery.

The plan was made to insert a Tuohy needle directly into the epidural space and administer a slow bolus of local anesthetic without threading a catheter. A 17-gauge Tuohy needle was inserted and no catheter was placed. Three milliliters of 2% lidocaine with epinephrine were bolused at three-minute intervals. The rising level was regularly assessed via sharp pinprick. An appropriate level was obtained with 15 milliliters of 2% lidocaine with epinephrine and 100 micrograms of fentanyl total across 18 minutes. The patient tolerated the procedure well and her pain during surgery was adequately controlled.

The patient had no apparent anesthetic complications following her surgery. She was placed on a patient-controlled analgesia infusion for 24 hours postoperatively then

transitioned to oral analgesics. She had an uncomplicated postpartum course and was discharged home on postoperative day two.

#### **Discussion:**

In patients with a history of spinal surgery in whom spinal anesthesia is contraindicated, there can be concern regarding the ability to access the epidural space as well as risk of potential obliteration of the epidural space that may limit the spread of anesthesia or increase the risk of dural puncture. A slow bolus directly through a Tuohy catheter into the epidural space can provide adequate operative analgesia for Cesarean delivery.


## Wernicke's Encephalopathy secondary to hyperemesis gravidarum during pregnancy

**Presenting Author:** Afshan Soomro MD, MD **Presenting Author's Institution:** Montefiore Medical Center **Co-Authors:** Yelena Spitzer, MD, MD - Montefiore medical center

Wernicke's encephalopathy is an irreversible central neurological disorder caused by severe thiamine (Vitamin B1) deficiency associated with significant morbidity and mortality if untreated. It is mostly observed in alcoholics and severely malnourished patients. The disease is characterized by nystagmus, ophthalmoplegia, ataxia and mental status changes. We present a rare case of Wernicke encephalopathy in a patient with a history of hyperemesis gravidarum, complicated by pancreatitis resulting severe malnutrition leading to Wernicke's encephalopathy.

29-year-old female (G2P1) 11 weeks pregnant was transferred to our hospital for further evaluation of her deteriorating mental status and management of her pregnancy in the setting of hyperemesis gravidarum. At the time of her presentation, she had a history of gallstone pancreatitis s/p ERCP s/p biliary and pancreatic duct stents, sphincterotomy. As per history from a close family member, patient carried out her normal daily activities without problems before her pregnancy but after her pregnancy due to severe emesis her PO intake was decreased, and she reported feeling weak and having trouble walking. As her mental status changed abruptly a concerned family member brought her to the hospital. Along with hydration, addressing her nutritional status and repleting vitamins and electrolytes she underwent a series of tests to determine the cause of her change in her mental status. To support and confirm the diagnosis, she underwent MRI which showed hyperintensity in periaqueductal gray matter, hypothalamus, bilateral thalami, peri Rolandic cortex, and bilateral mammillary bodies consistent with Wernicke's encephalopathy. The patient's overall prenatal course remained complex and challenging to the multi-disciplinary team, including prolonged care in the neuro ICU and then her transfer to an ICU closer to labor and delivery floor. The patient was planned for induction at 35 weeks of her pregnancy. , An epidural catheter was placed for labor analgesia, patient delivered a baby (small for gestational age) with Apgar score of 9 and 9. The patient was monitored during postpartum period and later was transferred to the floor. She is still admitted due to her mental status and deconditioning secondary to malnutrition and nosocomial infection during prolonged hospital course. She also had Acute Kidney injury, COVID and pneumonia during her lengthy hospital stay from 11 weeks to beyond 35 weeks of her pregnancy. We are presenting this case to raise awareness about how simple and common conditions in pregnancy like Hyperemesis gravidarum can cause severe morbidity where a young mother, the newborn baby and the entire family gets affected for life.

## Long COVID-19 complications affects both antepartum and intrapartum care

Presenting Author: Logan Ernst, MD
Presenting Author's Institution: Ohio State University
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Emily Schueppert, n/a - Philadephia College of Osteopathic Medicine

## Introduction

Post-tracheostomy stenosis after prolonged intubation (incidence 4-13%), can cause significant complications in pregnancy [1]. Increased oxygen consumption, coupled with decreased FRCC and increased airway edema can exacerbate dyspnea in these parturients[1, 2]. We present a case of glottic stenosis following COVID-19 pneumonia who required tracheal dilation during pregnancy and subsequent CS for breech presentation.

## Case

A 39 year old G2P1 with history of COVID-19 with prolonged intubation, tracheostomy with subsequent glottic stenosis and bilateral true vocal cord paralysis requiring serial dilations. History also significant for PE during COVID-19 requiring prophylactic lovenox during pregnancy, GMD, BMI 45, hypertension and prolonged pulmonary sequela. Initially presented to ENT with unplanned pregnancy and worsening respiratory status. Decision for repeat dilation at 27 weeks to mitigate risk of further respiratory compromise. MLB under general anesthesia with TIVA with jet ventilation and intermittent intubation with 5.0 MLT. Found to be breech at 35 weeks. Seen for antenatal anesthesia consult. In coordination with MFM and ENT primary CS scheduled at 38 weeks to decrease risk of unplanned delivery given difficult airway and anticoagulation status. Uneventful CS performed under CSE with isotonic bupivicaine. Stable hemodynamics and no respiratory compromise. Backup airway equipment and ENT available.

## Conclusion

Parturients with laryngotracheal stenosis require prenatal multidisciplinary planning and close follow up with ENT, MFM and anesthesia. Fetal maturity must be weighted against risk of further airway/respiratory compromise with ongoing pregnancy. It is prudent to see these patients, particularly those with relevant co-morbities (anticoagulation, morbid obesity), in antenatal consult to allow adequate time for delivery planning.

#### Streptococcal Shock in a Parturient

### **Presenting Author:** Keith Delaune, MD **Presenting Author's Institution:** Ochsner Medical Center

#### Introduction:

Sepsis is a leading cause of morbidity and mortality in pregnant patients throughout the world (1). We present a case of Group C streptococcus bacteremia in a parturient and the resulting sequalae.

#### Case Presentation:

A 29-year-old G4P3 female at 29 weeks EGA presented to the OB-ED endorsing 24 hours of diarrhea, nausea, malaise, "contractional" abdominal pain, and URI symptomology. She was severely hypotensive and tachycardic. She underwent fluid resuscitation (FR) while labs were pending: the only initial concerning laboratory finding was a lactic acidosis (3.7), which worsened despite FR. FHT's showed prolonged decelerations, prompting OB to start a Mg infusion. A CXR to evaluate her URI symptoms showed nonspecific bilateral airspace disease, and the patient promptly developed supplemental O2 needs. Broad spectrum antibiotics were soon initiated due to suspicion for sepsis.

She was admitted to Labor and Delivery the following morning for monitoring. Despite initial improvement in FHT's, she again became hypotensive and developed a fever. OB anesthesia unsuccessfully attempted management with further FR and vasopressor therapy. A decision was made to proceed to OR for emergent C-section, which was carried out under GETA (+ arterial line). Her LTCS course was uncomplicated and she delivered a viable infant. Difficult surgical hemostasis prompted suspicion for DIC. Transfusion of blood products was initiated while blood counts and coagulopathy labs were pending. Patient was found to be persistently hypoxic despite maximal ventilatory settings, and ARDS was diagnosed based on her severe P/F ratio on POC labs. Patient remained intubated and was transferred to the ICU, where she underwent Trialysis line placement, vasopressor therapy, and further diagnostics.

Blood cultures returned positive for Group C Streptococcus. Antibiotics were appropriately narrowed. Though the patient was eventually discharged to an inpatient rehabilitation center, her ICU stay was prolonged and complicated by: ARF requiring CRRT, severe ARDS requiring proning/paralysis, refractory shock requiring stress-dose steroids, multiple transfusions, IR embolization of intra-abdominal bleed, and critical ischemia of distal LLE requiring hyperbaric O2 therapy and eventual TMA. Discussion:

Though maternal sepsis is a rare occurrence, it is still one of the leading causes of maternal mortality worldwide (2). Normal physiologic changes of pregnancy (ie expansion of plasma volume) can mask signs of sepsis until late in its course (3). Respiratory dysfunction and coagulopathy are the most common presentation of endorgan dysfunction in maternal sepsis (1). Complications include premature birth, fetal infections, higher fetal mortality, and higher rates of Cesarean section (4). Many committees recommend "think sepsis" when presented with any unwell pregnant patient.



Parturient with Massive Cervical Fibroid Requiring Repeat Cesarean Section Presenting Author: Kathleen M. Daly-Jensen

**Presenting Author's Institution:** Oregon Health and Science University - Portland, Oregon

Co-Authors: Mike Benson, MD - Oregon Health & Science University

**Introduction**: A 44-year-old G6P3023 at 26w 6d is admitted with PPROM. A 17cm x 15cm cervical fibroid is present obstructing the vaginal canal, eventually requiring cesarean section (C/S). Nephrostomy tubes are in place due to hydronephrosis from compression of ureters by fibroid. Patient had prior C/S and self-reported tubal ligation. Upon admission, patient is in acute psychosis from schizophrenia, off meds.

#### Anesthetic Considerations:

1) Increased risk of hemorrhage - altered anatomy due to mass effect of cervical fibroid, vascularity of fibroid, potential for difficult fetal extraction, history of prior C/S and adhesions. Need art-line, blood T&C 4 units, possible central line.

2) Potential for transition from neuraxial to GA - possible hysterectomy due to difficult surgery. Need GA induction meds, airway equipment ready, clear communication with OB and Gyn-Onc teams before and during surgery.

3) Potential for inability to cooperate during surgery - acute psychosis present on admission, psychiatry determines patient lacking decision-making capacity, started on antipsychotic medication. Need continued antipsychotic meds, and sedation meds available intraoperatively.

**Case Progression**: Multidisciplinary team conference convenes to discuss management plan and concerns. Acute psychosis stabilized with olanzapine. Patient deemed to have capacity the day of surgery by managing team. At 33w 3d, C/S with tubal is performed by OB team in main OR under epidural with art-line and large-bore IV access. A T4 level is obtained, and delivery accomplished with classical uterine incision. Exploratory laparotomy then performed by Gyn-Onc team to visualize anatomic structures and plan for possible future removal of fibroid. Dexmedetomidine 8mcg given post-delivery, procedure continued uneventful, fibroid not disturbed, hemostasis achieved, blood loss ~700ml.

**Discussion**: This case demonstrates the importance of a multidisciplinary approach to planning the anesthetic management in the unique scenario of a massive cervical fibroid complicating a planned C/S. In review of literature, this appears to be the only described case of a massive cervical fibroid in a current pregnancy. The additional factor of an unpredictable mental health condition added to the need for a clear plan and communication as the case progressed. The eventual outcome was uncomplicated, in part due to the advanced preparation by all team members for the possibility of major hemorrhage, predicted prolonged fetal extraction time, and potential need to convert to GA for hysterectomy.



Anesthetic Management of Bethlem Myopathy: A Multidisciplinary Approach **Presenting Author:** Lauren A. Blake, MD

**Presenting Author's Institution:** University of North Carolina at Chapel Hill - Chapel Hill , North Carolina

**Co-Authors:** Courtney R. Hood, MD - University of North Carolina Lacey Straube, MD - University of North Carolina at Chapel Hill

Bethlem myopathy is a benign form of Ulrich's disease, which is a neuromuscular disease caused by a mutation in collagen IV, the collagen responsible for the structural integrity of tissue. It manifests as a spectrum of neonatal hypotonicity, proximal muscle weakness, and progressive scoliosis.¹ The constellation of symptoms can make anesthetic management challenging, particularly in a parturient, and requires a multidisciplinary approach.² Our case involves a 20-year-old G2P0101 at 37 weeks and 6 days who presented for a scheduled repeat cesarean section in the setting of Bethlem myopathy. The patient is wheelchair bound with a history of severe restrictive lung disease requiring the use of a noninvasive Trilogy home ventilator. Other anesthetic concerns included a history of supraventricular tachycardia (SVT) in her prior pregnancy requiring adenosine and a history of multiple family members with airway losses resulting in death. The multidisciplinary team included obstetric anesthesia, maternal fetal medicine, cardiology, pulmonology, and otolaryngology (ENT). Upon arrival to labor and delivery, access was established with 2 large-bore IVs and an arterial line. Given the patient's respiratory status and airway history, neuraxial anesthesia was the planned anesthetic with general anesthesia as a backup to avoid invasive ventilation. For the general anesthetic, a total IV anesthetic (TIVA) with propofol was prepared in accordance to the muscular dystrophy guidelines due to the risk of rhabdomyolysis. ENT was on standby during the neuraxial placement. The epidural was performed using a slowly titrated approach. The epidural was slowly dosed to a T4 level with 2% lidocaine with epinephrine 1:200,000. A spinal dose was avoided due to the increased risk of respiratory decompensation from an acute loss of respiratory accessory muscles. The patient tolerated epidural placement and the cesarean section was performed under neuraxial anesthesia successfully. Postoperatively, the epidural was kept in place for postoperative pain control to minimize the use of opioids and respiratory depression. The epidural was removed on postoperative day one and the patient was discharged on day three. This case illustrates the use of epidural anesthesia in a patient with significant respiratory compromise and the importance of a multidisciplinary preoperative evaluation and plan.

# Anesthetic considerations for a parturient with subglottic stenosis and multiple sclerosis: a case report

#### Presenting Author: Justin Shang, DO

Presenting Author's Institution: Rush University Medical Center

#### Introduction

Subglottic stenosis (SGS) can be a complication of repeated intubation, or may be idiopathic. Multiple sclerosis (MS) is an autoimmune disease with three-quarters of patients being women of childbearing age [1]. The combination of these two comorbidities requires careful planning.

#### Case

We present the case of a 41yo G2P0010 with history of idiopathic SGS s/p multiple tracheal balloon dilation and relapse-remitting MS. Initial SGS symptoms included exertional dyspnea after an URI and inspiratory stridor with her first pregnancy. Laryngoscopy during her initial pregnancy revealed a 50-60% SGS, and dilation resulted in a 7.5 regular ETT passing through SGS. Initial MS symptoms included left arm numbness and left eye blindness. She had no pulmonary and neurologic complaints upon arrival.

She presented for IOL at 38w1d gestation and received early epidural placement with a continuous infusion for labor analgesia. Multiple ETT ranging from size 6.0-7.5, video laryngoscope, fiberoptic bronchoscope, percutaneous trach kits, and cricothyrotomy kits were made available in the OR in the event of a crash c-section. After NSVD, she lost about 1800cc of blood from PPH and was given misoprostol while multiple passes to remove retained placenta were made. The delivery ultimately resulted in a healthy male infant with apgars 9/9 and mother with no exacerbations of her SGS or MS.

## Discussion

Pregnancy is associated with airway edema and predisposes SGS patients to the cannot intubate, cannot ventilate situation. Multidisciplinary planning with ENT and OB teams is crucial for patient safety. Although MS is a neurodegenerative disease, there is evidence that relapse rates decrease during pregnancy, increase slightly during the first three months postpartum, and finally regress to pre-pregnancy rates thereafter [2]. Additionally, there is a hypothetical risk that injecting LA in the intrathecal space, which is continuous with potentially demyelinated white matter, may be associated with MS exacerbations since the concentration, and thus neurotoxic effects, of LA would be higher if injected as a spinal versus epidural. However, no data has supported this theoretical complication [3].



## Delivery and Management of a Parturient with Spontaneous Dural Leak and Intracranial Hypotension

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Case: A 38-year old female, G2P0 at 36w5d, presented with postural headache. MRI showed caudal displacement of the brain, diffuse dural thickening, and enlargement of the pituitary gland, suggestive of intracranial hypotension likely due to spontaneous CSF leak. She was initially managed with conservative measures: supine positioning, hydration, and caffeine. Over 3 weeks these did not relieve her symptoms, her headaches progressed, with Valsalva exacerbations. She was re-admitted for MRI spine imaging including T2 weighted fat-saturated sequences which localized her CSF leak to posterior T11-L2 and possible ventral T10 dura. After multidisciplinary discussion, it was decided she would undergo delivery via cesarean section (CS) under general anesthesia (GA) at 37w 1-2 hours after an Epidural Blood Patch (EBP) for neuroprotection and potential curative leak closure. The CS would avoid the dangers of Valsalva and further CSF volume loss with labor; and reduce the risk of precipitating subdural hematoma, aggravation of headache, or cerebral herniation.(1) She first underwent an ultrasound-guided L1/L2 EBP with 33 mLs administered. Prior to removal of the Touhy needle, an epidural catheter was placed (to provide more neuraxial volume if worsening of neurological symptoms, administer neuraxial opioids for analgesia, and attempt neuraxial anesthesia for the CS). After 90 minutes of observation, she had no new neurological complications and resolution of her headache. She was given a total of 10 mLs of 2% lidocaine with epinephrine in divided doses via her epidural catheter but did not develop any sensory level. The GA was done with TIVA with propofol and remifentanil, to decrease risk of postoperative emesis and raised intracranial pressure secondary to emergence coughing. She had an uneventful induction, intubation, delivery of infant, closure, emergence, and extubation. Multimodal analgesics (NSAIDs. acetaminophen and an OnQ continuous wound infiltration catheter) provided postoperative pain relief. In PACU she was fully neurologically intact, had no headache and 4/10 incisional/uterine pain.

**Discussion:** A collaborative multidisciplinary (MFM, OB Anesthesiology, Neurology, Neurosurgery, and a CSF Leak Specialist) approach was key to the safe management of this rare condition. We elected to administer an EBP prior to CS both to potentially seal the CSF leak and also to transiently raise spinal CSF pressure – independent of defect occlusion- during the period of GA when neurological status could not be directly monitored. GA is considered preferable to spinal anesthesia which can worsen the CSF

leak. This is the first report of attempted epidural anesthesia after an EBP. Unsuccessful activation of the epidural catheter after EBP may be due to impaired local anesthetic action in the presence of autologous blood following EBP.

## MRI Images of the Patient's CSF Leak





T2-Weighted Fat-Saturated Axial MRI Images: A. T12 Posterior extradural CSF collection B. T11 Posterior extradural CSF collection C. Possible T10 Anterior extradural CSF collection



# Anesthetic Management of a Parturient with a Hodgkin's Lymphoma and Anterior Mediastinal Mass

### Presenting Author: Kalissa Zhang, MD

**Presenting Author's Institution:** Stony Brook University Hospital - Stony Brook, New York

**Co-Authors:** Tiffany Angelo, DO - Stony Brook University Hospital Bahaa Daoud, MD - Stony Brook University Hospital

#### Introduction:

An anterior mediastinal mass poses unique anesthetic challenges dependent on the size of the mass and its impact on surrounding anatomical structures. Diagnosis and management can be particularly difficult in pregnant women as expected physiologic changes of pregnancy can mask the effects of an anterior mediastinal mass. When possible, precautions to avoid general anesthesia should be taken due to the risk of airway and cardiovascular collapse.

#### **Case Description:**

We report a case of a 31-year-old female G5P1 who presented at 16 weeks gestation with atypical prenatal screening results concerning for maternal malignancy. Workup revealed Hodgkin's lymphoma with a 10cm anterior mediastinal mass. Multidisciplinary care was initiated for peripartum delivery planning. She underwent two cycles of chemotherapy during her pregnancy and the anterior mediastinal mass decreased in size to 6 cm. Subsequently, the patient had an uneventful delivery via repeat cesarean section with low-dose combined spinal epidural anesthesia. Emergency difficult airway equipment was readily available during the cesarean section.

#### **Discussion:**

A comprehensive multidisciplinary approach to patient care including obstetrics, maternal fetal medicine, hematology/oncology, and obstetric anesthesiology can optimize parturients with anterior mediastinal lymphomas for safe delivery of the fetus and peripartum care for the patient.

## Management of a Parturient with Aortic Stenosis and Worsening Aortic Coarctation

#### Presenting Author: Bill Hum, MS

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Due to the marked changes in cardiac anatomy and physiology that occur in pregnancy, parturients with cardiovascular disease are at a high risk for complications and poor maternal outcomes^{1,2}. For instance, patients with aortic stenosis or congenital coarctation of the aorta can experience an increased pressure gradient through the obstructive lesion and risk complications such as myocardial ischemia and arrhythmias³. Here, we present a 25-year-old G2P1 at 40-weeks gestational age with a history of previous cesarean delivery, bicuspid aortic valve complicated by mild-moderate aortic stenosis, and a previously repaired aortic coarctation now with possible worsening of her coarctation proximal to the left subclavian artery on transthoracic echocardiogram who presented for a scheduled trial of labor after cesarean.

Due to this patient's NHYA II classification and CARPREG-II score of 4, a multidisciplinary meeting was set up to minimize the risk of a cardiac-related complication during delivery. The patient highly desired a vaginal birth and thus induction of labor was started. The anesthetic plan for labor analgesia consisted of a pre-neuraxial left radial arterial line to monitor perfusion post-obstruction to the placenta, non-invasive blood pressure cuff on the right arm to monitor maternal cerebral perfusion and an uncomplicated placement of a dural puncture epidural with slow titration of a total of 10cc of 0.125% bupivacaine followed by an infusion of 0.625% bupivacaine with 2mcg/cc Fentanyl. Shortly after, the patient had elevated blood pressures and met the criteria for pre-eclampsia with severe features. Cesarean delivery was recommended by the obstetric and cardiology teams and, after initially declining, the patient agreed. In the OR, the epidural was slowly loaded with a total of 400mg 2% lidocaine with epinephrine, 100mcg Fentanyl, and 3mg Morphine. A background phenylephrine infusion was used to keep blood pressure at baseline. There were no significant hemodynamic changes and the case proceeded without maternal or fetal complications. The patient was monitored on telemetry for 24 hours post-partum.

This case demonstrates the importance of a multidisciplinary approach to caring for parturients with complex cardiovascular diseases. While this patient was at high-risk for a major adverse cardiac event perioperatively, by following this approach we were able to ensure a successful outcome.

### Management of a Parturient with ESRD and Worsening Pericardial Effusion

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There is relatively little data regarding the management of pericardial disease during pregnancy, however the number of parturients in which pericardial effusion has been reported is far from trivial, approaching 20% of parturients within the first and second trimester and up to 40% of parturients during the third trimester ¹. The physiologic effects of pregnancy lead to an increase in blood volume and can mask the signs of cardiac tamponade, therefore worsening pericardial effusion in a parturient must be carefully monitored ^{2,3}. Proper planning and risk assessment via a multidisciplinary approach are of particular importance in the anesthetic management of such patients. We present a case of a 25-year-old G1P0 at 25 weeks gestation whose pregnancy was complicated by C3 glomerulonephritis with ESRD on dialysis and subsequent hypervolemia leading to worsening pericardial effusion, increased intracranial pressure, and poorly controlled hypertension. She initially presented with hypertensive emergency and bilateral subarachnoid hemorrhage and was treated with a nicardipine infusion. which was subsequently transitioned to oral agents. Transthoracic echocardiogram demonstrated Right ventricular collapse in diastole, suggestive of tamponade. Physical exam was notable for bilateral crackles on lung auscultation and mild ascites. In the setting of her worsening clinical status, we proceeded with an urgent primary classical cesarean section. The cardiology and cardiac anesthesia teams were on standby, if needed, for urgent pericardial window. The anesthetic plan consisted of a pre-neuraxial arterial line followed by a low dose-combined spinal epidural with 7.5mg hyperbaric bupivacaine, 15mcg Fentanyl and 150mcg Morphine followed by a total of 300mg 2% lidocaine through the epidural to achieve an appropriate anesthetic level. A background nicardipine infusion was used for blood pressure control throughout the procedure. Fluid intake was tightly regulated as to not exacerbate the patient's volume overload, with a total of 300cc crystalloid infused throughout the case. Additionally, 10 units of oxytocin was administered intramuscularly to further reduce fluid intake. Hemodynamics remained stable throughout the case and the patient was taken to the cardiac ICU for post-operative monitoring. The multidisciplinary approach to this patient's care, optimization of her fluid status, and close hemodynamic monitoring pre, intra, and post-operatively facilitated this successful outcome.

# Anesthetic Management of a Parturient with Post-COVID ILD, Large Pulmonary Bulla, and Acute-on-Chronic Respiratory Failure

**Presenting Author:** Carolina Aravera, MD **Presenting Author's Institution:** Stony Brook University Hospital **Co-Authors:** Bahaa Daoud, MD - Stony Brook University Hospital Morgane Factor, MD - Stony Brook University Hospital

A significant number of parturients_infected with SARS-CoV2 experienced pulmonary sequelae such as acute respiratory distress syndrome and pulmonary fibrosis. Though pulmonary fibrosis in pregnancy is uncommon, these patients have a significantly increased risk of peripartum complications.

We report a case of a 38-year-old G3P2 at 31w2d gestation with severe post-COVID ILD & chronic hypoxic respiratory failure on 2L nasal cannula at home. Her history is also complicated by a prior ICU stay 1 year ago secondary to COVID-19 infection complicated by ARDS, emergent preterm cesarean delivery due to hypoxic respiratory failure, pneumothoraces and multiple cardiac arrests. More recently, she presented to the labor floor with acute-on-chronic respiratory failure with increasing oxygen requirements & work of breathing. A large left lower lobe pulmonary bullae was found to be causing a mass effect on the left hemidiaphragm, upper lobe, and heart. A multidisciplinary collaboration between MFM, obstetric anesthesiology, cardiothoracic anesthesiology, cardiothoracic surgery, and intensive care specialists occurred to coordinate delivery planning. The patient underwent a scheduled repeat cesarean section in a cardiothoracic operating room equipped with cardiopulmonary bypass, TEE, and ECMO capabilities. The anesthetic plan consisted of pre-induction arterial line, central venous access, and a slowly loaded epidural. After that, both arterial and venous central access was obtained for possible need for ECMO. Approximately 45 minutes after delivery of the fetus, the patient became dyspneic with signs of respiratory acidosis and required initiation of VV ECMO for acute hypoxic/hypercapnic respiratory failure. Immediately after initiation of ECMO, the patient was found to be unresponsive and was then intubated for airway protection. Over the next 6 days, she underwent a bleb resection and then sequentially weaned off ECMO and extubated.

Parturients with post-COVID ILD are at high risk for perinatal pulmonary complications. The anesthetic management of a parturient with post-COVID ILD should include special consideration of disease severity and a multidisciplinary approach to reduce peripartum complications.

# Multidisciplinary Management of a Third Trimester Parturient with a Rapidly Expanding Renal Mass Undergoing Right Radical Nephrectomy

**Presenting Author:** Jake Graffe, DO **Presenting Author's Institution:** Temple University Hospital - Philadelphia , Pennsylvania **Co-Authors:** Diana Feinstein, DO - Temple University Hospital

Introduction: Management of renal masses with radiographic findings concerning for malignancy is especially challenging in parturients given the risks associated with surgical intervention and general anesthesia to both the mother and fetus. We describe the multidisciplinary perioperative management of a parturient in her third trimester undergoing radical nephrectomy in the setting of a renal mass exhibiting rapid growth kinetics.

Case: A 40-year-old, G1P0 with a past medical history of uterine fibroids, fibromyalgia, anxiety, and depression was diagnosed with an asymptomatic renal mass 6 months prior to presentation. Surveillance imaging at 26 weeks gestational age (GA) revealed a renal mass that had expanded 1.3 cm over six months, a concerning rate.¹ The characteristics of the mass were concerning for malignancy given its appearance on imaging, rapid growth rate, and the patient's history of fibroids – the lattermost feature suspicious for hereditary leiomyomatosis and renal cell cancer.

Following a multidisciplinary planning meeting, the patient was admitted at 31w1d GA for right radical nephrectomy with intraoperative fetal monitoring. She was also consented for emergency Cesarean section. We performed a modified rapid sequence induction technique with propofol and rocuronium, followed by uneventful endotracheal intubation. Intraoperative fetal monitoring was successfully deployed throughout the entire case, despite the use of a DaVinci robot and abdominal insufflation (see figure). Right radical nephrectomy was uncomplicated and fetal heart rate tracings were within normal limits. The patient was successfully extubated in the operating room and discharged to home on POD #2.

Discussion: The gold standard for localized renal masses is surgical excision. However, special considerations must be made when evaluating a parturient for non-obstetric surgery. Typically, the second trimester is the preferred window for such surgeries given the high risk of teratogenicity and fetal loss in the first trimester and preterm delivery in the third trimester – especially for abdominal surgery. Physiologic changes in pregnancy also complicate the anesthetic plan and influence the risk-benefit profile considerably. Anesthetic agents have a limited or inconclusive dataset on their safety profiles in pregnant patients and may need to be deployed at the clinical discretion of the anesthetic team. Ultimately, a multidisciplinary approach to parturients with concerning solid organ masses is recommended to evaluate the prognosis of the mass and risk of metastatic disease against the risks associated with surgery and general anesthesia to both the mother and fetus. It is essential that all non-surgical options be explored with

patients as well, so that a patient-centered, well-informed, and evidence-based decision can be made that minimizes risk and maximizes benefit in the best judgment of all involved parties.

Intraop Fetal Monitoring Third Trimester Parturient Radical Nephrectomy Graffe SOAP 2023.pdf

## Drug-induced hypotension leading to cardiac arrest during cesarean delivery

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Optimal blood pressure range during cesarean delivery in women with severe hypertension remains unknown. Antihypertensive drugs may alter responses to vasopressors during surgery.

A 41 y/o 72kg G5P2A2 at 28 weeks gestation underwent repeat cesarean delivery due to severe and labile blood pressure ranging from 180-200/100-120 mmHg at baseline. Her history was also significant for diabetes, chronic kidney disease requiring dialysis, and left heart failure. Before surgery, she was treated with maximum doses of amlodipine, hydralazine, and labetolol. Prior to surgery, magnesium sulfate 4g was administered. Her blood pressure upon arriving in the operating room was 128/74 mmHg.

Due to her severe thrombocytopenia (platelets  $30-41 \times 10(9)/L$ ), general anesthesia was performed. To avoid abrupt blood pressure changes, remifentanil 100 mcg bolus was administered for intubation followed by an infusion at 0.2 mcg/kg/min. After delivery, oxytocin 20u was administered intramuscularly to minimize fluid load. Over 3-4 min, her blood pressure decreased to 50-60/25-35 mmHg, with heart rate decreasing to 45 bpm and end-tidal (ET) CO₂ to 25 mmHg. She did not respond to boluses of phenylephrine or ephedrine or epinephrine 100 mcg, and progressed to pulseless electrical activities. Chest compressions were immediately initiated, with ET CO₂ returning to over 40 mmHg. She returned to spontaneous circulation in six minutes. Her coagulation and thromoelastogram studies were normal and an immediate postoperative CT angiography ruled out pulmonary embolism. She continued to recover from the cardiac arrest, and was extubated on postoperative day (POD) 1, and discharged on POD 15.

Blood pressure may be kept within 25% baseline during cesarean delivery in women with hypertensive disorders (1). The optimal range of blood pressure in severely hypertensive women remains unknown. Antihypertensive drugs may alter responses to vasopressors during surgery (2). In addition, boluses of oxytocin may also exacerbate hypotension (3). Our patient most likely suffered from low blood pressures away significantly below her baseline, an altered response to routine vasopressors, and combined effects of remifentanil and oxytocin bolus. This case illustrates the need for extra caution with severe hypertension and use of drugs to correct hypertension before and during cesarean delivery. Simulation on cardiac arrest in pregnancy helps ensure timely and high-quality chest compressions.

## Anesthetic Considerations in a Parturient With Mast Cell Activation Syndrome

## Presenting Author: Daniel Arce, DO

**Presenting Author's Institution:** UConn **Co-Authors:** Jamie Zorn, MD - Saint Francis Hospital/UConn

Mast Cell Activation Syndrome is a diverse, multisystem disease characterized by the accumulation of pathological mast cells in many organs with the release and degranulation of their mediators. In this case report, we present a clinical scenario of a pregnant patient with a history of Mast Cell Activation Syndrome (MCAS). It is imperative to understand the triggers that can cause an MCAS flare during labor, including the stress of labor and surgical stressor with a cesarean section. Careful consideration should be made to prevent any stressor, such as early epidural analgesia during labor and avoiding cesarean section, avoiding certain medications that cause mast cell mediator release including morphine, ester local anesthetics, induction medications such as etomidate, paralytics including succinvlcholine, as well as atropine and beta-blockers. Adequate premedication should be considered with the use of antihistamines (preferably H2 blockers), leukotriene receptor antagonists, and corticosteroids prior to receiving any invasive procedures requiring anesthesia. Extremes of temperature should also be avoided. One should anticipate a higher risk of postpartum hemorrhage with an MCAS flare (which causes fibrinolysis) and an increased risk of anaphylaxis with prompt treatment of epinephrine, fluids, and airway management. Therefore, it is prudent in creating a preoperative plan, avoidance of triggers, and have a treatment plan with a parturient patient with MCAS.

## Management of an asymptomatic patient with reactivated Q fever in pregnancy: a case report

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**Introduction:** Q fever, caused by the highly infectious zoonotic bacteria *Coxiella burnetii*, is rare in the general population. Due to its low incidence¹, no consensus guidelines exist for its management in pregnancy. Q fever can result in various obstetric complications including premature delivery, IUGR, IUFD, and spontaneous abortion^{2,3}. Management involves specific challenges for the patient, obstetricians, anesthesiologists, pediatricians, and nursing staff. We describe the case of a parturient diagnosed with reactivated Q fever presenting for induction of labor and will provide an overview of the obstetric course including antibiotic selection and infectious disease considerations, intraoperative management during Cesarean delivery, and transmission-based precautions for admission and delivery.

Case description: A 33-year-old-G1P0 with positive Q fever serology presented for induction of labor at 38 weeks and 4 days. She was a sheep rancher and actively worked in the lambing barn up until the first trimester. In consultation with Hospital Epidemiology and Infection Prevention, she was placed on novel respiratory and enteric isolations on admission, which required unusual attention to all equipment and items that entered and exited the room. In a multidisciplinary discussion with ID, the CDC, and MFM, she was started on TMP-SMX 800-160 mg twice daily to be taken until delivery to prevent risk of placental and fetal transmission. Early in her labor course, she requested a labor epidural. Dural puncture was not attempted out of precaution for rare CNS involvement in Q fever⁴. Given second stage arrest of labor, a decision was made to undergo C-section. The operating room was prepared with novel respiratory isolation precautions. The labor epidural was activated to achieve a surgical block, and the C-section proceeded uneventfully. The patient gave birth to a liveborn male neonate with APGARs of 5 and 9. The postpartum course was complicated by surgical site cellulitis despite ongoing TMP-SMX treatment. She was started on vancomycin and eventually transitioned to doxycycline on discharge. The patient was discharged on postpartum day 3 with instructions to follow up on Q fever titers every 4 weeks.

**Discussion:** This case demonstrates the management of known, asymptomatic, reactivated Q fever in a pregnant patient with successful outcomes for mother and

child. Management considerations discussed include selection of antibiotics for prevention of placental and fetal transmission, neuraxial considerations, infection prevention precautions, and frequency of serological follow-up due to potential for reactivation at the time of another pregnancy.

## Anesthetic Implications of Hereditary Angioedema in Pregnancy

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## **Background:**

Hereditary angioedema (HAE) is a rare autosomal dominant disorder characterized by episodic angioedema of the upper airway, skin or GI tract. The two most common subtypes are type 1 HAE with deficient C1 esterase inhibitor (C1-INH) and type 2 HAE with dysfunctional C1-INH. SERPING1 gene mutations cause alterations in the C1-INH protein leading to bradykinin (BK) overproduction and, ultimately, angioedema.¹ Medications that inhibit BK production or are BK receptor antagonists are treatment mainstays for both disease prophylaxis and acute exacerbations. Exacerbations are often due to triggers, such as stress, procedures or estrogen, thus having specific implications in the gravid population.

## Case:

A 32-year-old G3P1 female with type 1 HAE C1-INH deficiency and BMI of 35 presented for delivery planning prior to scheduled rLTCS at 39w0d gestation for fetal bilateral CDH. Her symptoms were well controlled on long-term prophylaxis with subcutaneous plasma-derived C1-INH, without a history of laryngeal edema. Prior to admission for rLTCS, plans for short-term, pre-procedure prophylaxis with IV plasma-derived C1-INH and contingency management for acute exacerbation were established by her allergy and anesthesiology teams. On the day of delivery, she received IV plasma-derived C1-INH and an uncomplicated CSE was placed. During the intra and postoperative periods, she showed no evidence of acute HAE exacerbation. She was subsequently discharged on POD#3, with plans for close outpatient follow-up.

## **Discussion:**

Pregnancy can significantly influence HAE due to estrogen effects and peripartum stressors (procedural delivery, labor pain).² The management of HAE in pregnancy requires a multidisciplinary approach, involving allergists, anesthesiologists and obstetricians. The mainstay of therapy during pregnancy is the use of subcutaneous and IV plasma-derived C1-INH. These medications are effective for prophylaxis and acute exacerbation treatment, with good maternal-fetal safety profiles.^{1,3,4} Icatibant, a BK B2 receptor antagonist, has not been studied in pregnancy, but its use has been described in case reports. Though upper airway edema only occurs in 1-3% of exacerbations, the gravid population is at high risk for potentially life-threatening airway complications, given their predilection for difficult airway management.⁵ Gravid women

with HAE should deliver in a facility where fiberoptic intubation, surgical airway equipment and skilled airway clinicians are readily available.¹

## **Conclusion:**

We report successful delivery with minimal complications in a patient with type 1 HAE C1-INH deficiency, who was well-managed via a multidisciplinary care approach, using C1-INH as long-term and preprocedural prophylaxis.

## Combined Cesarean Delivery and Adrenalectomy for Pheochromocytoma Diagnosed During Pregnancy

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**Co-Authors:** Jalal Nanji, MD, FRCPC - University of Alberta Faculty of Medicine and Dentistry

Pheochromocytoma is a rare tumor affecting 0.007% of pregnancies. While historically associated with high mortality, improved care has decreased fetal mortality to less than 10% and maternal mortality to 1% when the diagnosis is made antenatally. Current management goals include early initiation of alpha blockade and often surgical resection in the second trimester, although recent studies have called this practice into question. Given these complexities, these patients require a multidisciplinary approach to ensure safe fetal and maternal outcomes.

We present the case of a 30 year old nulliparous female with poorly controlled type 2 diabetes and a prenatal diagnosis of essential hypertension. As her pregnancy progressed, she was followed by obstetrical medicine and her blood pressure became increasingly labile. She was diagnosed with a pheochromocytoma at 22 weeks gestation as her urine metanephrines were 30 times the upper limit of normal and imaging revealed a 7.9 cm adrenal tumour. She was initiated on terazosin followed by metoprolol and nifedipine for ongoing hypertension.

A multidisciplinary team was assembled with obstetrics, endocrinology, anesthesiology, and urology to review her care plan. Due to tumor and patient factors, it was deemed unsafe to resect the tumor during pregnancy or proceed with a vaginal delivery. After many discussions, the patient elected to proceed with a planned caesarean section and immediate adrenalectomy.

Our patient required three admissions to hospital for hypertensive urgency as her pregnancy progressed and betamethasone was administered. She was brought to the operating room at 35 weeks gestation still having two severe hypertensive episodes a day despite supratherapeutic terazosin, doxazosin, metoprolol, nifedipine, and magnesium. She was managed with thoracic epidural and general anesthesia. A healthy infant was delivered and after hemostasis was achieved the adrenalectomy was performed. Intraoperative medications included phentolamine, magnesium, sodium nitroprusside, nitroglycerin, esmolol and opioids. Her blood pressure remained labile throughout the procedure until adrenal vein ligation. Norepinephrine and vasopressin were then initiated to counteract the expected hypotension from decreased catecholamines. Postoperatively she was admitted to the ICU where her vasoactive medications were weaned and she was extubated. She was discharged home on postoperative day 7 on doxazosin for blood pressure control. Further testing revealed no evidence of malignancy, no genetic diseases increasing her susceptibility to pheochromocytoma and normal urine metanephrines.

#### Neurofibromatosis and Anesthesia in an Obstetric Patient - Case Report

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**Background**: Neurofibromatosis (NF) is due to an autosomal dominant mutation. There are 3 different types recognized: NF1, NF2, and schwanomatosis1. NF1 is the most common type and is the primary discussion of this case report. NF1 is characterized by Café au lait spots, cutaneous neurofibromas or plexiform neuromas, axillary/inguinal freckling, Lisch nodules, and optic gliomas1.

**Case**: We present a case of a 23-year-old primigravida with NF1 who presents at 39 weeks and 1 day to the L&D unit for scheduled cesarean delivery due to fetal malpresentation. Her past medical history included NF1, optic nerve glioma, anxiety, ADHD, GERD, anemia of pregnancy, and occasional headaches managed with acetaminophen. She recently moved and had no available past medical records. An MRI had been recommended but not performed. The patient denied any spinal cord involvement from previous imaging. She denied neurological symptoms including a change in headache severity, changes in vision, significant nausea/vomiting, or weakness. The neurologic exam was unremarkable. Her BMI was within normal limits and difficult neuraxial placement was not anticipated. Risks/benefits were discussed with the patient/obstetric team, and the decision was made to proceed with a single-shot spinal for CD. Spinal anesthesia was performed without complication, and surgery was uneventful.

**Discussion**: There are many anesthetic considerations in patients with NF. Pheochromocytoma is associated with neurofibromatosis and should be considered in the preoperative evaluation1. When signs of elevated intracranial pressure are present, intracranial tumors should be considered1. Potential laryngeal neurofibromas may compromise airway anatomy¹. The obstetric patient with NF1 requires careful consideration and the anesthetic plan should be individualized for each patient. Spinal or epidural placement in these patients may be difficult due to potential kyphoscoliosis and surface neurofibromas². Furthermore, any neurofibromas along the path of the needle may limit the safety of the procedure due to the potential for bleeding concerns². When there are tumors near the spinal cord, regional anesthesia may even be contraindicated². Due to these potential concerns, imaging prior to neuraxial anesthesia is important and should always be considered. In patients with NF1, spinal neurofibromas with clinical implications are only reported in approximately 5% of patients². The clinical picture of NF1 is variable, central tumors are not a hallmark of the disease and the majority of cases are uncomplicated. This patient was asymptomatic and we proceeded without neuraxial imaging, however, this remains controversial.

## A Case of Angiosarcoma in a Complex Parturient

### Presenting Author: Allen Wang, MD

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 Co-Authors: Erin I. Martin, MD - University of California, San Diego
 Lawrence Weinstein, MD - University of California, San Diego
 Introduction

Angiosarcoma (AS) is a rare and aggressive endothelial tumor with a propensity for local invasion, recurrence, and metastases. AS presents with nonspecific symptoms and is often misdiagnosed, leading to poor prognosis and high mortality. We report a parturient mortality case of AS. Her complex medical history and severe symptomatology allowed the diagnosis of AS to be elusive.

#### Case

A 38-year-old G1P0 parturient at 23 weeks of gestation presented with worsening shortness of breath, orthopnea, tachycardia, and chest pain. Comorbidities included a recent COVID-19 infection, pacemaker-dependent 3rd degree AV block, supraventricular tachycardia, and chronic thromboembolic pulmonary hypertension (CTEPH).

Echocardiogram demonstrated a large pericardial effusion with ventricular restriction. To prevent worsening cardiac tamponade, she underwent an emergent pericardiocentesis. Her hospital course was further complicated by increased clot burden, recurrent pericardial effusion, and peripartum cardiomyopathy.

An interdisciplinary team consisting of cardiology, pulmonary, critical care, perinatology, neonatology, cardiothoracic surgery, and obstetric anesthesiology were formed to manage the complex parturient. The primary concern was the acute cardiac decompensation in the setting of CTEPH.

Due to maternal deterioration, an emergent cesarean section was performed at 31 weeks and 5 days under general anesthesia. Postoperatively, the patient remained in critical condition, on multiple pressors, and was transported to the cardiovascular care intensive care unit (CVC ICU) for further management.

Over the next few days, her condition worsened with the development of constrictive pericarditis requiring veno-arterial extracorporeal membrane oxygenation therapy. An exploratory thoracotomy with pericardiectomy revealed an extensive undiagnosed tumor burden. Pericardial stripping was attempted but hindered by severe pericardial hemorrhage requiring massive transfusion. Due to her critical state and terminal condition, she was transported back to the CVC ICU, transitioned to comfort care, and passed away with family at bedside.

The postmortem pathology reported diffuse poorly differentiated angiosarcoma that was evident in the lung, superior vena cava, and pericardium.

#### Conclusion

AS is a rare and aggressive malignant tumor of the endothelial cells. In the setting of pregnancy, the incidence of AS is extremely rare and elusive. The diagnosis of AS requires physicians to have a high index of suspicion. Our case highlights the importance of an interdisciplinary approach in the management of such a complex parturient and furthers our knowledge of these aggressive tumors.

## Anesthetic Considerations in a Parturient with Acute Psychosis

#### Presenting Author: Eva Martinez, MD

**Presenting Author's Institution:** University of Illinois at Chicago - Chicago, Illinois **Co-Authors:** Nakia Hunter, MD - University of Illinois at Chicago

#### Introduction:

The global disease burden of psychiatric illness is substantial. In the United States, the lifetime prevalence of mood disorders is 20.8 percent1. Anesthesiologists face ethical and medical challenges when caring for parturients with psychotic disorders. This is due to a number of factors, such as scant prenatal care, comorbid conditions, malnutrition, and alcohol and illicit drug abuse, while also lacking decision-making capacity.2 We present the case of a parturient who presented for urgent cesarean delivery at 40.2 weeks gestation for fetal malpresentation in the setting of latent labor and acute psychosis.

#### Case Report:

A 24-year-old G2P1 female at 33.4 weeks gestation with a history of paranoid schizophrenia, posttraumatic stress disorder and polysubstance abuse (methamphetamine, cocaine, alcohol) presented as a hospital transfer for delivery management of acute psychosis and continued substance abuse. She refused all medical care during admission, including IV placement, laboratory draws, ultrasounds, and cervical exams. She required direct supervision due to assaulting staff and herself. At 40.2 weeks gestation, a multidisciplinary team of maternal-fetal medicine (MFM), obstetrics and anesthesia decided to urgently deliver via cesarean due to a concern for latent labor in the setting of transverse fetal lie with an inability to monitor the patient. Surgical consent was obtained from her father as the surrogate decision maker. The patient was first premedicated with IM olanzapine 10mg and diphenhydramine 50mg. She was then transferred to the labor and delivery unit. The patient was combative upon arrival to the operating room and 4 mg/kg IM ketamine was administered. Once sedated, an IV was placed and general anesthesia was induced with propofol and succinylcholine. The patient underwent an uncomplicated cesarean delivery. One- and five- minute Apgar scores were 8 and 9, respectively. She was transferred back to inpatient psychiatry for continued care on postpartum day two where she had a prolonged psychiatric hospitalization.

## Conclusion:

Management of psychosis in the parturient necessitates consideration of the high risk for cesarean delivery and other deterrents to good outcomes. To ensure maternal and fetal safety, a multidisciplinary approach to delivery planning (anesthesiology, obstetrics, MFM and psychiatry) is necessary for the appropriate selection of anesthetics and psychotropics. In addition, it is inevitable that ethical concerns regarding consenting capacity will arise, which must be addressed promptly.

# Complex Multi-Disciplinary Decision Making for a Parturient with Pulmonary Fibrosis and Cystic Bronchiectasis: Delivery Timing and Safety.

## Presenting Author: Jarrell Holland, MD

**Presenting Author's Institution:** University of Illinois Hospital Chicago **Co-Authors:** Rachel Waldinger, MD, MPH - University of Illinois Hospital Chicago

## BACKGROUND:

Acute respiratory failure complicates 0.2% of pregnancies², and there is limited data to guide management and timing of delivery.

## CASE REPORT:

38yo F G4P0303 at 30 weeks and 6 days with PMHx of pulmonary fibrosis with cystic bronchiectasis of unclear etiology complicated by recurrent lower respiratory infection, spontaneous bleb s/p RUL resection on home oxygen presented due to shortness of breath. Hospital course was significant for worsening respiratory failure requiring ICU admission for NIPPV with initial improvement to home setting 3-4L NC. However, at hospital day 8, 32 wga, the patient was noted to be acutely worse with a need for BiPAP and an ABG showed hypoxemia and respiratory acidosis. At that time, a multidisciplinary meeting was convened with MFM, Pulmonology/Critical Care, nursing, and Anesthesia. Without a clear etiology for her pulmonary disease, treatment options were limited. A fetal ultrasound demonstrated new oligohydramnios, and the patient reported 2 days of decreased fetal movement. After 1 hour on BiPAP, the patient's respiratory acidosis worsened, and the multidisciplinary team felt the patient soon would need to be intubated. Given worsening fetal status and the potential of maternal improvement with delivery, especially if the patient's disease was caused by lymphangioleiomyomatosis (LAM), a possibility at that time, the decision was made to proceed with delivery. Other complicating factors included recent prophylactic anticoagulation and PO intake.

We proceeded with a low-dose CSE and slowly dosed the epidural with the patient sitting at 30 degrees to optimize respiratory mechanics. BiPAP was continued throughout the entire anesthetic and surgery. The delivery was complicated by significant adhesive disease, prolonged surgical time, and postpartum hemorrhage due to surgical site bleeding. BiPAP support was increased during the surgery, but ventilation improved immediately post op, and the patient was transitioned to 6L nasal cannula POD 1. The patient's respiratory status continued to improve to her baseline, and she was discharged on hospital day 21.

## **DISCUSSION:**

Respiratory failure in pregnancy poses challenges in weighing the risk and benefits of intervention for both the mother and the fetus. Multidisciplinary decision making is paramount in evaluating complex patients and guiding a safe delivery plan.



## Anesthetic Management for Diagnosis and Potential Management of Incarcerated Uterus in Bicornate Uterine Pregnancy

Presenting Author: Melissa Bavitz

**Presenting Author's Institution:** University of Kansas Medical Center **Co-Authors:** Joanna Gould, MD - University of Kansas Medical Center Johanna Hild, n/a - University of Kansas Medical Center

In the parturient, congenital uterine anomalies (CUAs) may lead to recurrent pregnancy loss or preterm birth. A bicornuate uterus is a CUA that can potentially lead to complications including an incarcerated gravid uterus. This results when the uterus is trapped between the sacral promontory and pubic symphysis, which can¹ lead to a compromise of uterine arterial blood flow, increasing the risk for decidual hemorrhage, miscarriage, oligohydramnios, fetal growth restriction, and fetal demise. Diagnosis is made by ultrasound and management includes passive reduction, manual reduction or more invasive measures of reduction, most of which require anesthesia. We present our case of the anesthetic management utilized to diagnose and ultimately rule out an incarcerated gravid uterus. Patient is a 26 year old G2P1001 who presented at 19w0d with right lower quadrant pain and urinary retention. Her obstetric history is significate for a pregnancy in the left uterine horn of a bicornate uterus delivered by cesarean section due to breech positioning of the fetus. Her current pregnancy is located in the right horn confirmed by ultrasound imaging. The patient received intrathecal neuraxial anesthesia to allow for adequate pelvic exam with ultrasound to rule out uterine incarceration and to manage this condition if identified. In the sitting position, the patient received 45 milligrams of chloroprocaine intrathecally. Patient had a sensory block up to T4 and tolerated the procedure well without discomfort. Fortunately, an incarcerated uterus was ruled out and symptoms were ultimately attributed to round ligament pain. Patient was treated with an abdominal binder, heating pad, and acetaminophen and discharged without complication one day following the procedure. The prevalence of an incarcerated uterus increases when the uterus is retroflexed although it is not well studied if a bicornate uterus increases this risk.² One pitfall to performing a manual reduction under anesthesia is that the pain signal is lost to signify the use of excessive force. Additionally, the use of intrathecal chloroprocaine can reduce motor function of the lower extremity which can be helpful if knees to chest positioning is required to assist in the reduction maneuver. This case highlights the importance of selecting an anesthetic that provides adequate analgesia while remaining cognizant of potential pitfalls that may hinder the success of the procedure.

#### Anesthetic Considerations in a Parturient with Caudal Regression Syndrome

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This is a 32 year-old G3P0 with a history of caudal regression syndrome including spina bifida occulta, neurogenic bladder, and unicornuate uterus. Medical history included surgical fusion of C1/C2 at age 8 for atlanto-axial instability, and a chronic intracranial colloid cyst in the third ventricle. Only limited information was available about her prior anesthetics, but her last general anesthetic (GA) documented easy mask ventilation and challenging intubation with video-laryngoscopy. Neurosurgery strongly advised against neuraxial anesthesia due to the herniation risk from her untreated colloid cyst. Pelvic architecture precluded the option for vaginal delivery.

The patient presented to our outpatient anesthesia clinic at 22 weeks of this pregnancy. The clinic, inpatient OB anesthesia service and patient all agreed that GA was the only option for cesarean delivery (CD).

On arrival for scheduled primary CD at term, physical examination revealed a suboptimal airway with a 3 cm mouth opening, Mallampati III and limited neck motion. She declined awake intubation, as per our prior discussions. The anesthetic plan was GA with asleep intubation, and LMA #3 as a backup airway device. GA was initiated with IV propofol, fentanyl and rocuronium. Mask ventilation was unexpectedly challenging, but sufficient with two experienced anesthesiologists. Oral intubation was challenging as well, but successful with video-laryngoscopy and the use of a fiberoptic bronchoscope as a manueverable endotracheal tube stent. The CD surgery was challenging due to severe dextrorotation of the gravid uterus requiring manual adjustment prior to uterine incision. A female infant was delivered with Apgar scores of 7 & 9. The remainder of the surgery and anesthetic were routine, and the patient was discharged home in stable condition on postop Day 2.

Successful pregnancy with maternal caudal regression syndrome is a very rare event, with this being only the third reported case. Delivery planning for this complex patient is an example of the need for excellent coordination between the anesthesia outpatient clinic, inpatient OB anesthesia service, and the maternal-fetal medicine obstetricians. Due to her history of C1/C2 fusion, past challenging oral intubation, and a challenging preoperative airway examination; four experienced anesthesiologists were present for induction and extra airway safety equipment prepared, leading to a successful and safe outcome for both mother and infant.

#### Anesthetic Considerations for Situs Inversus in the Peripartum Period

#### Presenting Author: Preston Root, DO

Presenting Author's Institution: University of Kentucky College of Medicine – Lexington, KY

**Introduction:** Situs Inversus refers to a 180-degree rotation of the abdominal visceral organs. It occurs in approximately 1:12,000¹ and is inherited in an autosomal recessive pattern. It can occur in isolation or in association with rotation of the thoracic organs. Variations on thoracic presentation can include dextrocardia and levocardia, with the latter associated with increased rates of congenital heart defects. Situs Inversus is often associated with other pathological conditions like primary ciliary dyskinesia, congenital heart defects, and splenic malformations. We present a case of Situs Inversus in a patient admitted to the Labor and Delivery unit.

**Case:** A 22-year-old G1P0 female at 41w0d with past medical history of mild intermittent asthma presented to Labor and Delivery for a scheduled induction of labor. An abdominal MRI conducted in the antepartum period to evaluate for pyelonephritis had revealed Situs Inversus and dextrocardia. Induction of labor with an oxytocin infusion was started and a continuous lumbar epidural was placed for labor analgesia. Bedside transthoracic echocardiogram was performed for confirmation of anatomy, resident education, and assessment of cardiac function. Telemetry was utilized during delivery for monitoring of any potential arrhythmias, with the leads placed in a mirrored position. The patient was eventually taken for a Cesarean delivery due to failure to progress in labor. Her epidural had been providing adequate analgesia and was dosed with 2% lidocaine with epinephrine and fentanyl. The patient remained hemodynamically stable and comfortable throughout the procedure. The delivery was complicated by a difficult extraction due to large fetal head requiring a vacuum assisted delivery of the infant. A male infant was delivered with APGAR scores of nine and nine. The patient was transferred to PACU in stable condition. Both the patient and her child were discharged from the hospital on post-operative day three.

**Discussion:** Situs Inversus provides some interesting considerations for anesthesiologists. It can be associated with a wide variety of clinical presentations, not all involving dextrocardia. Bedside TTE can assist with the diagnosis of dextrocardia as well as obtain information about cardiac function, optimal EKG lead placement, and defibrillator pad placement. OB patients may benefit from right lateral tilt rather than left lateral tilt to relieve the pressure from the gravid uterus and improve cardiac preload. If central venous access is warranted, understanding the anatomy will assist in choice of location. In the setting of ciliary dyskinesia, anesthesia providers should evaluate pulmonary status, the need for assistance with pulmonary secretion clearance, and appropriate use of uterotonics.



Endometriosis of the Lungs Causing Recurrent Pneumothoraces in Pregnancy Presenting Author: Katelyn T. Scharf, MD Presenting Author's Institution: University of Maryland School of Medicine - Baltimore, Maryland Co-Authors: Shobana Bharadwaj, MBBS - University of Maryland School of Medicine Jessica Galey, MD - University of Maryland School of Medicine Autumn LaRocque, MD - University of Maryland School of Medicine

Thoracic endometriosis is the presence of endometrial tissue in the diaphragm, pleura, or lungs¹. Though rare, it is the most common form of endometriosis outside of the pelvis² and often manifests as pneumothoraces³. This condition typically affects women of reproductive age and is thought to be caused by endometrial tissue traveling through diaphragmatic defects or via microembolization in pelvic veins³.

We present a case of recurrent bilateral pneumothoraces in pregnancy in a 37yo G1P0 with a history of uterine fibroids status-post a myomectomy who was ultimately diagnosed with endometriosis of the lungs postpartum. She traveled from Ghana prior to pregnancy to seek a second medical opinion on her recurrent shortness of breath, bilateral pneumothoraces, and progressive fatigue. In Ghana, she had undergone a computed tomography (CT) guided biopsy, which was unrevealing. At our medical center, she underwent a CT scan that showed diffuse pulmonary cystic and nodular changes bilaterally as well as a 2.6 cm nodule in the right lower lobe containing soft tissue, fat, and a central cavitation (Image 1).

Unfortunately, she was lost to follow up until she became pregnant and developed recurrent bilateral pneumothoraces. She underwent endobronchial ultrasound bronchoscopy (EBUS) and biopsy at 20w5d, but the results were non-diagnostic. She presented three more times over the span of several weeks with recurrent pneumothoraces and need for chest tube placement until she underwent placement of indwelling pigtail catheters bilaterally by interventional radiology.

She was recommended to undergo a primary caesarean delivery (CD) given her risk of pneumothorax with the Valsalva maneuver and underwent an uncomplicated CD at 36w4d. During her CD, her indwelling chest tubes were placed to suction, and she underwent a combined-spinal-epidural anesthetic. The fetus was delivered vertex via Kiwi vacuum assistance to avoid fundal pressure and potential popping of a pulmonary bleb. Apgar scores were 8 and 8 at 1 and 5-minutes.

Postpartum she developed another pneumothorax requiring an additional chest tube to be placed. At 2-weeks postpartum, she underwent Video Assisted Thoracoscopy for pleurodesis and wedge biopsy, which confirmed endometriosis of the lungs. Unfortunately, patient was lost to follow up when she returned to Ghana 2 months postpartum.

Scharf endometriosis abstract image.pdf
### Preterm Delivery in a Patient with Chronic Hypercarbia Secondary to Severe Kyphoscoliosis

### Presenting Author: Cortney Barbica, MD

**Presenting Author's Institution:** University of Maryland School of Medicine, Maryland **Co-Authors:** Shobana Bharadwaj, MBBS - University of Maryland School of Medicine Katelyn T. Scharf, MD - University of Maryland School of Medicine

A 31-year-old G1P0 at 20w4d gestation with hypertension and severe kyphoscoliosis, Cobb angle of 55, status-post Harrington rod placement (Image 1) was admitted for hypoxic/hypercarbic respiratory failure.

ABG showed respiratory acidosis with metabolic compensation (7.34/52/71/27). CT chest showed right basal atelectasis and severe thoracic scoliosis with rightward convexity. Echocardiogram revealed a normal ejection fraction and moderate pulmonary hypertension. Ventilation-perfusion scan showed decreased size/activity of the right lung. Pulmonary function testing revealed severe restrictive lung disease.

Initial management in the medical intensive care unit (MICU) included nocturnal bilevel positive airway pressure (BiPAP) and daytime high flow nasal canula (HFNC). BiPAP was poorly tolerated, so she was transitioned to continuous HFNC. Daily venous blood gases were drawn over 5 weeks, from admission to delivery, with an average  $\pm$  standard deviation pH of 7.3  $\pm$  0.012, pCO₂ of 54.22  $\pm$  5.66, PO₂ of 68.5  $\pm$  34.1, and HCO₃ of 28.5  $\pm$  1.8.

A 25w4d, ultrasound showed absent end diastolic flow and a large retroplacental clot and the patient was diagnosed with HELLP syndrome based on worsening labs (platelets 86 from 110, AST/ALT 214/196, LDH 437). Betamethasone was started for fetal lung maturation and a magnesium infusion was initiated for seizure prophylaxis and fetal neuroprotection. The multidisciplinary team decided to deliver via c-section.

General anesthesia was chosen after a discussion of the risks of neuraxial including the precipitous drop in platelets, suspected difficulty with epidural placement, and possible unpredictable local anesthetic spread. Preoxygenation was achieved in an upright position. Following rapid sequence induction, she was intubated easily with video laryngoscopy in a supported supine position. End tidal CO₂ was maintained at the patient's baseline without any ventilation/oxygenation problems. Following Pfannenstiel incision and classical uterine hysterotomy, the neonate weighing 645g was delivered with Apgar scores of 1, 3, 3, at 1, 5, and 10 minutes. The patient returned to the MICU intubated for recovery and was extubated the following day.

Women with restrictive lung disease from severe kyphoscoliosis are at risk of hypoxic or hypercarbic respiratory failure during pregnancy when lung volumes are further reduced by the gravid uterus and there is increased ventilation¹. Furthermore, the effects of chronic hypercarbia in pregnancy on fetal development are unclear¹, but elevated CO₂

levels may cause an increased respiratory effort in the fetus, increasing fetal oxygen utilization¹. While this patient's complex condition was complicated by HELLP syndrome and placental abruption necessitating preterm delivery, it is possible her longstanding hypercarbia also contributed to the poor neonatal outcome.

Scharf kyphoscoliosis image.pdf

### Anesthetic Management of a Pregnant Patient with Severe Tracheal Stenosis Undergoing Microdirect Laryngoscopy with Incision, Dilation, and Steroid Injection

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Presenting Author's Institution: University of Minnesota
Co-Authors: Iryna C. Chugaieva, MD - University of Minnesota
Liliana Goelkel-Garcia, MD - Department of Anesthesiology, University of Minnesota

Most cases of subglottic stenosis(SGS) arise after traumatic, prolonged intubation, or a tracheostomy.^(1,2) Pregnancy physiology makes SGS challenging to diagnose and manage.^(3,4)Presentation of dyspnea rather than stridor can go unnoticed until symptoms are severe.⁽⁵⁾Some cases are wrongfully diagnosed with asthma.⁽¹⁾We present a case of symptomatic SGS that required intervention prior to delivery. 24yo G3P2002 at 35w4d with severe SGS after seizure that required emergency intubation.Otorhinolaryngology(ENT),Maternal Fetal Medicine(MFM), and Anesthesiology teams concurred on need to do CO2-laser excision prior to delivery. Case started in reverse Trendelenburg with left tilt, continuous fetal heart tone, and standard ASA monitors. Abdomen was prepped and draped.MFM team was ready to perform emergency cesarean section (CS). ENT was present with Ossoff laryngoscope, rigid bronchoscope, and jet ventilation set up. After propofol/succinylcholine induction, gentle mask ventilation verified patient could be ventilated. We then started propofol drip for maintenance.5.0-ETT could not be advanced beyond vocal cords, but adequate ventilation achieved with ETT resting above stenotic area, with cuff inflated. We deflated the cuff and removed ETT to start CO2-laser excision under intermittent ventilation. Whithin 30 seconds of apnea patient's saturation dropped to 87%. Procedure immediately aborted and ventilation resumed after placement of 5.0-ETT above stenotic area.Procedure converted to incision, dilation, and steroid injection.Patient and fetus tolerated procedure without complications. She was discharged after a routine recovery. SGS in pregnancy is rare but potentially life threatening. Despite aspiration risks, we assessed ability to mask-ventilate given potential for a cannot-intubate situation. Indeed a smaller ETT could not be advanced beyond stenotic area, and even brief periods of apnea were poorly tolerated.Balloon dilation and steroid injection were successfully done, allowing pregnancy to safely continue to term. Backup plan included rigid bronchoscopy, jet ventilation, and surgical airway.MFM and NICU team remained on stand-by in case emergency CS was needed.Early diagnosis and prompt multidisciplinary evaluation and management avoided progression to a critical airway. Adequate planning is paramount, as is the presence of all members of care team prior to induction of anesthesia.



(3)





(4)



Preoperative flexible bronchoscopy images showing (1) a patent glottis, (2) good bilateral vocal fold mobility, (3) and immediate subglottic area pattency. (4) There is obvious severe mature tracheal stenosis. Beyond this (5) and (6) mid and lower trachea patent, and takeoffs of mainstem bronchi were unremarkable

In the operating room microdirect laryngoscopy identified 4mm-diameter tracheal stenosis, starting ~5cm below true vocal cords, ~2cm length. A laser resistant 5.0 cuffed endotracheal tube(ETT) could not be advanced beyond vocal cords. (no images available)

# Cesarean Section Under Spinal Anesthesia In Parturient With History Of Reversible Cerebral Vasoconstriction Syndrome (RCVS)

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**Background:**Reversible Cerebral Vasoconstriction Syndrome(RCVS) presentation can range from isolated severe thunderclap headaches with full recovery in most patients, to rare permanent brain injury related to intracerebral hemorrhage, cerebral edema, stroke, seizure, and death(1,2). Although RCVS can occur spontaneously, at least 50% of the cases reported exposure to vasoactive medications or recreational drugs. It is advised to avoid vasoactive medications including triptans, ergots, and vasopressors in patients with acute RCVS or with a history of RCVS as they can aggravate symptoms(1). Pregnant patients with RCVS who undergo spinal block for a Cesarean Section(CS) pose a unique anesthetic challenge as the use of vasoactive drugs(Phenylephrine) has become standard practice to manage post-spinal hypotension(1,3).

**Case Report:**25-year-old G1P0 obese female presenting at 39 weeks of gestation for elective CS. Past medical history remarkable for anxiety, depression, migraines, and one episode of RCVS which was complicated by a subarachnoid hemorrhage in the context of use of marijuana and selective serotonin reuptake inhibitor. Her pregnancy was uneventful, and she was on no medications. Anesthetic plan included a single shot spinal block. Emphasis was put on avoiding vasoactive medications for neuraxial-induced hypotension. In addition to standard ASA monitors, a noninvasive finger cuff (Edwards ClearSight System) was used for continuous noninvasive hemodynamic monitoring. This enabled us to proactively manage hemodynamic changes. Patient received 500ml of 5% Albumin before intrathecal injection, and 500ml bolus of Lactated Ringer's(LR) solution was given as a co-load. After an uneventful spinal block, the patient was placed in a slight trendelenburg position, with 30° left lateral tilt. During the case the patient received additional 250ml of 5% Albumin and 1000ml of LR.Patient remained hemodynamically stable. No vasoactive medications were used during the case. Post-operative course and 1-month follow-up were uneventful.

**Conclusion:**To our knowledge, while avoiding vasopressors is recommended, there are no guidelines regarding post-spinal hypotension management in patients with RCVS. We report our successful experience managing post-spinal hypotension without use of vasoactive medications in a patient with RCVS who underwent CS. We also outline the precautions that need to be considered during evaluation and management of RCVS.

### When There Seems to be No Anesthetic Options for Delivery A Case of Jarcho Levin Syndrome

Presenting Author: Yuki Shima, n/a Presenting Author's Institution: University of Minnesota Co-Authors: Iryna C. Chugaieva, MD - University of Minnesota

**BACKGROUND:** Jarcho Levin Syndrome (JLS) is an autosomal recessive disorder characterized by short trunk, craniofacial abnormalities, cervical vertebral fusions and short rigid neck, fused thoracic vertebrae, and "crab-like" rib cage. Significant thoracic restriction occurs in approximately 60% of the newborns, resulting in respiratory distress and around 45% mortality rate by the end of infancy. This case highlights the unique difficulties with parturients with Jarcho Levin syndrome who undergo delivery.

**Case report:** A 26 year old G1P0 female at 34w0d with past medical history of JLS, short stature (132 cm), kyphoscoliosis and rib malformation, leading to severe restrictive lung disease, chronic bronchitis, and nocturnal hypoventilation treated with BiPAP presented for primary cesarean section (CS). Past surgical history included vertical expandable prosthetic titanium rib implant placement and recent abdominal surgery. Preoperative lung volume test showed significantly reduced FEV1, FVC, FEF, and increased FEV1/FVC. A CS was recommended for diminished lung function and no exercise tolerance. Plan was to proceed at 34 weeks due to increased risk for pulmonary compromise later in the third trimester. General Surgery was present in the operating room for possible lysis of adhesions and closure of abdomen. After discussion with the obstetric, pulmonology and general surgery, the decision was made to proceed with intrathecal catheter placement to minimize the risk of perioperative lung complications with general anesthesia (GA) and in case of severe adhesions additional local anesthetic could be administered. After multiple attempts by different anesthesiologists, CSF was obtained and the catheter was placed intrathecally, only to provide analgesia to the right foot, thus we converted to GA with an endotracheal tube using a video laryngoscope. Surgery was uneventful and the patient was extubated postoperatively.



### **Peripartum Vascular Malformation**

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Vascular malformations (VMs) can occur in any tissue and are typically present at birth. Pelvic VMs are rare and can be asymptomatic for years but can grow with hormonal changes of pregnancy. Since treatment strategy depends on the type of VM by content and flow characteristics, correct diagnosis and classification are crucial.

Our patient was a healthy 31 y.o. G1P0 diagnosed with a left pelvic VM at 21 weeks gestation. Before diagnosis she noted a painful, swollen groin mass. VM was suspected on ultrasound (US) though definitive characteristics were lacking in the setting of a non-contrast MRA. Given its size and location, vaginal delivery was contraindicated due to concern for rupture.

She presented for cesarean delivery at 39 weeks. The multidisciplinary care team included obstetrics, interventional radiology (IR), vascular surgery, and anesthesiology. The patient was informed of her elevated bleeding risk, and we planned for a combined spinal epidural (CSE) with a low threshold for conversion to general anesthesia in the event of hemodynamic instability. Six units of pRBC, four units of FFP, one unit of platelets, and cell saver were in the room. Prior to induction, two large bore peripheral IVs and an arterial line were placed. The IR team performed a diagnostic angiography, with dose reduction to limit fetal radiation, and placed bilateral internal iliac artery (IIA) balloon catheters. No abnormally dilated vascular structures were identified during surgical entry. Just prior to uterine incision, the balloons were inflated to achieve hemostasis. They remained inflated for two minutes during neonatal delivery and then were deflated to evaluate hemostasis. Moderate uterine atony improved with oxytocin and methylergonovine, and tranexamic acid was administered for hemorrhage prophylaxis. Catheters and sheaths were removed once hemostasis was satisfactory. QBL was 700mL. Her postoperative course was uncomplicated, and she was discharged home on postpartum day four. A pelvic CTA eight weeks postpartum showed a cluster of prominent veins surrounding the left ovary with an enlarged venous varix that had decreased in size since pregnancy.

The gold standard for pelvic VM diagnosis is digital subtraction angiography. Diagnosis in pregnancy is challenging given that the necessary contrast dye is contraindicated. Our patient was diagnosed based on color spectral doppler US, and a subsequent non-contrast MRA was indeterminant regarding exact location and flow characteristics. Thorough consent, adequate vascular access, and invasive monitoring were established preoperatively. A multidisciplinary approach aimed to minimize bleeding and maximize resources in the case of massive hemorrhage. Our patient's VM did not result

in significant morbidity, though hemorrhage could have been promptly managed with endovascular transcatheter embolization or surgical repair.



### Prolonged Spinal Anesthesia in a Patient with Lumbar Stenosis and Amphetamine Use

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Delayed return of sensation and motor function after neuraxial anesthesia is concerning for rare but potentially severe neurologic complications.¹ Prompt diagnosis is necessary to prevent irreversible injury.²

A 43 y/o presented for urgent repeat cesarean delivery due to contractions. She was 66 inches tall, normal weight, and positive for amphetamines. The resident placed a single-shot spinal (fentanyl 15 mcg, morphine 0.15 mg, 1.6 mL hyperbaric bupivacaine) without difficulty. Epinephrine was not added. Cesarean delivery was uneventful. Six hours post-neuraxial, the patient had a T10 level with dense bilateral lower extremity paralysis and areflexia. At eight hours, the level regressed to T12. MRI ruled out neuraxial hematoma but revealed 7 mm L5 disc protrusion with canal stenosis. Motor deficits resolved at 12 hours and sensory deficits at 16 hours.

Slow but consistent resolution was reassuring in this case. Prolonged anesthetic was the diagnosis of exclusion, with multiple potential causes. Decreased CSF volume due to lumbar stenosis likely contributed to delayed dilution of local anesthetic.^{3,4} Vasoconstriction by amphetamines could theoretically also prolong spinal anesthesia, although this relationship is not described in current literature.

Low thoracic combined spinal-epidural anesthesia for cesarean delivery in a patient with history of spina bifida and tethered cord.

Presenting Author: Vickie Hau, MD

**Presenting Author's Institution:** University of Washington - Seattle, Washington **Co-Authors:** Ian Johnson, DO - University of Washington

### Case Report:

We report a case of a 39-year-old G1P0 with spina bifida and tethered cord. Her surgical history is significant for bilateral lumbar laminectomies, myelomeningocele repair at birth, and multiple abdominal urologic surgeries. She received a thoracic combined spinal-epidural anesthetic (tCSE) for planned cesarean delivery at 35w3d. Her physical exam was notable for absent landmarks in the lumbar spine and a Mallampati score of III. Lumbar MRI showed an elongated conus with attachment at S2, obliteration of normal epidural space anatomy below L1 with postsurgical changes from L2-S1. LOR at T12-L1 was estimated to be 5.6cm (Fig1).

At her high-risk clinic visit, the patient expressed a strong desire for neuraxial anesthesia for her delivery. After obtaining consent, a tCSE was uneventfully placed by midline approach at T12-L1. LOR to saline was at 4.5cm using an 18g Tuohy needle, the dura was punctured with a 29g Gertie Marx needle (spinal dose: 7.5mg hyperbaric bupivacaine, 10mcg fentanyl, and 100mcg morphine PF); transient paresthesia was reported at the removal of the spinal needle. The highest block assessed was at the T4 dermatomal level. Due to the presence of a stoma, a vertical paramedian midline incision was made. A healthy baby girl was delivered, and the uterus was closed in situ. On POD1, the block had fully regressed without neurological sequelae. The patient was satisfied with her care.

### Discussion:

Only one prior case of thoracic spinal anesthesia for cesarean delivery has been reported¹.

Thoracic spinal anesthesia has been safely and successfully utilized in cohorts of various surgeries, ranging from orthopedic, breast, and abdominal surgery². Collectively, hundreds of cases have been performed under thoracic spinal anesthesia. This technique is controversial due to concern for iatrogenic harm caused by inserting a needle above the conus medullaris. In a recent review, there have been no reports of long-term neurological sequelae from transient paresthesia during thoracic spinal placement². Studies have cited anatomical differences in thoracic and lumbar anatomy to support the safe use of thoracic spinal injection, including a larger distance between posterior dura and the spinal cord in the thoracic region on supine MRI³. Undoubtedly, spine imaging is integral to preprocedural planning, as well as extensive counseling regarding risks and benefits of thoracic spinal injection by an experienced obstetric anesthesiologist. More investigation is needed regarding the use of thoracic spinal anesthesia in the obstetric population.



Peripartum management and inter-hospital planning for a pregnant patient with bleeding arteriovenous malformations and high-output heart failure from hereditary hemorrhagic telangiectasia

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### Introduction

Hereditary hemorrhagic telangiectasia (HHT) is an autosomal dominant disorder characterized by mucocutaneous telangiectasias, recurrent epistaxis episodes and arteriovenous malformations (AVMs) in pulmonary, hepatic, and cranio-spinal distributions. Pregnancy exacerbates HHT due to maternal cardiovascular physiological adaptations and hormone mediated angiogenesis.

### Case

A 25-year-old G1P0 with diamniotic dichorionic twin pregnancy and history of epistaxis presented to an outside hospital 24 weeks with dyspnea, cough, and lower extremity edema. Imaging revealed 3 pulmonary AVMs, dilated portal and mesenteric veins, and enhancing vascular structures (right gluteal, left iliacus, right chest wall, right paravertebral). HHT was diagnosed and she had coil embolization of two pulmonary AVMs. Post-procedure, she had dyspnea and increased oxygen requirement, so was transferred to our level IV cardiac hospital. After multidisciplinary team coordination and further work up with right heart catheterization, she was diuresed and symptoms improved. At all times, there was an emergency delivery plan in place with special contingencies for twin gestation and decompensated high output cardiogenic shock.

### Discussion

Management of a parturient with newly diagnosed HHT with multiple systemic arteriovenous malformations requires a multidisciplinary team approach. Patients with HFpEF and diastolic dysfunction are less tolerant of tachycardia and volume shifts. Delivery planning relies on clear understanding of current patient hemodynamics and risk for cardiogenic shock with potential need for mechanical support after anesthetic induction and maintenance.

Due to multiple mucocutaneous telangiectasias, airway instrumentation should be avoided, and nasotracheal intubation and gastric nasal probes are prohibited. Cerebral AVMs should be ruled out, and if present, strict peri-anesthetic blood pressure control is critical to prevent intracerebral hemorrhage. Despite published guidelines, patients with HHT should have spine imaging to rule out the presence of spinal AVMs before undergoing neuraxial anesthesia.

Cardiopulmonary decompensation can occur immediately after placental delivery (Fig 1). Right-to-left shunt can result in hypoxemic episodes, exacerbated by positive pressure ventilation and PEEP. Due to risks for paradoxical air emboli, filtered intravenous access are needed to prevent neurovascular events. The presence of intraabdominal AVMs increases the risk of surgical morbidity. Appropriate uterotonics and vasopressors should be readily available.

### Conclusion

Peripartum management of parturients with HHT requires a multidisciplinary approach to reduce morbidity and mortality. Considerations for appropriate location of care aim to strike balance in local hospital resources with pre-identified priorities for maternal and neonatal safety.

Figure1 hereditary hemorrhagic telangiectasia Bergeron.pdf

# Preoperative management of twin gestation pregnancy in a parturient with Eisenmenger Syndrome

Presenting Author: Kyle M. Struzyk, MD Presenting Author's Institution: UTHSC Memphis - Germantown, Tennessee Co-Authors: Molly Houser, MD - UTHSC - Memphis

Women with Eisenmenger syndrome who elect to attempt pregnancy and delivery of children are at significant risk for peripartum morbidity and mortality to themselves and their progeny. Historically, patients with Eisenmenger syndrome are strongly advised to abstain from pregnancy or terminate pregnancy within the first trimester. This recommendation is even more paramount when considering multiple gestation. However, with modern medical management, these congenital heart patients are surviving to later ages and requiring obstetric care. We present a woman with severe pulmonary hypertension due to Eisenmenger Syndrome associated with a congenital unprepared ASD, who successfully underwent cesarian delivery of her di/di twin pregnancy. This patient is is a 29F, G2P1011, with PMH remarkable for severe pHTN (unrepaired ASD c/b Eisenmenger Syndrome) who presented with 30w5d di/di twin IUP. Patient presented from MFM clinic visit and found to be hypoxic, with SpO2 at 87% and she was promptly admitted to the cardiac ICU for preoperative planning. An ECHO was obtained revealing a severely dilated RA, RV with severe hypertrophy, moderate TR and a preserved LVEF at 60%. A PA line was placed revealing admission PA pressures of 102/40 mmHg, consistent with known severe pHTN. Bilateral 16g IVs and radial arterial line was obtained the night prior to scheduled C-section. The patient received supplemental oxygen to goal >94% for fetal oxygenation and was continued on her home treprostinil. NO was initiated with minimal change to her pulmonary pressures. On the day of surgery, the patient received an epidural with test dose confirmation. Small intermittent doses of lidocaine, 2%, were used to achieve an adequate surgical level. The patient was taken to the OR where bilateral access was obtained via small 5fr introducers as a precaution for potential ECMO. C-Section was performed, with delivery of both babies within 8minutes of skin incision. After delivery, 30 units of oxytocin was diluted into 500ml LR and an infusion was promptly started. The patient was started on a vasopressin drip to support the hypotension experienced from oxytocin. Intermittent boluses of vasopressin were also administered. After delivery, the patients systolic pulmonary artery pressure began to exceed her systolic blood pressure with subsequent hypoxemia. The patient's SpO2 dropped into the middle 80s and eventually settled around 92%. This continued for approximately 20 minutes. Face mask oxygen was titrated during this time with increasing doses in conjunction with coaching the patient to hyperventilate as tolerated. Eventually inversion of forward flow and hypoxemia subsided and the patient's pulmonary pressures decreased. Cesarian closure was performed without complication and the ECMO cannulas were removed. The patient recovered without further complication.

# It All Comes Back to Anatomy - Is the Optimal Level for Neuraxial Anesthesia Different in the Achondroplastic Parturient

**Presenting Author:** Annastacia Woytash, DO **Presenting Author's Institution:** Vanderbilt University Medical Center **Co-Authors:** Ashley Lewis, MD - Vanderbilt University Medical Center

### Introduction:

Management of the parturient with achondroplasia presents many unique obstetric anesthetic considerations in addition to those associated with the performance of general anesthesia for this patient population.¹ Achondroplasia is the most common skeletal dysplasia, however, the likelihood of a parturient presenting for delivery has historically been low, although this is changing with recent advances in reproductive medicine.² Due to cephalopelvic disproportion these patients often require delivery by cesarean, and a review of available case reports suggests a high rate of deferred or failed neuraxial anesthesia necessitating general anesthesia for this population.³ Congenital and acquired changes to normal back anatomy commonly seen in achondroplastic patients increase the likelihood of failed neuraxial techniques when performed in the lower lumbar spine.³ Recent imaging studies of nonpregnant achondroplastic patients demonstrate a higher level of spinal cord termination as well as specific changes in the lumbar spine anatomy that likely make obtaining CSF and threading an epidural catheter more challenging at lower spinal segments.^{4,5} Based on these studies, we present this case to offer providers with a safe alternative to general anesthesia and postulate that providers may have greater success with neuraxial anesthesia performed in the upper lumbar and potentially lower thoracic spinal segments of an achondroplastic parturient. Case Report:

A 29 year old primigravida presented for cesarean delivery at 38 weeks and 5 days gestational age due to cephalopelvic disproportion. There was no history of prior surgeries, the patient had never been intubated, and she denied a history of back pain and back trauma. Patient's height was 113.7 cm, weight 61.6 kg, and BMI 47.6 kg/m². Careful palpation of landmarks allowed us to identify the L1-2 interspace at which level there existed left lateral rotation in the spine. A combined spinal and epidural was performed at L1-2 using 0.75% bupivacaine 5.25 mg with dextrose, fentanyl 10 mcg, and morphine 0.1 mg intrathecally (total volume 0.9 mL). The catheter threaded smoothly with one transient paresthesia noted during initial entry into the epidural space. Evaluation to pinprick sensation after five minutes revealed an adequate level bilaterally. The delivery and postpartum course proceeded in an uneventful manner. Learning Objectives:

- 1. How is back anatomy altered in achondroplastic patients?
- 2. Is the optimal level for neuraxial placement in the achondroplastic patient higher than that for a parturient without achondroplasia?

### Not Just a Startle Response: Anesthetic Management of a Parturient with Hyperekplexia

**Presenting Author:** Lindsey N. Nguyen, MD **Presenting Author's Institution:** Vanderbilt University Medical Center **Co-Authors:** Holly Ende, MD - Vanderbilt University Medical Center Ashley Lewis, MD - Vanderbilt University Medical Center Annastacia Woytash, DO - Vanderbilt University Medical Center

**Introduction:** Hyperekplexia is a rare, hereditary condition with nearly complete penetrance, characterized by excessive startle responses to auditory or tactile stimuli and electrolyte abnormalities. Pathophysiology involves mutation of the glycine receptor and presynaptic sodium and chloride-dependent glycine transporter genes, which diminishes the glycinergic input necessary for muscle relaxation. This disinhibition manifests as sudden stiffening or startle response, resulting in falls with preserved consciousness (i.e. "drop attacks"). Severe cases can lead to sudden death due to apnea, aspiration pneumonia, and cardiac irregularities.

**Case**: A 31-year-old G1P0 parturient with a history of hyperekplexia and epilepsy presented with preterm premature rupture of membranes at 36w0d gestation. Her hyperekplexia symptoms include exaggerated startle response and sudden hypotonia with preserved consciousness, triggered by auditory stimuli. Drop attacks previously led to multiple head injuries, which necessitated wheelchair use and anticoagulation for chronic immobility. Prenatally, she was managed with clonazepam and oxcarbazepine; however, symptoms continued to occur approximately once per day. Following an appropriate interval after last enoxaparin dose, she received early dural puncture epidural for labor analgesia. Upon initiation of neuraxial anesthesia, hypotension ensued that led to fetal heart rate deceleration, which was corrected by resuscitation measures. Due to arrest of descent, she subsequently underwent successful cesarean delivery under neuraxial anesthesia with labor epidural.

**Discussion**: Due to the acute sensitivity characteristic of hyperekplexia, minimization of unexpected stimuli and emotional stress from abrupt movement, uncontrolled pain, or commotion during labor is a primary goal. During an attack, implementing a Vigevano maneuver may terminate a hypertonic crisis. This maneuver of forced truncal flexion has been shown to be effective in neonates but has uncertain utility in adults. Alternatively, benzodiazepines should be administered at early recognition of attacks.

Neuraxial anesthesia should be placed preemptively as it is crucial to blunt the intensity of contractions that could elicit startle attacks. Lateral positioning for neuraxial anesthesia should be considered due to risk of collapse during procedure. Neuraxial anesthesia may precipitate autonomic insufficiency during hypertonic crisis; hypotension should be proactively treated. If general anesthesia is required, the literature describes marked resistance to succinylcholine and exaggerated train-of-four fade after

maintenance anesthesia with sevoflurane in this patient population.

### Learning Objectives:

1. What are the special considerations for labor analgesia in patients with hyperekplexia? Is neuraxial or general anesthesia preferred for cesarean delivery in patients with hyperekplexia?

### Airway Management in Parturient with Subglottic Stenosis

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The difficult airway is one of the most feared complications of anesthetic management, with increased prevalence during pregnancy. Parturients with additional risk factors for difficult airway management require special planning and peripartum care. A 35 year old G2P1001 female presented to labor and delivery for induction due to pre-eclampsia. Her medical history was notable for asthma and DiGeorge syndrome with congenital laryngeal webbing requiring tracheostomy as a neonate. She was subsequently decannulated and underwent anterior cricoid split with persistent laryngeal stenosis. Her first pregnancy required cesarean delivery which was complicated by postoperative respiratory decompensation requiring intensive care unit (ICU) admission for bilevel positive airway pressure (BiPAP). A repeat cesarean delivery was planned, and by the time of her transfer to our hospital, she had developed pre-eclampsia with severe features. Otolaryngology (ENT) was consulted and recommended preoperative flexible laryngoscopy which the patient declined. She subsequently underwent an uneventful cesarean delivery under combined spinal-epidural anesthesia with ENT present in the room throughout the case. On post-operative day one, she developed cardiogenic shock with worsening dyspnea, pulmonary edema, increasing oxygen requirements and respiratory acidosis. She was transferred to the ICU and started on BiPAP and Heliox therapies; however, she continued to deteriorate. Anesthesia and ENT were paged to the bedside for airway management. Her intubation was performed after ketamine induction and confirmation of easy mask ventilation. The first airway attempt using CMAC 3 blade with a 6.0 ETT met resistance at the vocal cords. The second attempt utilized a CMAC 3 blade and flexible bronchoscope. Unfortunately, the bronchoscope could not be positioned anterior enough to pass the glottic opening. The procedure was paused, and the patient was ventilated with an i-Gel LMA 3. The third attempt again utilized the CMAC 3 and a flexible tip bougie was passed through the cords, but the 6.0 tube again could not be passed. The patient was then ventilated via the 6.0 ETT at the entrance of the vocal cords, and a cook airway exchange catheter was passed through the 6.0 ETT and vocal cords under CMAC visualization. The 6.0 ETT was exchanged for a 5.0 ETT which passed through the glottic opening atraumatically. The final ETT position was confirmed via flexible bronchoscopy. The patient was extubated in the operating room on post-operative day 4 with anesthesia and ENT present. This case demonstrates the importance of pre-operative planning, tertiary care resource utilization, and multidisciplinary collaboration in the setting of a known difficult peripartum airway.

### **Esophageal Rupture Associated with Vomiting in Pregnancy**

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Deborah L. Cohan, MD, MPH - Zuckerberg San Francisco General Hospital and Trauma Center / University of California San Francisco
Veronica Segredo, MD, PhD - University of California San Francisco

Esophageal rupture in pregnancy is rare and is often associated with hyperemesis gravidarum.^{1,2} We present a case of a woman with a history of gastroesophageal reflux disease (GERD)-related vomiting who was found to have an esophageal rupture.

A 27 year-old female G6P4 with no prenatal care and multiple social stressors presented to the emergency department with a 3 week history of chest pain, mild shortness of breath, nausea, and hematemesis. She was discovered to be 6-7 months pregnant and was admitted for management of hematemesis and opioid withdrawal. Four months earlier, the patient had nausea and vomiting of pregnancy which spontaneously resolved. For 2 months prior to presentation the patient had severe GERD symptoms with nausea and vomiting similar to prior pregnancies. Three weeks prior to presentation she reported an episode of severe vomiting while in the supine position with her torso rotated to the right; this event felt markedly different than prior vomiting events in both pain intensity and sound, and now contained blood. The patient's medical history was significant for OUD, housing instability, and 4 prior NSVDs. On presentation she admitted prior trauma within systems of care, punitive engagement by peripartum staff in prior pregnancies, and poor management of her withdrawal during prior hospitalizations that were barriers to her accessing care at the onset of symptoms.

Her physical exam was notable for bilateral lower extremity swelling, epigastric pain on palpation, and tachycardia. There was no subcutaneous emphysema. She was found to be COVID positive. The patient underwent computerized tomography (CT) of the chest which was significant for a right mediastinal mass consistent with abscess without pneumomediastinum or pulmonary embolism (Figure 1). These results, combined with her history, were suspicious for esophageal perforation. During this work up, the patient had an unanesthetized precipitous preterm delivery of a neonate of approximately 30 weeks gestational age. A CT esophagram postpartum confirmed the perforation. Under uncomplicated general anesthesia, the patient underwent urgent esophageal endoscopy which demonstrated a 3 cm distal esophageal perforation that was washed out and stented. This was followed by video-assisted thoracic surgery for right chest washout and placement of mediastinal and pleural tubes. A thoracic epidural was placed postoperatively for pain control. The patient's recovery was uneventful.

Esophageal rupture is an uncommon complication of the second stage of labor,^{1,2} hyperemesis gravidarum,^{3,4} and rarely GERD.⁵ The combination of any vomiting history, hematemesis, and chest pain should elicit suspicion for esophageal rupture.

SOAP 2023 case report 01-31-23 figure.pdf

## Program Material Sunday, May 7, 2023

**Opening Remarks** 

Rebecca Minehart, MD, MSHPEd & May Pian-Smith, MD

### SOAP/ASRA Panel: "A tailored approach to management of the thrombocytopenic patient"

- SOAP guidelines surrounding thrombocytopenia Melissa Bauer, DO (SOAP)
- Managing thrombocytopenia in patients with different etiology and levels Lisa Leffert, MD (SOAP)
- ASRA guidelines for performing nerve blocks in patients with low platelets Melissa Byrne, MD (ASRA)

### **Concurrent Sessions**

### Sol Shnider Track #3 (main stage)

Moderator: Greg Palleschi, MD

- Dural Puncture Epidural v. Other Neuraxial Anton Chau, MD
- POCUS in the Emergency How Can We Guide Care Clemens Ortner, MD
- Barriers to Optimal Staffing Mark Zakowski, MD

### Oral Research Presentations #2 (breakout room)

Case Reports and Research Abstracts #4 (breakout rooms)

- Room 1 Post-Cesarean Pain and Opioids
- Room 2 General Anesthesia
- Room 3 Neuraxial Labor Analgesia & Complications
- Room 4 ECV, EXIT, NTG and N2O
- Room 5 Case Reports Cardiac & ECMO
- Room 6 Case Reports Cardiac & ECMO



Thrombocytopenia Cases: Where the rubber meets the road Lisa Leffert, MD

neuraxial procedure?

**YES** 

🗆 NO

## Patient Story

36-year-old G1P0 presents with painful contractions and requests labor pain relief. This is her first pregnancy

This is her first pregnancy. Previously, she had an appendectomy without untoward events.

Review of Systems: Negative





### Intrapartum Platelet Count.

- The anesthesiologist's decision to order or require a platelet count should be individualized and based on a patient's history (e.g., preeclampsia with severe features), physical examination, and clinical signs.#
  - A routine platelet count is not necessary in the healthy parturient.

### PRACTICE PARAMETERS

Practice Guidelines for Obstetric Anesthesia

An Updated Report by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia and the Society for Obstetric Anesthesia and Perinatology*







Highlights

• In 984 women with preeclampsia, 64(6.5%) had a platelet count <100,000 mm^-3, 21(2.1%) <70,000 mm^-3, and 5(.5%) < 50,000 mm^-3

It is rare for the platelet count to decrease significantly in women with preeclampsia in the 72 hours prior to delivery

- There were no epidural hematomas in 40 women with preeclampsia who had an epidural placed with a platelet count <100,000 mm  $^{-3}$ 

New Patient Story

36-year-old G2P1 presents with painful contractions and requests labor pain relief.

She tells you she has a history of thrombocytopenia.



Platelet count during pregnancy





### CASE REPORT



international Journal of Obstetric Anesthesia	131
How low did we go? A case report of unexpected thrombocytopenia	Const for Without the
M.L. Meng, E. Wang, C. Cain, R. Landau Columbia University Medical Center, Department of Anosthesiology, New York, United States	of America
BSTRACT We report the case of a nonmotensive 31-year-old parturient who received combined spinal-epidural anal sho was then found to have an unexpectedly low platelet count (25 000/j.1.) with elevated liver enzymes, body pressure.	gesia for early labor, and but without alterations in



A. L. Frelinger III^{1,2} R. F. Grace² A. J. Gerrits^{1,2} S. L. Carmichael^{1,2} E. E. Forde^{1,2} A. D. Michelson^{1,2}

 ¹ Center for Plathet Research Studies, Division of Hematology/ Oncology, Botton Children's Hospital, Dana-Farber Cancer Institute, Harrand Medical School, Botton, Maschuetts, United States
 Address for correspondence. Andrew L. Freinger III, PhD, Center for Discology, Botton Children's Hospital, Distributed Research Studies, Division of Hematology/Oncology, Boston Children's Hospital, Kap 2012; 2010 Longwood Avenue, Boston, MA 021155737, United States

 Dana-Farber Cancer Institute, Massachusetts, United States
 Children's Hospital, Kap 2012; 2012; 2010 Longwood Avenue, Boston, MA 021155737, United States

Cellular Haemostasis and Platelets 143

Thromb Haemost 2018;118:143-151.



### e12 | Correspondence

Obstetric neuraxial anaesthesia in the setting of immune thrombocytopenia and low platelet counts: call to participate in an international registry

International registry
Ann Kinga Malinovski^{1,10}, Maha Othman^{10,4} on behalf of the International Society on
Thrombosis and Haemostasis 'Women's Health Issues in Thrombosis and Haemostasis
SSC, Flattele Hybriology SSC, Flattele Hybriology SSC, Patheter Hybriology SSC, Patheter Hybriology SSC, Patheter Hybrin, Torento, Charada, Topartment of Obstrica 4 Oracedog, Divisio of Marma-Heal Medica, Lamentól - Frankman Research
Interns, Saai Haeho Hybran, Torento, Charada, Topartment of Obstrica 4 Oracedog, Divisio of Marmin, Society Markin, Torento, Charada, Topartment of Districa 4 Oracedog, Divisio of Marmin, Olice, Garetta University, Kagaton, OK,
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### Preeclampsia

- Conflicting evidence about platelet function
- No strong evidence to show function is drastically different to warrant different management
- HELLP Syndrome
  - AST/ALT > twice normal
  - Platelet count < 100,000 10^6
  - LDH > 600

The eligible study population includes pregnant women with ITP and peripartum platelet counts below 100 x 109 1 ub no received neuraxial anaesthesia: spinal, epidural, or combined spinal-epidural. Acknowledging that the lowest platelet count accepted even by staunch advocates of neuraxial anaesthesia in this population is 50 x 109 11, no lower range platelet count restriction has been placed for inclusion, as occasional reports of neuraxial anaesthesia at even lower platelet counts are available, and all such reports will add valuable data.



The platelet count was 60,000 10^9/L one hour ago.



The SOAP Decision Aide advises NOT to proceed with a platelet count < 70,000 10^9/L

YesNo



### The following are **helpful** bleeding history Q's:

- A. Easy bruising, only
- B. Spontaneous major bleed, not associated with trauma or anatomic lesion
- C. Both
- D. Neither



Would you do a neuraxial anesthetic for labor?

- Depends on the neuraxial technique (epidural versus spinal)
- □ Epidural technique (includes CSE/DPE)
- Spinal technique

Relative Proportion of Spinal Epidural Hematomas



Would you consider administering a platelet transfusion prior to the neuraxial procedure?



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### Is a labor epidural indicated?

Patient autonomy
 Medical indications
 Fetal indications



What are the patient and situational features that would impact your choice of whether to proceed?

Difficult airway
 High Risk for Cesarean Delivery
 Medical Complexity (cardiac issue; preeclampsia)
 Obstetric Complexity (VBAC, multiple gestation, LGA)

### Summary

- There are risks and benefits in *doing* and *not* doing the procedure
- Marshall your resources
- Communicate with all teams





### Disclosures



How Low Can You Go: Thrombocytopenia and Neuraxial Procedures

> Melissa E. Bauer D.O. Associate Professor of Anesthesiology

> > **Duke** Anesthesiology

**Duke** Anesthesiology

### **Objectives**

sia, 1987, Volume 42, pages 487-490

### Difficult tracheal intubation: a retrospective study

### G. L. T. SAMSOON AND J. R. B. YOUNG

- · Review the evidence for neuraxial procedures in obstetric patients with thrombocytopenia
- Explain the rationale for SOAP consensus • statement for obstetric patients with thrombocytopenia
- · Educate about how to obtain a bleeding history assessment

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### Epidural Anesthesia in Pregnant Patients With Low Platelet Counts

### S. H. ROLBIN, MD, D. ABBOTT, MD, E. MUSCLOW, MD, F. PAPSIN, MD, L. M. LIE, MD, AND J. FREEDMAN, MD

One hundred four patie

# ts demonstrate thrombocytopenia in the One hundred four patients with unex-periparturient thrombocytopenia were sonth period. Sixty-one of them received without neurologic sequence. Evort, in vote the second second second second to be second second second second to be second second second second to be second second

c) such deviations are of clinical signs, is not known. In the absence indications, platelet counts are ed in the parturient. The litera ing reports as to the range of non or hype

## nia. The patients requested epidural analş they felt that they needed pain relief in lab

they fit that they needed p Materials and Methods We parformed planket commi-gapilated with relynerational from 666 normal, healty pro-selected vormer during prog-peried.³ Subject with a clife selected vormer during prog-peried.³ Subject with a clife selected vormer lupus ery thronics/topenic purpus). Taktele counts of a showed a confident of the selected vormer lupus ery thronics/topenic purpus). Taktele counts of a showed a confident of the selected vormer lupus ery thronics are selected wormer lupus thronics/topenic purpus). Taktele counts of a showed a confident of the selected vormer lupus ery selected vormer lupus ery heat the selected selected and showed a selected selected and showed a selected selected and planket confident of the selected selected selected and selected selected selected selected selected billow with index, medication following the selected selecte rith ethylenediaminetetra-acetic a normal, healthy persons meetin criteria as blood donors and 220 omen during pregnancy and the ubjects with a clinical diagnosis

Results

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### Safe Epidural Analgesia in Thirty Parturients with Platelet Counts Between 69,000 and 98,000 $\rm mm^{-3}$

Yaakov Beilin, MD, Jeffrey Zahn, MD, and Michele Comerford, BA Department of Anesthesiology, Mount Sinai School of Medicine, New York, New York

	Regional anothenia is a papelar form of pain relief for the management of labor and delivery. Thomsecreta- penia is considered a relative contrainfluctation to the administration of regional anothenia. Some authorities administration of regional anothenia. Some authorities held if the platelet count is <100,000 mm ⁻¹ . For the pe- verse with chartor of all participants who had a platelet count <100,000 mm ⁻¹ during the peripartum period. Egiloty women met this criterion. Of these 80, 30 had an	epidura <100,00 an epid >100,000 thetic. V complic regional when th
ea is of cy du int Al pla co an is	existent anesthesia is often administered to the parturisent for the management of labor and de- vilvery. A clinically significant cough(path), i.e., interpart of the significant cough(path), i.e., considered an absolute count-150,000 mm ⁻³ , particular as platistic count-150,000 mm ⁻³ , particular as a platistic count-150,000 mm ⁻³ , addy 546,900, but some women present during a start of the size of the size of the size of the size of the size of the size of the size of the attraintic size of the size of the size of the size of the during of the size of the size of the size of the size of the attraintic size of the size of the size of the size of the during of the size of the size of the size of the size of the during of the size of the size of the size of the size of the during of the size of the size of the size of the size of the during of the size of the during of the size of the during of the size o	Methic After a we use Mount patient who ha peripar sion to specim minatic Coulter Hialcal which deliver sending

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114 Regional anesthesia in parturients with low platelet counts

To the Editor: The lowest platelet counts at which one can safely administer neuraxial anesthesia for labour and delivery is controversial. Published studies are few and sample sizes small.^{1–2} We report our institutional experience with thrombocytopenic parturients, probably the

1997 to 2002 of parturients with methods of anes and hospital cour itions; 177 patie e identi to 60,000 µL. group 29/10 anesthesiologists of unatoma associated with spin. anesthesia (1:150,000),⁴ Parturi 20-µL⁻¹ received regional anesth the lower risk ral (1:220,000)

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incidence of a rare event is difficult in the Therefore, in the absence of large, ur it is prudent to evaluate the risk-benefit we case basis basis enk MD

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The Society for Obstetric Anesthesia and Perinatology **Interdisciplinary Consensus Statement on Neuraxial** 

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Supported by:

)AP

**Procedures in Obstetric Patients** 

ociety for Naternal • Fetal Nedicine

With Thrombocytopenia

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- Ibbott D, Musclow E, Paprin F, Lie LM, Epidural anesthesia in pregnant patients relet counts. Obstet Gynecol 1988; 71: Prevaluan J. Epro-... with low platest counts. Obster ..... 918-20. Brilin 7, Zahn J. Comerford M. Safe epidural analge in thirty parturients with platelet counts between 60,000 and 98,000 nm⁻¹. Anasth Analg 1997, 85: Katelku DM, Weight W.
- KT, Rottman RL, Kotelko DM, Wright WC, Rosenblatt RM. Unrecognized thrombocyie II.
- Nome JJ, Reenblatt RML Unrecognized thrombocy-topenia and regional anesthesia in parturients a retro spectro review. Obstet Gynesol 1989; 73: 943-6. Amtroagalants and spinal epithenia anesthesia. Amenda Amtroagalants and spinal epithenia anesthesia. Amenda Inatel JA, Lippann-Hand A. If nothing goes wrong is everything all right Interpreting zero numerators. JAMA 1985; 240: 1743-8.

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**Modified Delphi Process** 

- Systematic review/meta-analysis
- Questionnaires
- Face-to-face meetings
- Telephone and email exchanges •

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**ASTA**|♥

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### 33 cases of spinal epidural hematoma

• <25,000x 10⁶/L (14)



### 33 cases of spinal epidural hematoma

- 26-50,000 x 10⁶/L
- 51-75,000 x 10⁶/L (9)
  - 2 prolonged PT or PTT
  - 2 Clinical signs of bleeding
  - 3 subsequent drop to less than 50,000 x 10⁶/L
  - 2 multiple attempts or traumatic procedures

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### 33 cases

### • 75-100,000 x 10⁶/L (4)

- 2 Abnormal PTT/PT
- Subsequent drop to less than 30,000 x 10⁶/L
- Unknown dose of aspirin

### **Asymptomatic patients**

- 10 patients asymptomatic, found at autopsy
- 14-year-old

Lee AJ et al. Pediatr Blood Cancer 2005

- LP at 46,000 x 10⁶/L (platelet transfusion)

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- Second LP 2 days later (frank blood)
- MRI T12-L5 hematoma
- Hb drop from 8.1 to 5.6 g/dL

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Abut[44] 2006	30-year-old F Preeclampsia	66,000 Normal PT, aPTT, bleeding time	Spinal Presented with nasal hemorrhage, gross hematuria	24 hours: weak flexion of right hip, hypoesthesia of right L1-L4 dermatomes 48 hours: paralysis and severe pain of right lower extremity	MRI: subdural and epidural hematoma L1-L3 Surgery: subdural hematoma, arteriovenous malformation at puncture site	Yes, emergently (exact timing NR)	Full recovery	Abut[44] 2006	30-year-old F Preeclampsia	66,000 Normal PT, aPTT, bleeding time	Spinal Presented with nasal hemorrhage, gross hematuria	24 hours: weak flexion of right hip, hypoesthesia of right L1-L4 dermatomes 48 hours: paralysis and severe pain of right lower extremity	MRI: subdural and epidural hematoma L1-L3 Surgery: subdural hematoma, arteriovenous malformation at puncture site	Yes, emergently (exact timing NR)	Full recovery
Koyama[45] 2010	39-year-old F HELLP syndrome	91,000 Normal coagulation profile	Spinal Decreasing platelet counts for 2 days postpartum (down to a nadir of 26,000 x 10 ⁶ /L.)	Day 2: right posterior thigh and toe numbness, urinary retention, mild flaccid paraparesis, bilateral sensory deficits below L3-L4	MRI: subarachnoid hematoma L2-S1	No	Slight sensory deficits	Koyama[45] 2010	39-year-old F HELLP syndrome	91,000 Normal coagulation profile	Spinal Decreasing platelet counts for 2 days postpartum (down to a nadir of 26,000 x 10 ⁶ /L)	Day 2: right posterior thigh and toe numbness, urinary retention, mild flaccid paraparesis, bilateral sensory deficits below L3-L4	MRI: subarachnoid hematoma L2-S1	No	Slight sensory deficits
Moen[22] 2004*	NR F HELLP	44,000 NR	Spinal Decreasing platelet count	NR	NR	No	Full recovery	Moen[22] 2004*	NR F HELLP	44,000 NR	Spinal Decreasing platelet count	NR	NR	No	Full recovery
Nguyen[46] 2006	38-year-old F Massive obstetric hemorrhage, coagulopathy	58,000 PT, aPTT prolonged	Epidural catheter removal Catheter removed while in DIC (accidentally)	48 hours: paraparesis (right>left)	MRI: epidural hematoma T3-L5	No	Full recovery	Nguyen[46] 2006	38-year-old F Massive obstetric hemorrhage, coagulopathy	58,000 PT, aPTT prolonged	Epidural catheter removal Catheter removed while in DIC (accidentally)	48 hours: paraparesis (right>left)	MRI: epidural hematoma T3-L5	No	Full recovery
Yuen[47] 1999	20-year-old F Preeclampsia	71,000 Normal PT, aPTT	Epidural	>1 hour: tonic clonic seizure, motor and sensory deficits in lower extremities	CT: small (2 x 1 cm) lumbar hematoma Surgery: 4 mL clot	Yes, emergently (exact timing NR)	Full recovery	Yuen[47] 1999	20-year-old F Preeclampsia	71,000 Normal PT, aPTT	Epidural	>1 hour: tonic clonic seizure, motor and sensory deficits in lower extremities	CT: small (2 x 1 cm) lumbar hematoma Surgery: 4 mL clot	Yes, emergently (exact timing NR)	Full recovery
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### W Abut[44] 2006 30-year-old F 66,000 MRI: subdural and epidural hematoma L1-L3 Yes, emergently (exact timing NR) Full recovery 24 hours: weak flexion of right hip, hypoesthesia of right L1-L4 dermatomes pinal Preeclampsia Normal PT, aPTT, bleedi time Presented wit nasal hemorrhage, gross hematu ad with Surgery: subdural hematoma, arteriovenous malformation at puncture site dermatomes 48 hours: paralysis and severe pain of right lower extremity Day 2: right Day 2: right Day 2: right Day 2: right uniary retention, mild flaccid paraparesis, bilatera sensory deficits below L3-L4 MRI: subarachnoid hematoma L2-S1 Slight sensory deficits Koyama[45] 2010 9-year-old F 91,000 Spinal No Normal coagulation profile HELLP syndro Decreasing platelet cou for 2 days postpartum (down to a nadir of 26, x 10⁶/L) Moen[22] 2004* NR F 44,000 Spinal Full Decreasing platelet count Epidural catheter removed while in DIC (accidentally) Epidural HELLP NR Nguyen[46] 2006 38-year-old F 58,000 48 hours: paraparesis (right>left) MRI: epidural hematoma T3-L5 No Full rec Massive obstetric hemorrhage, coagulopathy PT, aPTT prolonged >1 hour: tonic clonic seizure, motor and sensory deficits in lower extremities 71,000 CT: small (2 x 1 cm) lumbar hematoma (exact timing NR) 20-year-old F Full recovery Yuen[47] 1999 Normal PT, aPTT reeclampsia Surgery: 4 mL clot

## Signs and symptoms of a spinal epidural hematoma



Bauer ME et al, J Clin Anesth 2020

Lumbar neuraxial procedures in thrombocytopenic patients across populations: A systematic review and meta-analysis ¹ Mellssa E. Bauer (DO)^{3,4}, Roulhac D. Toledano (MD, PhD)⁵, Timothy Houle (PhD)^c, Yaakov Beilin (MD)⁶, Mark MacEachern (MLIS)⁶, Madeline McCabe (BS)⁸, Dana Rector (BS)⁸, Jason P. Cooper (MD, PhD)⁶, Terry Gernsheimer (MD)⁵, Ruth Landau (MD)⁶, Lisa Leffert (MD)⁶



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Which patients?

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### **Definitions**

- Gestational thrombocytopenia
  - Normal platelet count prior to pregnancy or early pregnancy
     Decreased to ≥ 70,000 x 10⁶/L
- Immune thrombocytopenia (ITP)
  - Diagnosis prior to pregnancy
  - Work up by hematologist
- Preeclampsia •
  - Meets diagnostic criteria
  - > 140mm Hg SBP or > 90mm Hg DBP twice at least 4 hours apart
  - Proteinuria and/or end organ injury

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Platelet count during pregnancy

35-30-

25-

15

10

0-

50

100 150 200 250 300 350

Platelet Count (×10⁻³ per mm³)

400 450 500

Percent 20-



## ITP = Superplatelets?



 No specific evidence to show improved function over normally functioning platelets

### Preeclampsia

W

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- Conflicting evidence about platelet function
- No strong evidence to show function is drastically different to warrant different management

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### **Current signs of bleeding**

### How to assess?

- Hematuria
- Bleeding from IV sites
- Mucosal bleeding
## Past bleeding history assessment



# Survey says...

- · VonWillebrand patients vs normal coagulation patients
- · General screening: 25-46% positive response
- Targeted questions (bleeding after surgery, family history)

Sadler Blood 2003 Sramek A et al, Arch Intern Med 1995



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# **Unknown etiology**

- · Caution with neuraxial procedures
- Other conditions:
  - Von Willebrand type 2B
  - Autosomal dominant macrothrombocytopenias

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# Spinal vs epidural procedures



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# Strategies to reduce risk

- Most experienced provider
- Lateral position
- Fluid predistention
- Wire-embeded catheter
- Limited depth of insertion to 6 cm

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There are risks and costs to action. But they are far less than the long-range risks and costs of comfortable inaction.

- John F. Kennedy

UNDUKE Anesthesiolog



Exclusion Thrombocytopenia other than ITP INTERNATIONAL REGISTRY: IMMUNE THROMBOCYTOPENIA & OBSTETRIC NEURAXIAL ANAESTHESIA AT LOW PLATELET COUNTS

## HTTPS://REDCAP.LINK/ITP_OBNA

- > OPEN TO CLINICIANS WORLD-WIDE
- ALL PATIENT-RELATED DATA ARE NON-IDENTIFIABLE
- ➢ CONVENIENT ON-LINE DATA COLLECTION ON REDCAP
- ➢ WORD DOCUMENT SURVEY AVAILABLE IF PREFERRED
- INTEREST OR QUESTIONS:
   <u>E-MAIL</u>: KINGA MALINOWSKI
  - ANN.MALINOWSKI@SINAIHEALTH.CA



# **Questions?**

- Thank you
- Melissa.e.bauer@duke.edu
- Twitter: @melissaebauer1

**Duke** Anesthesiology

Thrombocytopenia and Peripheral Nerve Blockade: Delivering Safer Care
Melissa L. Byrne, DO MPH Cilnical Assistant Professor, Department of Anesthesiology Associate Program Director, Core Residency Program Director, PoCUS Education Michigan Medicine, Ann Arbor, MI
💙 @dr_melissabyrne
ASRA PAIN MEDICINE

# 🥑 @dr_melissabyrne

# Learning Objectives

- Recognize the utility of peripheral nerve blockade in the pregnant patient
- Review recent guidelines and recommendations for regional anesthesia in patients on anticoagulation
- Reflect on recent guidelines and recommendations for regional anesthesia in thrombocytopenic patients

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x	Nothing to disclose	Faculty Disclosure
	Yes, as follows:	
	Honoraria/Expenses	
	Consulting/Advisory Board	
	Speakers Bureau	
F	unded Research (Individual)	
Fı	unded Research (Institution)	
	Royalties/Patent	
	Stock Options	
_	Ownership/Employee	
	Other	
		Off-Label Product Use
/i	Il you be presenting or refere	ncing off-label or investigational use of a therapeutic product?
	No	
-		



3











х	Nothing to disclose	Faculty Disclosure
	Yes, as follows:	
	Honoraria/Expenses	
	Consulting/Advisory Board	
	Speakers Bureau	
F	unded Research (Individual)	
F	unded Research (Institution)	
Royalties/Patent		
Stock Options		
Ownership/Employee		
	Other	
		Off-Label Product Use
Wi	Il you be presenting or refere	encing off-label or investigational use of a therapeutic product?
х	No	







#### 💟 @dr_melissabyrne

G1PO at 36⁵ presents after slipping on the ice for a ORIF distal radius

Gestational thrombocytopenia Platelet count of 73k

What is your anesthetic plan?



14





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G2PO at 37^o Crohn's patient presents for primary C/S

Multiple abdominal surgeries Platelets 68k

What is your anesthetic plan?

17



18



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G1P0 patient at  $39^3$  presents for elective induction

ITP; SUD history on Suboxone Platelets 45k

What is your anesthetic plan?



19











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# Disclaimer

- Guidelines DO NOT define standard of care
- Not intended to replace clinical judgment
- Variances may be acceptable based on the judgment of the responsible anesthesiologist
- Designed to encourage safe and quality patient care



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Figure 1
 Base on measure subjects the subject of the su













🎔 @dr_melissabyrne Plexus and Peripheral Blockade in the Anticoagulated Patient ORIGINAL ARTICLE The Incidence of Hematoma Formation in Patients With Continuous Femoral Catheters Following Total Knee Arthroplasty While Receiving Rivaroxaban as Thromboprophylaxis An Observational Study Chris Idestrup, MD, MSc, FRCPC,* Mona Sawhney, PhD, NP,† Catherine Nix, MBChB, FCARCSI,¢ and Alex Kiss, PhD§



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There is no change in this recommendation

Recommendations

Peripheral Block

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• 16.0 Anesthetic Management of the Patient Undergoing Plexus or

• 16.1 For patients undergoing perineuraxial, deep plexus, or deep peripheral block, we recommend that guidelines regarding neuraxial technique be similarly applied (grade 1C).

ASK

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#### Recommendations

- 16.0 Anesthetic Management of the Patient Undergoing Plexus or Peripheral Block
  - 16.1 For patients undergoing perineuraxial, deep plexus, or deep peripheral block, we recommend that guidelines regarding neuraxial technique be similarly applied (grade 1C).
     There is no change in this recommendation
  - 16.2 For patients undergoing other plexus or peripheral techniques, we suggest management (performance, catheter maintenance, and catheter removal) based on site compressibility, vascularity, and consequences of bleeding, should it occur (grade 1C).
     This is a new recommendation
     PAIN MEDICINE







TABLE 22. Stratific	ation of Risk Accord	ing to Procedures			
Low Risk		Intermediate	Risk	High	Risk
Regional Guidelines	Pain Guidelines	Regional Guidelines	Pain Guidelines	Regional Guidelines	Pain Guidelines
Superficial and compressible plexus/peripheral nerve blocks	Peripheral nerve blocks Joint injections Sacroiliac joint and sacral lateral branch blocks	Other procedures based on based on compressibility, patient body habitus, comorbidities, and the degree and duration of anticoagulation	Neuraxial injections Facet procedures Visceral sympathetic blocks Pocket revision	Neuraxial blocks Deep and noncompressib plexus/peripheral nerve blocks	Spinal cord stimulate trial and implant Intrathecal pump tria and implant Vertebroplasty and kyphoplasty Epiduroscopy

TABLE 22. Stratifica	ation of Risk Accord	ing to Procedures	o Disk	High I	lick
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♥ @dr_melissabyrne		The S Inter Proce- With Manager Boots of Sec. ent Los V	Comparison of the second
Society Recommer	Idations for N	euraxial Procedures in the	e Setting of Thrombocytopenia
Society and Year of Publication	Procedure Types	Indications to Assess Platelet Number Prior to Procedure	Platelet Count (x10 ⁶ /L) Recommendations
		Anesthesiology Societies	
American Society of Regional Anesthesiology and Pain Medicine (ASRA), 2018 ¹	Anesthesia	If unfractionated heparin administered > 4 days, check plts prior to NB/CR	NA

@dr_melissabyrne	ndations for N	The Soc Interdia With T Research With T Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research Research	Arrowski and
Society and Year of Publication	Neuraxial Procedure Types	Indications to Assess Platelet Number Prior to Procedure	Platelet Count (x10 ⁶ /L) Recommendations
		Anesthesiology Societies	
American Society of Regional Anesthesiology and Pain Medicine (ASRA). 2018 ¹	Anesthesia	If unfractionated heparin administered > 4 days, check plts prior to NB/CR	NA

@dr_melissabyrne		The Soci Proceeding With Th Results for Results for Re	Control Advancements
Society Recommen Society and Year of Publication	ndations for Neuraxial Procedure Types	leuraxial Procedures in the Indications to Assess Platelet Number Prior to Procedure	Setting of Thrombocytopenia Platelet Count (x10%/L) Recommendations
		Anesthesiology Societies	
American Society of Regional Anesthesiology and Pain Medicine (ASRA), 2018 ¹	Anesthesia	If unfractionated heparin administered > 4 days, check plts prior to NB/CR	NA

























ur_menssabyme	Body region	Block	Consensus	Gende*
		Occipital, peribulbar, Sub-tenoris PNB	Lowrisk	III-B
		Superficial cervical plenas block	Low risk	III-B
cta	Head and neck	Deep cervical plenus block	High risk	III-B
lla		Stellate gauglion	High risk	IV-C
linica	All second second second	Interscalene brachial plexus block	Intermediate risk	III-C
······································	ADONE CHARAC	Supraclavicular brachial pleuas block	Intermediate risk	III-C
roatica		Infractasicular brachial plexus block	Intermediate risk	III-C
	Below claricle	Asillary brachial plexus block	Low risk	III-C
EDIDLIEDAL NEDVE DI OCKE IN DATIENTE ON		Median, radial, ulnar PNB	Low risk	IV-C
ERIPHERAL NERVE BLOCKS IN FAITENTS ON		Lumbar plexus, psoas compartment b.	High risk	III+B
NTITHROMBOTIC DRUGS - A RESCUE OR AN		Femoral nerve block	Internediate risk	III C
		Pericapsular nerve group	Intermediate risk	
UNNECESSARY RISK?	Lumbar olevas	Lateral femoral cutaneous n. block	Low risk	IV-C
		Suprainguinal fascia iliaca block	Intermediate risk	IV-C
Dearse Dears de V		Infrainguinal fascia iliaca block	Low risk	IV-C
Feter Foredos		Obtarator nerve block	Intermediate risk	IV-C
		Adductor canal nerve block	Intermediate risk	IV-C
		Proximal sciatic nerve block	Intermediate risk	IV-C
	Sacral plonus	(anterior, transgluteal, subgluteal)		
		Poplitzal sciatic nerve block	Intermediate risk	IV-C
	Ankle	Ande block Berne doeth	Low risk Intermediate risk	IV-C
		TARAL	Internet late sich	III.C
		T&P subcutul block	Intermediate risk	IV-C
		Beingeinel/Behanssettis block	Internetista sick	III-C
		Ourdates lembaten block	High rick	W-C
	Interfascial plane	Thereare the foreign black	Langer res.	W.C.
		Transversage fascia boxes	Internet in the	IV-C
		Erector spinae plane roocs	Low risk	IV-C
		PECS 1	Intermediate risk	III-C
		PECS 2	Internediate risk	IV-C
		Senatus anterior plane block	Intermediate risk	IV-C
	Truncal	Paraversebra	ruga noc	III+B





	✔ @dr_melissabyrne Acta clinica ONTITHROMBOTIC DRUGS - A RESCUE OR AN UNNECESSARY RISK? Perr Parela Perr Parela Intrombocytopenia: paucity of clinical data on bleeding risk or thrombocytopenic patients bases the recommendations on expert consensus opinion. Consequently, it is not possible to give definitive values for a lower limit at which there is an increased risk of hermatoma. A count of > 75 × 10 ⁹ /L has been proposed as an adequate level for al lower limit at which there, is an individual thrombocytopenia, there are reduced platelet numbers, but normal function, therefore an experimed an individual risk-benefit assessment should be made. ⁴⁵	<ul> <li>         edr_melissabyrne         PERIPHERAL NERVE BLOCKS IN PATIENTS ON ANTITHROMBOTIC DRUGS – A RESCUE OR AN UNNECESSARY RISK?         Perr Perds     </li> <li> <b>Rare Recommendation:</b>         •&gt; 75 × 10⁹/L → adequate level for all regional anesthesia procedures (no other risk factors)         • In ITP or gestational thrombocytopenia, → &gt; 50 × 10⁹/L with individual risk-benefit assessment         Thrombocytopenia, there are no other risk factors.^{4,4}         In ITP or gestational thrombocytopenia, +&gt; 50 × 10⁹/L with individual risk-benefit assessment     </li> </ul>
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# Control of the second sec

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#### 🎔 @dr_melissabyrne

Journal cination d'anestédie Constant d'anticipation Constant d'anticipation RESPONDENCE

#### Practice advisory on the bleeding risks for peripheral nerve and interfascial blockade: *rooted in evidence*

Ban C. H. Tosi, MD, MSC O· Kyle Kirkham, MD · M. Kwesi Kwefe, MD · De Q. Tran, MD · Patrick Wong, MD · Ki Jian Chin, MD · Rakesh V. Seodekoppan, MD

#### Rebuttal:

- Aim to facilitate clinical decision-making
- Complementary advisory to ASRA recommendations
- Many PNBs used a surgical anesthetic

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G2PO at 37° Crohn's patient presents for primary C/S  $\,$ 

Multiple abdominal surgeries Platelets 68k

What is your anesthetic plan?

113



G2PO at 37^o Crohn's patient presents for primary C/S <u>refusing neuraxial</u>

Multiple abdominal surgeries; <u>h/o ileus</u> Platelets 68k

What is your anesthetic plan?



114









Re Ane:





















/ @dr_melissabyrne	Anaesthesia 2021, 76, 393-403	doi:10.1111/anae.15160				
-	Review Article					
	Quadratus lumborum block vs.	ransversus abdominis				
	plane block for caesarean delive	ery: a systematic review and				
	network meta-analysis*					
	K. El-Boghdadly , ^{1,2} 📀 N. Desai, ^{1,2} S. Halpern, ³ L. B. Carvalho ⁶ and P. Sultan ⁷	Blake, ⁴ P. M. Odor, ⁵ S. Bampoe , ⁵				
	1 Considuant, Department of Anaesthesia, Guy's and St Thomas' 2 Nonorary Serior Lecture, King's Collega London, UK 3 Professor, Departmert of Anesthesiology, and Pain Medicial 5 Considuant, Department of Anesthesia (Dava d Pain Medicial 5 Considuant, Department of Anaesthesia, University Collega be 6 Professor, 7 Associate Professor, Department of Anesthesiolog	NHS Foundation Truit, London, UK Jinversity of Tozonio, OH, Canada Jisona Librar, Jitti Rosk, AR, USA gihal London, UK Jisaford Uhwanity, CA, USA				
Cor						
COI	iciusion.					
<b>√</b> T/	AP and OL are effec	tive for postoperative				
ar	nalgesia when ITM i	s not possible or				
مام						


















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G1P0 patient at  $39^3$  presents for elective induction

ITP; SUD history on Suboxone Platelets 45k

What is your anesthetic plan?

137



138





140







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Bilateral erector spinae plane catheters for labor analgesia in the setting of idiopathic thrombocytopenia purpara

International Journal of Obstetric Anestl

(a)



















Clinical Trials gov	
Cuncul Thuis.gov	
Home > Search Results > Study Record Detail	Save this study
Comparison of TAP Anterior OL or ESP Block for Elective Caserson Sec	tion
Comparison of TAP, Antenor QL, of ESP Block for Elective Cesarean Sec	
	ClinicalTrials.gov Identifier: NCT03695172
The safety and scientific validity of this study is the responsibility of the	Recruitment Status 0 : Terminated (Decline of elinible participants)
study sponsor and investigators. Listing a study does not mean it has	First Posted (): October 3, 2018
for details	Results First Posted 6 : January 12, 2022
	Last Update Posted () : January 12, 2022
	View this study on Reta Clinical Trials nov
Sponsor:	
Duke University	
Information provided by (Responsible Party):	
Duke University	
study Description	Go to 💌





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#### References

INSERT QR CODE WITH LINK TO DROPBOX OF PAPERS





#### Anton Chau, MD FRCPC MMSc

Clinical Associate Professor | University of British Columbia Obstetric Anesthesia Fellowship & Research Director | BC Women's Hospital and Health Centre Director of Obstetric Anesthesia | St. Paul's Hospital, Providence Health Care



### Disclosure

I have received honorarium and royalties from Merck and UpToDate®

### Labor Epidural Initiation Techniques in 2023



# Objectives

- 1. Highlight the unique value propositions of DPE
- 2. Discuss practical considerations when performing a DPE



- Transdural flux of epidurally administered medications
   Translocation
- Avoid direct intrathecal LA and opioids
   Improved Safety



Confirmation

# Hallmark of Dural Puncture (CSE / DPE) Techniques



CSF return adds visual confirmation to tactile LOR

Value over CSE

# CSF confirms likely midline position



Source: Hadzic A: The New York School of Regional Anesthesia

# Anatomic Basis for Equivocal LOR



#### Oct 2021

Original research

Anatomy of the lumbar interspinous ligament: findings relevant to epidural insertion using loss of resistance

Sue Lawrence O^{1,2} Stacey Llewellyn,³ Helen Hunt,⁴ Gary Cowin,^{1,2} David J Sturgess,⁵ David Reutens^{1,2}

Lawrence S et al., RAPM 2021

# **Interspinous Ligament Midline Gaps**





Lawrence S et al., RAPM 2021

# Ligamentum Flavum Midline Gap





# Ligamentum Flavum Midline Gap

GAI





Lirk P et al., Anesth Analg 2004 Abd El Aziz et al., Eur J Anat 2019

Lawrence S et al., RAPM 2021

# Incidence of LF Midline Gaps



# Absence of Characteristic Crisp LOR



Stop, or go further?

Lawrence S et al., RAPM 2021

# **Confirming of Location**

CSF return decreases risk of epidural catheter failure

Study	N	CSE	EPL	Failed Catheter
Eappen IJOA 1998	4,240	7.2%	13.1%	CSE lower failure
Norris et al. IJOA 2000	2,065	0.2%	1.3%	CSE lower failure
Van de Velde et al. Anaesth Intensive Care 2001	2,736	1.5%	3.2%	CSE lower failure
Pan et al. IJOA 2004	12,590	3.2%	7.1%	CSE lower failure
Goodman et al. Anesth Analg 2009	84	0%	7.3%	CSE lower failure
Lee et al. Anesth Analg 2009	1,025	1.1%	5.8%	CSE lower failure
Gambling et al. Anesth Analg 2013	800	1.2%	2%	CSE lower failure
Groden et al. IJOA 2016	5,487	2.1%	3.9%	CSE lower failure
Booth et al. Anesthesiology 2016	2,395	6.6%	11.6%	CSE lower failure

# CSE lowers risk of catheter failure / replacement

#### What about DPE ?

	Anesthesiology 2005; 103:1046-51	© 2005 American Society of Anesthesiologists, Inc. Lippincott Williams & Wilkins, Inc.
Thomas et al. Anesthesiology 2005	Dural Puncture with a 27-Gauge Whitacre Needle as Part of a Combined Spinal-Epidural Technique Does Not Improve Labor Epidural Catheter Function Join A. Thomas, M.D., Peter H. Pan, M.D., Lynne G. Henris, B.S.N.; Medge D. Owen, M.D.; Bebert D'Angelo, M.D.;	
Arnolds et al. IJOA 2021	Neuraxial labor analgesia failu ≥50 kg/m ² : a single-center re: D. Arnolds ^{a,a} , B. Scavone ^{a,b} "Paparment ef Økustrika and Orikecideg. The University of Cha	rre rates in women with a body mass index trospective study
Berger et al. IJOA 2022	Epidural catheter replacement analgesia compared with epidu retrospective cohort study	rates with dural puncture epidural labor ral analgesia without dural puncture: a

A.A. Berger^{*}, J. Jordan, Y. Li, J.J. Kowalczyk^{*}, P.E. Hess^{*} Bith Inred Descenese Medical Center, Department of Aneshesiskop, Critical Care, and Pain Medicine, Horword Medical School, Boston, MA, USA

### Thomas JA et al. Anesthesiology 2005



No difference between EPL vs. DPE-27G

Thomas et al. Anesthesiology 2005

### Absence of CSF Increases Risk of Replacement



Arnolds D et al. IJOA 2021



Primary outcome: Failure rate of first neuraxial catheter for labor

Thomas et al. Anesthesiology 2005

Arnolds et al. IJOA 2021

# CSF return improves catheter function



# Berger AA et al. IJOA 2022



Primary outcome: Propensity score-adjusted epidural catheter failure rate

Arnolds et al. IJOA 2021

Berger AA et al. IJOA 2021

	EPL	DPE	P-value
Outcomes			
Catheter Failure	9.8%	6.5%	0.019
Catheter Replacement	9 %	5.9 %	0.025

	EPL	DPE	P-value
Outcomes			
Catheter Failure	9.8%	6.5%	0.019
Catheter Replacement	9 %	5.9 %	0.025
Timing of Failure			
Initiation	0.8 %	0.4 %	0.51
Maintenance	9 %	6.1 %	0.032

Berger AA et al. IJOA 2021

Berger AA et al. IJOA 2021



Berger AA et al. IJOA 2021

### More Data Coming...

Multicenter retrospective cohort study

PI: Dr. Emily Sharpe, Mayo Clinic

What are the risks of failed catheter conversion to surgical anesthesia at cesarean delivery for EPL / CSE / DPE ?





Review Article 🔂 Free Access

Meta-analysis of the success of block following combined spinalepidural vs epidural analgesia during labour

M. Heesen 🔀 M. Van de Velde, S. Klöhr, J. Lehberger, R. Rossaint, S. Straube

First published: 28 October 2013 | https://doi.org/10.1111/anae.12456 | Citations: 43

10 RCTs comparing CSE and EPL in 1722 women in labour

Unilateral block significantly reduced after CSE (RR 0.48, 95% CI 0.24-0.97)

Transdural flux compensate for non-uniform drug spread ?

# Mechanistic Evaluation of Translocation



Taha B, et al. SOAP Gertie Marx Competition 2020 / ASA 2020

### Translocation is Dependent on Size of Dural Puncture



Bernards CM et al. Anesthesiology 1994

Study	Needle Gauge	Onset
Thomas et al. 2005 Anesthesiology	27	No difference
Suzuki et al. 1996 Anesth Analg	26	DPE > EPL
Cappiello et al. 2008 Anesth Analg	25	DPE > EPL
Chau et al. 2017 Anesth Analg	25	DPE > EPL
Wilson et al. 2018 Anesth Analg	26	DPE > EPL
Contreras et al. 2019 Reg Anesth Pain Med	25	DPE > EPL
Song et al. 2021 Anesth Analg	25	DPE > EPL

Study	Needle Gauge	Onset
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Contreras et al. 2019 Reg Anesth Pain Med	25	DPE > EPL
Song et al. 2021 Anesth Analg	25	DPE > EPL



Anesth Analg

#### Dural Puncture Epidural Technique Improves Labor Analgesia Quality With Fewer Side Effects Compared With Epidural and Combined Spinal Epidural Techniques: A Randomized Clinical Trial

Anthony Chau, MD, MMSc, FRCPC,*†‡ Carolina Bibbo, MD,§ Chuan-Chin Huang, ScD,† Kelly G. Elterman, MD,|| Eric C. Cappiello, MD,†‡ Julian N. Robinson, MD,‡§ and Lawrence C. Tsen, MD†‡



#### **Translocation Improves Speed of Onset**



Chau et al. Anesth Analg 2017



Chau et al. Anesth Analg 2017

Translocation Improves Bilateral S2 Blockade



### Physician Epidural Top-Ups (Breakthrough Pain)

#### Translocation - Harnessing Both Epidural & Spinal Spaces



**? Transition of analgesia** from spinal to epidural component may be perceived as breakthrough pain

Chau et al. Anesth Analg 2017

	EPL	DPE	CSE
Initiation	Epidural	Epidural & Spinal	Spinal
Maintenance	Epidural	Epidural & Spinal	Epidural & Spinal



does initial intrathecal analgesia reduce the subsequent minimum local analgesic concentration of epidural bupivacaine?

N. P. Patel, S. L. Armstrong, R. Fernando, M. O. Columb, J. K. Bray, V. Sodhi, G. R. Lyons First published: 15 March 2012 | https://doi.org/10.1111/j.1365-2044.2011.07045.x | Citations: 17

Initial intrathecal analgesia increased the subsequent minimum local analgesic concentration of epidural bupivacaine by a factor of 1.45 compared with epidural analgesia.



#### CSE - Speed





	CSE (n=40)	DPE (n=40)	EPL (n=40)	р
Pruritus	67.5 %	10 %	10 %	< 0.05

Pruritus

Chau A et al. Anesth Analg 2017

Chau A et al. Anesth Analg 2017

# Transient Fetal Bradycardia

RR 1.31, 95%Cl 1.02–1.67, *P* = .03 Hattler J et al., Anesth Analg 2016 NNH 28 Mardirosoff C et al., BJOG 2002

- Does NOT lead to higher C/S and worst neonatal outcomes
- Exact mechanism unclear
- Unpredictable and no reliable prophylaxis

Practical Considerations in Performing a DPE Technique



#### How do I do a DPE ?

#### Standard epidural Kit + a spinal needle!





# Dry Tap – Deflection of Spinal Needle



Tran C et al., Can J Anesth 2021

### Shearing of Metal Fragments? Not a concern!

#### No Risk of Metal Toxicity in Combined Spinal-Epidural Anesthesia

Dietmar Holst, MD*, Michael Möllmann, MD+, Beate Schymroszcyk, MD‡, Claudia Ebel, MD*, and Michael Wendt, MD*

Anesth Analg 1999

No additional metal particle formation using the needlethrough-needle combined epidural/spinal technique

N. HERMAN, J. MOLIN AND K. G. KNAPE Disision of Disterie's Anothesia, Department of Anothesiabagy, University of Texas Health Science Center at San Antonio, Texas, USA

Acta Anaesthesiol Scand 1996

# Length of Spinal Needle

	Protrusion out of epidural needle tip	Failed DP / no CSF
Riley ET et al., Anesthesiology 2002	9 mm	17 %
Joshi et al., Reg Anesth 1994	10 mm	15%
Thomas et al. Anesthesiology 2005	12.5 mm	14%
Joshi et al., Reg Anesth 1994	13 mm	3%
Hoffmann VLH et al., Anaesthesia 1997	15 mm	1.3%
Riley ET et al., Anesthesiology 2002	17 mm	0 %

# Barriers to Clinical Adoption of DPE

- Perceived lack of benefits Low baseline rate of difficult / failed epidural
- Perceived risks on 'invading the dura' (e.g. PDPH)

# Risk of PDPH similar between CSE / EPL

	N	CSE	EPL	Risk of PDPH
Van de Velde et al. Anaesth Intensive Care 2001	2736	0.43%	0.45%	No difference
Norris et al. Anesthesiology 2001	2065	1.7%	1.6%	No difference
Miro et al. IJOA 2008	6497	1.4%	0.8%	No difference
Van de Velde et al. IJOA 2008	17198	0.5%	0.4%	No difference

### What about DPE ?



#### What about DPE ?

Event	Overall n=1518	LEA n=759	<b>DPE</b> n=759	<b>P-value</b> ^a	
PDPH	14 (0.9%)	6 (0.8%)	8 (1.1)	0.59	
EBP	7 (0.5%)	3 (0.4%)	4 (0.5%)	>0.99	
	No significant difference in the rates of PDPH and EBP following EPL or DPE after propensity score matching				

Larger studies needed

Berger et al. IJOA 2022

### Barriers to Clinical Adoption of DPE

- Perceived lack of benefits Low baseline rate of difficult / failed epidural
- Perceived risks on 'invading the dura' (e.g. infection, PDPH)
- Conflicting evidence

ANESTHESIOLOGY

Quality of Labor Analgesia with Dural Puncture Epidural *versus* Standard Epidural Technique in Obese Parturients: A Double-blind Randomized Controlled Study

Hon Sen Tan, M.D., M.Med., M.H.Sc., Sydney E. Reed, M.D., Jennifer E. Mehdiratta, M.D., M.P.H., Olga I. Joimede, M.D., M.S., Riley Landreth, M.D., Luke A. Gatta, M.D., Daniel Weikel, M.Sc., Ashraf S. Habib, M.B.B.Ch., M.Sc., M.H.Sc., F.R.C.A. *Ansestisesuicol 2022;* 136:678–67



Tan et al. Anesthesiology 2022

#### DPE vs. EPL in BMI >=35



No significant differences between DPE-25G and EPL **PIEB Effect** 

- Chau et al.: EPL + CEI < DPE + CEI
- Tan et al.:
- EPL + PIEB = DPE + PIEB

Tan et al. Anesthesiology 2022

# Value – Target Mismatch

#### Matching the Value of DPE to Target Situations

- Equivocal LOR
- Unanticipated challenging epidural
- · Re-siting a failed epidural

Chau A, Tsen L. Best Pract Res Clin Anaesthesiol. 2022

#### Matching the Value of DPE to Target Situations

#### Faster labor analgesia onset....

Study	DPE	EPL	Р
Wilson et al.	8 [6-10] min	10 [8-14] min	0.04
Song et al.	8 [2-14] min	10 [8-12] min	0.015

#### Faster conversion to surgical block ??

Wilson et al. Anesth Analg 2018 Song et al. Anesth Analg 2020

#### **SOAP 2023 Best Paper Competition abstract**

#### El Sharawi N et al.

- 140 women elective CS, randomized to DPE or EPL
- T10 block 20 mL 0.0625% bupivacaine + 2 mcg/mL fentanyl 1 hour prior CS
- 20 mL 3% chloroprocaine epidural extension
- Primary outcome: time to surgical anesthesia - loss of sharp sensation to T6



HR 1.84; 95% CI 1.29 to 2.64; P< 0.001

#### **DPE** may still be beneficial in specific situations

Difficult to show these benefits in RCT



### Summary

# **DPE – Value Propositions**



- Confirmation: CSF return → midline location and improves catheter function
- Translocation: Hasten onset, harnessing both epidural & spinal spaces to improve quality of analgesia
- · No direct IT injection: Minimizes SEs

#### Maximize technical success:

at least 26G spinal needle
at least 15-17mm protrusion

One Technique will Not Fit All A look to the future Consider adding **DPE** to your practice Refining and improving neuraxial initiation techniques Novel method to decrease EPL failure and improve function ~~~ EPL DPE CSE Elucidating mechanism(s) driving FHR changes after CSE and -@ways to prevent its occurrence Institutional culture | provider experience | clinical context Large population data on DPE to better understand its efficacy †††† and risks



Anton.chau@ubc.ca

# How would you estimate your ratio of EPL/DPE/CSE to be?

	Anton	Greg	Mark	Clemens
EPL	60%	85%		
DPE	20%	0%		
CSE	20%	15%		

# Labor DPE Technique

Needles:

17G Hustead epidural needle 113mm

25G BD Whitacre 5 in (127 mm) Protrudes ~14mm

25G PENCAN® 6.1 in (156 mm) Protrudes ~43mm



25G x 5.00IN

# DPE + PIEB synergism

Effect of Du	ral Puncture Epidural Technique
Combined W	ith Programmed Intermittent Epidural
Bolus on Lal	oor Analgesia Onset and Maintenance:
A Randomize	ed Controlled Trial
Yujie Song, MD, Weijia Zhendong Xu, MD, PhD	Du, MD, Shuangqiong Zhou, MD, Yao Zhou, MD, Yibing Yu, MD, , and Zhiqiang Liu, MD, PhD

	EPL + CEI	EPL + PIEB	DPE + CEI	DPE + PIEB	Р
Patients requiring PCEA	73.7%		75%	39.5%	0.001
Mean # of PCEA boluses	2		2	0	<0.001
Physician Bolus Intervention	44.7%		25%	10.5%	0.003

Song et al. Anesth Analg 2020



# POCUS in the Emergency -

# How Can We Guide Care?

Clemens M. Ortner, MD, MSc, DESA Clinical Associate Professor Department of Anesthesiology, Perioperative and Pain Medicine Stanford University School of Medicine





Conflict of interest: none





Beyond Tuohy Needles and Emesis Basins: A Case for Focused Cardiac Ultrasound Training in Obstetric Anesthesiology

#### Case #1

Brian Tolly, M.D.

- 38 yo G2P1,
- 48hrs post D&E
- Fever (Chorioamnitis?)
- Severe dyspnea



ASA Monitor 02 2017, Vol.81, 62-63.

www.asamonitor.org

Beyond Tuohy Needles and Emesis Basins: A Case for Focused Cardiac Ultrasound Training in Obstetric Anesthesiology



Brian Tolly, M.D.

- SaO₂ 88%
- HR 140 bpm
- NIBP ?
- PANIC in the room
- OBGYN resident staring at ECG

DD: Sepsis? Occult hemorrhage? PE? Heart failure?



Beyond Tuohy Needles and Emesis Basins: A Case for Focused Cardiac Ultrasound Training in Obstetric Anesthesiology Brian Tolly, M.D.





Beyond Tuohy Needles and Emesis Basins: A Case for Focused Cardiac Ultrasound Training in Obstetric Anesthesiology Brian Tolly, M.D. ASA Monitor 02 2017, Vol.81, 62-63.

SOAI

www.asamonitor.org











ASA Monitor 02 2017, Vol.81, 62-63.

www.asamonitor.org



Beyond Tuohy Needles and Emesis Basins: A Case for Focused Cardiac Ultrasound Training in Obstetric Anesthesiology

#### Case #1

Brian Tolly, M.D.

- Stopped fluids
- Transfer SICU (within 30 min)
- iv Enoxaparin
- IR for catheter directed Thrombolysis (within 6hrs)

#### "Why was focused TTE not being used more widely in OB-Anesthesia?"

SOAP

ASA Monitor 02 2017, Vol.81, 62-63. www.asamonitor.org

#### Learning Objectives

- Definition of focused cardiac ultrasound (FCU)
- Feasibility and challenges of performing a FCU
- Ultrasound guided management of acute dyspnea
- Predicting fluid responsiveness
- POCUS in the PACU
- Hypovolemic vs. distributive shock



Focused Cardiac Ultrasound (FOCUS) Definition

- Why is this patient hypotensive? 1.
- Might this patient benefit from fluid loading? 2.
- 3. Is major LV-dysfunction responsible for the shock state?















Vasoplegia

Pulmonary embolus

Tamponade











# Focused Cardiac Ultrasound (FOCUS)

Feasibility in Pregnancy

#### Anatomic changes in Pregnancy:

- Anterior and left displacement of the heart
- Elevated diaphragm
- Partial left lateral tilt (LUD)



# Focused Cardiac Ultrasound (FOCUS)



#### Anatomic changes in Pregnancy:

- Anterior and left displacement of the heart
- Elevated diaphragm
- Partial left lateral tilt (LUD)

#### ➔IDEAL for parasternal and apical views

Dennis A.T., Int J Ob. Dennis A.T., Abstract	stet. Anesth., 2011; 20,160-158 SOAP 2010		Dennis A.T., Int J Obs Dennis A.T., Abstract	stet. Anesth., 2011; 20,160-158 : SOAP 2010
	18	May 12, 2023		





Focused Cardiac Ultrasound (FOCUS) Feasibility and Challenges





Feasibility and Challenges

Presence of breast implants decrease image acquisition feasibility to < 50%





#### Focused Cardiac Ultrasound (FOCUS) Feasibility and Challenges



#### US-guided management of acute breathlesness CASE #2













#### Pulmonary Ultrasound in Pregnancy Normal in healthy pregnancy

#### 150 women at 36-38 gest. weeks:

- n=0 Interstitial pulmonary syndrome (B-pattern)
- n=0 alveolar consolidation
- n=0 pleural effusion
- n=0 pneumothorax



# Pulmonary Ultrasound in Pregnancy Normal in healthy pregnancy

. ₽ \$

#### 150 women at 36-38 gest. weeks:

- n=14/150 (8%) 1 positive lung region
- n=2/150 (1.3%) 2 positive lung regions





 SaO₂ 85% NIBP 180/90, HR 120

Treatment initiated:

#### US-guided management of acute breathlesness CASE #2





#### US-guided management of acute breathlesness CASE #2 $\geq$ 3 B-lines in $\geq$ 2 Quadrants Bilateral = Interstitial Pulmonary Syndrome $\rightarrow$ EVLW $\uparrow$ LUQ LLQ RLQ

















# POCUS and Preeclampsia



- 25¹⁻³ % Interstitial pulmonary syndrome present in preeclampsia with SF
- =  $19^{1}$ - $20^{3}$ % raised LVEDP (and preserved EF) on TTE
- B-pattern on Lung-US is associated with raised LVEDP on TTE¹⁻³
- (Sensitivity 55-100 %, Specificity 80-85%)¹⁻³

#### → A-pattern on Lung-US excludes raised LVEDP

¹ Zieleskiewicz L., Anesthesiology 2014; 120: 906-14
 ² Ambrozic J., US Obstet Gynecol 2017; 49(1):104-109
 ³ Ortner CM, Anesth & Analg. 2018; Sept. 10



#### POCUS and Preeclampsia

Case #3



- 32yo G3P1, 34+3wks in labor,
- A2GDM, BMI 39
- PreE and SF (HTN)
- MgSO4 2g/hr, Labetalol for BP control
- Epidural in place

(《条》)	

#### POCUS and Preeclampsia

Case #3





#### POCUS and Preeclampsia

Case #3

- 32yo G3P1, 34+3wks in labor,
- A2GDM, BMI 39
- PreE and SF (HTN)
- MgSO4 2g/hr, Labetalol for BP control
- Epidural in place

Emergency CD for non-recovering FHT

#### Emergency CD:

- No sensory block on arrival OR (15ml Lido 2% on way to OR)
- GA-Induction: 100ucg Remi, 200mg Prop, 200mg Succhinylcholin
- Uncomplicated endotracheal intubation
- BP: 55/30, HR60,
- No response to 500mcg Phenylephrine

May 12, .








Assessing Fluid Responsiveness Passive Leg Raising Test (PLR)

Passive Leg Raising in Spontaneous Breathing					
	88.4 % [95% C.I.: 84 – 93 %]				
Specificity	91.4 % [95% C.I.: 86 – 95 %]				
AUC (ROC-curve)	0.95 [95% C.I.: 0.92 – 0.97]				

 $\Delta D_{IVC}$  of poor predictive value

Bentzer, JAMA 2016; 316: 1298-1309 Cavallaro, Int Care Med 2010; 36: 1475-1483

View 12,200 POCUS IN THE BARANEERY 59

Intensive Care Med DOI 10.1007/s00134-012-2770-2 Clément Brun Laurent Zieleskiewicz Julien Textoris Laurent Muller Jean-Pierre Bellefleur François Antonini

#### ORIGINAL

Prediction of fluid responsiveness in severe preeclamptic patients with oliguria



Positive fluid response was predicted by  $\Delta$  VTI of 12% during PLR (75% sensitivity, 100% specificity, 100% PPV)

 $\Delta\, D_{\text{IVC}}$  of poor predictive value

Brun C., Intensive Care Med 2013; 39, 593-600



POCUS in the PACU CASE 4





POCUS in the PACU CASE 4



- 39 yo, G4P4 @ 39wks
- PACU post CD#4
- Hypotensive (80/50) and tachycardic
- Block receding
- Abdomen non-distended
- Brief improvement with 500ml iv fluid bolus











#### Summary

- Definition of focused cardiac ultrasound (FCU)
- Feasibility and challenges of performing a FCU
- Ultrasound guided management of breathlessness
- Predicting fluid responsiveness
- FAST exam post-surgery
- Hypovolemic vs. distributive shock



Source for Changes SIGs Dashboard Events Fellowship Directory Learning Center SOAP.org





#### Barriers to Optimal Staffing in Obstetric Anesthesia

Mark Zakowski, M.D., FASA Professor, Obstetric Anesthesiology Cedars-Sinai Medical Center, Los Angeles CA Past-President, Society of Obstetric Anesthesia and Perinatology





🚳 Clemens 🔹 🗚 Q

# Disclaimer

- No conflict of interest
- Speaking as an individual
- Best effort for accuracy
  - Constantly changing
  - Consult your own economist
- Check with your own attorney/billing agency

Biologic Imperative

• Adapt or die • Charles Darwin



#### Overview

- Workload
- Expectations
- Optimal staffing
- Economics
- 'Long-Covid'
- Got 'Staff'?
- Improve productivity and staffing



#### Anesthesia Workload

- Epidural utilization rate
- Cesarean rate
- Length of cases
- Length of labor
- Service expectation timeliness
- Teaching program(s)
- Acuity
- OB Complication rates
- Other departmental activities

#### Obstetric Anesthesia Workforce Survey

Births/yr	Neuraxial 24h in house	Neuraxial On call	CRNA independent	L&D Non- exclusive	Require Plt	Training Programs ACGME
>1500	86%	10%	10%		43%	28%
500-1499	41%	48%	18%	22%	63%	2%
<500	15%	84%	68%	58%	67%	4%

-Traynor AJ. AA2016:122:1939

# SOAP Labor Epidural Documentation for Billing



SOAP Ad Hoc Committee Labor Epidural Documentation for Billing Members: Zakowski (Chair), Hoyt, Miles, Zhou, Yaghmour, Stein, Gerber, Fragneto, Small

<u>Mission</u>: Documentation for labor analgesia via epidural or other means has little national guidance for best practices. Some members have complained that various insurers are asking for different documentation practices, leading to confusion, difficulties, and wasted effort. Differing documentation may be requested or required by varied legislation, contracts, common local practices or different insurers.

Members currently provide medical management and services associated with epidural management which are generally underappreciated and often undocumented. The Society for Obstertic Anesthesis and Perinatology (SDAP) has developed some general best practices to help provide one documentation standard for labor epidural analgesia.

#### Anesthesia Workload

Beyond initial 'hands on' epidural/neuraxial insertion

- Labor analgesia ongoing assessment and management
- Safety rounds on L&D
- Staff alerts
- Boluses
- Bleeding
- Resuscitation
- Coordination of care

-SOAP Labor Epidural Documentation for Billing Statement 2019, www.soap.org :Consensus Statements

Expectations



-MZ&DALL-E2 4.9.23

#### Anesthesia Providers

- Want
  - Predictability
  - Work in area of specialized training, if any
  - Bigger system often works better for sub-specialty trained
- Reasonable workload
- Friendly environment
- Not too many night shifts
- Back-up availability

### Patient-Consumer-Family

- Timely service
  - <30 min typical</p>
- Quality service
- Neuraxial placement
- Pain relief
- Follow-up
- Emotional support
- Personalization
- Disinformation

## **Obstetricians**

- Anesthesia services available • Even if OB not in house
- Labor analgesia neuraxial availability
- Cesarean delivery availability
  - 30 min decision to incision?
  - Local policy National metrics
- UK/OAA vs. other
  ACOG Levels of Maternal Care
- Post-partum BTL
- Urgent cerclage

#### OAA/AAGBI

- Workload increasing
- Goal 30 min request to arrival labor epidural
   ->1h exceptional circumstance
- Cover OB occasionally
- Additional time on OB/teaching from experienced
- Elective work separate from emergency work
- Call room on L&D for rest

#### Crude delivery rates not good metric

- Case mix variation
  Increasing maternal co-morbidities
- Trainees, paperwork, etc.
- · Need to allow time for handovers as part of shift

#### OAA/AAGBI

#### • Urgency of caesarean

- 1=immediate threat to life of woman or fetus
- 2= maternal or fetal compromise is not immediately life threatening
- 3 = no maternal or fetal compromise but needs early delivery
- 4= delivery times to suit woman/staff

#### Audit goals

- * Category 1 Decision to delivery  $\leq$  30 min,  $_{\geq}$  90%
- * Category 2 Decision to delivery  $\leq 75~min, \geq 90\%$

NA/AAGBI guidelines for obstetric anaesthetic services 2013 , -rcoa.ac.uk/gpas/chapter-9

-OAA/AAGBI guidelines for obstetric anaesthetic services 2013

#### ACOG: TOLAC PB205

- at facilities capable of performing emergency deliveries.
- ACOG LOMC Level 1 or higher
- facilities that can provide cesarean delivery for situations that are immediate threats to the life of the woman or fetus.
- When <u>resources</u> for emergency cesarean <u>not available discuss</u> the hospital's resources and availability of obstetric, pediatric, anesthesiology, and operating room staffs.
  - [disclosure/informed consent to patient]

-ACOG Practice Bulletin 205, TOLAC, 2019

#### ACOG PB116: Management of Intrapartum FHR

#### Category III Abnormal

- Absent baseline FHR variability and any:
- Recurrent late decel
- Recurrent variable decel
- Bradycardia
- Sinusoidal

#### Timing Summary by Evidence Level:

- Level A Cat III abnormal, increased risk of fetal acidemia at time of observation
- Level B requires evaluation and initiation appropriate treatment
- Level C optimal time frame delivery not been established

-ACOG PB 116 Management of Intrapartum FHR Tracings, 2010

#### ACOG PB116: Management of Intrapartum FHR

#### Category III Abnormal

Intrauterine resuscitative measure unsuccessful

#### • Timing Delivery:

- optimal time frame delivery not been established
- '30 min rule' decision to incision, not scientific
- 30% cesareans began >30 min from decision, N=2808
   no increase adverse neonatal outcomes
- lack of association of increased adverse outcomes with 30-minute decision-to-incision time frame
- As <u>expeditiously as feasible</u>
- <u>Timing that best incorporates maternal and fetal risks and benefits.</u>
- May vary based on the institution and local circumstances

-ACOG PB 116 Management of Intrapartum FHR Tracings, 2010

#### Nursing Support: Mission Critical

- Help manage work-flow
- Smaller services especially (e.g. <2000 deliveries/year)</li>
  Nursing staffing
  - Monitoring patient Vitals, response as pain VAS
- Equipment
- Epidural Pump
- Request for additional medication
  - Evaluations for pain
  - bolus/'top up'/'pushing dose'
  - Evaluations for motor block

## AWHONN Position Statement Epidural Catheters

'...should monitor but not manage the delivery of analgesia and anesthesia by catheter techniques'
 '...AWHONN's position that RN's should not be responsible for adjusting or titrating epidural infusions.'

May:

- · Replace empty infusion bags according to orders
- Remove the [epidural] catheter... by local policy, orders

#### RN should not:

- Bolus medication ['hand bolus']
- Manipulate doses
- Increase or decrease infusion rate
  - [independently change rate allowed to adjust programmed rate per order]

-AWHONN doi: 10.1016/j.jogn.2020.02.002;

#### Employer/Group

- Cost minimized/efficient
- Pool of on-call personnel
  - In house
  - 'home call'
- Staffing L&D from main OR?
- Teaching hospital/service?
- Revenue generated L&D anesthesia services
- ACOG Levels of Maternal Care

# Regulatory

#### • TJC

Has expressed concern over % travel/temp RNs/Staff

#### • State regulations

- Federal payments to hospitals
  - COVID related programs \$178 Billion hospitals & providers
  - Medicare Part A
  - Rural Pass-through
    - Helps pay for nursing -> CRNA coverage
      Rural hospital

    - One FTE in hospital
      Not bill CMS Part B
    - Surgical volume <800/year</li>

#### **Optimal Staffing**

- Hospital desires
  - Service
  - Labor analgesia
     Cesarean delivery
     Postpartum BTL
     Emergencies

  - Outcomes
- Employer Department/hospital/private group Provide coverage with least #people = \$\$\$
  - Back-up coverage
- SOAP Centers of Excellence
  - · More time for non-clinical activities and clinical activities
  - More staffingStaff dedicated to L&D

# Optimal Staffing Obstetric Anesthesia – L&D

#### **Optimal staffing**

- Provider
- Patient
- OB
- Nursing
- Employer/group
- Regulatory agencies
- Professional Societies

# Optimal Staffing Obstetric Anesthesia – L&D

#### Common errors

- Average case load
- · 'Hands on' time accounting not sufficient
- Peak demand not average
- Capacity crash cesarean 24x7 have to staff for it
- · Organization's Short and Long-term objectives
- Indirect cost savings Patient Safety
  - Fewer adverse events
  - 2xLOS
    Lower medico-legal risks
  - Rescue/resuscitation PPH etc.

-Ginosar Y AA2022:135:1138

- Bates DW NEJM 2023:388:142, Berwick DM Editorial NEJM 2023:388:181

# Optimal Staffing Obstetric Anesthesia – L&D

- Treat multiple patients concurrently
- Significantly underestimates actual workforce required

#### Measure of Variance

- Workload variability
- Not average workload driver for margins of safety
- Workload of L&D generally <u>non-Linear</u>
- Requests and emergencies not evenly distributed

-Ginosar Y Editorial AA2022:135:1138

-https://www.cipd.co.uk/knowledge/strategy/organisational-development/workforce-planning-fac

## SOAP Centers of Excellence Workload

- Clinical procedures ~33% of time Attending workload similar
- Not adjust risk/case mix etc.
- NOT measure other tasks ☺
- Not include:
- Evaluations pre/post delivery
  Resuscitation
  - Resuscitation
     E.g. PPH

- Academic non-academic
- Higher volume higher workload
   Consistency of demand
- Facility utilization rates varied

esia Procedure-Based Workload and Facility Utilization of SOAP Centers of Excellence Designated Institutions, Anesth Analg. 2022 Dec 1:135(6):1142

# SOAP Centers of Excellence Workload

ley ET, Hoang D, Lim G, Zakowski M, Carvalho B. Obst

Work Index	Time	Academic	Non-Academic
Attending	weekday	.43	.48
	weeknight	.3	.34
	weekend	.3	.34
All staff	weekday	.2	.33*
	weeknight	.19	.23*
	weekend	.19	.23*

#### SOAP Centers of Excellence Workload











# Economics of L&D

#### Anesthesia services contracting

- \$/Unit
  - Insertion: base units + time procedure
  - Common 1 time unit/h to reasonable limit
- Flat rate • Governmental health insurance
- Medicare
- Medicaid



-as an illustrative example only***

CPT Code	01967	62326		
CPT Descriptor	Neuraxial labor analgesia/anesthesia for planned vaginal delivery (this includes any repeat subarachnoid needle placement and drug injection and/or any necessary replacement of an epidural catheter during labor)	E2220 injection(s), including indwelling catheter placement, continuous infusion or intermittent bolus, of diagnostic or therapeutic substance(s) (eg. anesthetic, antispasmodic, opioid, steroid, other solution), not including neurolytic substances, interlaminar epidural or substarachoid, lumbar or sacral (caudal); withoui maeine suidance		
Medicare Payment	5 Base Units + Time. Assuming 7.4 time Units and \$22/u = \$272.80	4.36 RVUs, \$156.47 Facility		
Pre- Service	<ul> <li>Patient H&amp;P, PMH, Prenatal History, Consent.</li> </ul>	<ul> <li>Patient H&amp;P, PMH, Consent.</li> </ul>		
Intra Service	Positioning     Scrub, dress, wait     Placement Epidural Active     Placement Epidural Active     Placement Epidural Active     Placement Epidural Active     Placement Active     Placement     Placement	Positioning     Scrub, dress, wait, Time Out     Induction account     function     consisting Applied     Infusion started		
Post- Service	Patient seen next day to     evaluate adverse sequelae.	Patient is monitored and observed by others     Physician is called for any issues     Physician communicates results to others as needed.		

#### Uncovered Services

- Insurers designate facility 'in network'
  - Leave insured exposed to no providers in network for services needed
     E.g. RAPs, ER hospital based
  - Puts consumer (patient/insured) in the middle
- 'balance billing'/No Surprises Act
  - Takes patient out of the middle
  - IDRP intended as fair process to drive parties to agreement
  - Lawsuits over implementationUnintended consequences
    - Insures cancelling existing contracts and/or decreasing rates because of N.S.A. leverage.
       CA AB72 IDRP
    - CMA survey 1/3 MDs insurers' have canceled, refusing to renew, no new contracts
    - https://www.cms.gov/nosurprises,
       https://cshq.org/practice-management/op-eds/new-california-medical-association-survey-demonstrates-serious-consequences-of-california-surprise-billing-law

#### Got Staff?



#### National Anesthesia Provider Staffing

- Increase in demand for anesthesia services
  - NORA increased 26% (2018->2022)
- Slight increase in Anesthesia providers
- 'Long-COVID': lasting effects
  - Some early retirements
  - Burn out/well-being
  - Millennial attitude adoption
    - Work-life balance

#### L&D Anesthesia Staffing

- 24x7
- Pool of anesthesia providers willing to do OB
  - much smaller than Main OR
  - High risk/timely
  - Skill neuraxial: average vs. above average vs. true mastery
- Trainees
  - May not provide true cost savings
    - SRNA not a 'qualified anesthesia provider' CMS can't supervise multiple rooms
       Anesthesiology resident 2:1 limit
  - Time/labor intensive
    - Complication rates higher

# L&D Anesthesia Staffing

#### • Expanding the pool of providers

- Mandate existing pool
- Pull from Main OR for flexing peak demand
- Technology assist neuraxial
- Work life balance
  - Millennial
  - Post-COVID
  - Staff 'wellness'

#### Staffing Anesthesia Providers

- Total pool, estimated
  - ASA 54,000
  - AANA 58,000
  - AAAA 3,300
- Turnover high
  - Leave for better pay/locale
  - Staffing needs high in local market -> Locums or change · 'price wars' by hospitals to stay adequate staffed
    - Exacerbated during COVID
    - RNs travel RN double pay as staff RN.
    - CRNA staff turnover est. 23% 2021, up from 8% prior

#### Anesthesia Workforce Projection



Physician specialty	Adequacy 2035
Allergy & Immunology	90%
Anesthesiology	93%
Cardiology	83%
Colorectal Surgery	100%
Critical Care Medicine	88%
Dermatology	99%
Emergency Medicine	126%

-National Center for Health Workforce Analysis, HRSA Nov 2022

## Anesthesia Staffing: Supply vs. Demand

National 'supply': # anesthesia providers vs. DEMAND for services

 High demand vs supply -> improved negotiations salary, conditions
 National supply of anesthesia providers – slight increase over time
 Demand for services likely to stay 'high'
 NORA

- NORA
   Sacklog of cases from COVID, improving
   New techniques, surgeries

#### • Educated Speculation

- Salaries/payments likely stable to slight decrease regardless of 'supply'
   Will demand for anesthesia services change?
   More case types, NORA, less invasive but not no risk
   Technology may decrease need for anesthesia 'sedation' in future
   A lassisted monitoring, drug delivery
   Nanotechnology
   NASA developing space-based medical approaches

-https://www.nasa.gov/feature/ad tal-flights, Pantalone D NPJ Microgravity 2021

# Shifting Workforce Demand

#### • GI Endoscopy

- 50 million 2017
- Deep Sedation by anesthesia provider more efficient

#### Remimazolam

- Shorter acting midazolam
- Peak sedation 3-3.5 min
- Alert 11-14 min

#### • T_{1/2} – 37-53 min GI endoscopy

- Phase IIa upper GI failure rate 46%
- Remimazolam + Fentanyl inadequate 30%

-FDA package insert, A&A2015:120:771,A&A2013:117:1093

# Hospital Economic\$\$\$

# Hospital Economics

#### Hospital labor expense

- 37% higher March 2022 from pre-pandemic
- Contract (temp) labor 11% of cost
- Corporate budgeting
  - Never want to go over budget

  - Don't want 'full' staffing

     Slowdown can cut travel/temp staff without firing

     • So never over budget
- Most hospitals deficit
  - Higher staffing costs
  - Payor mix increased Medicaid during COVID
  - Inflation

#### **Hospital Economics**

#### • Flat margins

- Volume steady
  - Shift to ambulatory
  - LOS down
- Outpatient driving revenue
- Cost of goods and services increasing faster than labor Contract labor decreasing
  - Inflation increase goods and services

-KaufmanHall.com/nhfr

March 2023

# Hospital Economics



-KaufmanHall.com/nhfr

# Hospital Economics



-KaufmanHall.com/nhfr

# Hospital Economics

	Net Operating \$ 2022	Investments 2022	Reported 2022			
Cleveland Clinic	-\$211 million	-\$1 billion	-\$1.2 billion			
	\$746 M 2021	\$1.4 B 2021	\$2.2 B 2021			
Mayo Clinic	\$595 M	-\$747 million				
↑ 8% expenses ↑5.9% labor	\$1.2 B 2021					
UPMC	\$238 M	-\$1.1 Billion	-\$1 Billion			
↑ 10.7% labor	\$843 M 2021	\$810 M 2021	\$1.5 B 2021			
Kaiser Permanente	-\$1.3 Billion	-\$3.2 Billion	-\$4.5 billion			
			\$8.1 billion 2021			
NOL -\$500 Million – \$1billion						

- https://www.fiercehealthcare.com accessed 4.6.23

# Salary vs. Performance Based

- Performance (Productivity) based remuneration
  - Bill your own cases private practice
  - RVU based 'eat what you kill'
- Is OR RN, surgical tech salary based on # cases performed?
- Should your income be based on Hospital efficiency?
- Shifting to 'RVU' based salaries
  - Risk Reversal unto provider
  - Keeps your area 'in budget' as revenues decrease your income decreases
     Anesthesia services could be part of OR overhead
  - 24x7 services, enough capacity to handle all surges

## Hospital Economics

#### Outlier\$\$\$

- Increased LOS
- Readmissions
- Some insurers won't pay for certain complications
- Quality initiatives (time/work/expertise)
  - Important to participate SOAP Centers of Excellence
    - · Extra time with patients, QI projects, more work/time allocation
- Private Equity ownership effects

# Staffing Future



Technology - productivity



Clone more staff

#### Improve Productivity

- Preop
   Al assisted pre-filled inputs EMR Plus outside information
- Labor analgesia epidural
  - TechnologyUS guided neuraxial
- RN directly helps workload

  - Patient ready when you arrive
     Patient ready when you arrive
     Help get equipment/supplies ready
     Manage timing of requests
     Epidural pump set-up/adjust per orders/connect new bag
- Rounding on patients
- Degree of Analgesia patient desires
   Motor block monitoring
- L&D 'patient safety' rounds

# Technology

- Increasing pool of Obstetric Anesthesia coverage
  - Neuraxial easier
  - Ultrasound guided
  - Simulation training/updates • VR/AR/XR
- ML/AI: Time management
- Monitor multiple locations
- Labor curve predictor
- Timing cesarean
- Not a substitution for pain relief
  - Nitrous vs Neuraxial
  - VR vs Neuraxial

# **Optimal Staffing Summary**

#### DO NOT ONLY USE:

- #Cases/day
- х
- Payor mix

#### DO ALSO Use:

Clinical needs

- Variance peak demands
- Timeframe for desired services
- Outcomes driven staffing
- Clinical non-procedural activities
- Non-clinical activities

# Optimal Staffing Summary

- Local needs
- Institutional goals & objectives
- External metrics
- Economics
- Supply & Demand for anesthesia services
- Support services
- Productivity/Technology
- Win-Win





# ACOG Management of Intrapartum FHR

 -ACOG PB 116 Management of Intrapartum FHR Tracings, 2010

#### Box 2. Potential Logistical Considerations in Preparation for Operative Delivery in Setting of Category III Tracing

- Obtain informed consent (verbal or written as feasible)
- Assemble surgical team (surgeon, scrub technician, and anesthesia personnel)
- Assess patient transit time and location for operative delivery
- Ensure intravenous access
- Review status of laboratory tests (eg, complete blood type and screen) and assess need for availability of blood products
- Assess need for preoperative placement of indwelling foley catheter
- Assemble personnel for neonatal resuscitation

#### Wide-area In Vivo Calcium Imaging in Mouse Myometrium

Presenting Author: David J. Combs, MD PhD

**Presenting Author's Institution:** Department of Anesthesiology, Critical Care, and Perioperative Medicine, Brigham and Women's Hospital; Harvard Medical School **Co-Authors:** Shahinoor Begum, MS - Department of Chemistry and Chemical Biology, Harvard University

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**Introduction:** Physiologic uterine contractions support labor & delivery, conception and implantation. Aberrant contractility has been implicated in preterm labor, obstetric hemorrhage, and infertility. Studies of myocytes or muscle strips have revealed important molecular and cellular factors governing uterine excitation. However, understanding of how activity is coordinated at organ-scale is lacking. Traditional methods for studying excitation events at the organ level suffer from limited spatiotemporal resolution, mechanical interference, and/or dissected (i.e. damaged) preparations. Optogenetics, the genetic targeting of optically-responsive proteins to specific cells, can overcome these limitations. Here, we report application of optogenetic tools to map excitations in mouse uterine muscle in vivo.

**Methods:** After laparotomy in nonpregnant adult female mice, adeno-associated virus (AAV) vectors encoding several different fluorescent reporters were injected into the myometrium using a micropipette and micromanipulator; subsequent experiments were performed between 8-40 days after surgery. Myometrial transgene expression was assessed in fixed, sliced rings of uterine tissue with immunofluorescence, using antismooth muscle actin antibodies for muscle layer labeling. Calcium imaging was performed on a widefield microscope in whole uterine explants or in vivo in anesthetized mice.

**Results:** AAV injection drove mouse myometrial expression of GFP in circular and longitudinal muscles (n = 7 animals, Figure 1A). Injections performed in non-pregnant mice showed sustained GFP expression in both muscle layers throughout pregnancy (n = 4 animals). Injection of virus expressing the genetically encoded calcium indicator GCaMP8m enabled detection of calcium transients in injected regions. Transients were readily detected from whole uterine explants (n = 14 animals, Figure 1B-C) and from anesthetized mice in vivo (n = 9 animals, Figure 1D-E). In non-pregnant uteri, the pattern of activity suggested distinct activity in the circular and longitudinal layers: bands

of excitation spanned the horn diameter and propagated along the ovarian-cervical axis; and, separately, strips of excitation along the ovarian-cervical axis propagated circumferentially.

**Conclusion:** Myometrial AAV injection enables expression of transgenes. Myometrial GCaMP8m enables wide-area imaging of calcium transients in whole uterine explants and from uteri in vivo and can independently track activity in the circular and longitudinal layers in the same intact preparation. These methods can be used to map excitation throughout the estrus cycle, in pregnancy, and in models



Figure 1. A: Fixed, axially sliced mouse uterus after injection with AAV virus encoding GFP (green), and stained with anti-smooth muscle actin (red), and dapi (blue) for nonpregnant (left panel) and 10 dpc pregnant (right panel) tissue (scale bars 50 µm). B: Single-frame image of fluorescence change ( $\Delta F$ ) from estrous-phase GCaMP8m-expressing uterine explant rendered in color and overlayed on a grayscale structural image. White arrowhead indicates longitudinal fiber activation. Colored regions of interest bracket circular layer activation. C: Timecourses of fluorescence from regions indicated by the colormatching boxes in B. D. Single-frame image of fluorescence change from metestrus-phase GCaMP8m expressing in vivo uterus rendered in color and overlayed on a grayscale structural image. Colored regions of interest bracket initiation site of bidirectional propagation. Ε. Timecourses of fluorescence from regions indicated by the color-

#### Comparison of Using Bupivacaine or Liposomal Bupivacaine or Methylprednisolone and Dexamethasone in Transverse Abdominis Plane (TAP) Block for Postoperative Cesarean Delivery Analgesia

Presenting Author: Suthawan Anakmeteeprugsa, MD
Presenting Author's Institution: Department of Anesthesiology, Yale School of Medicine - New Haven, Connecticut
Co-Authors: Antonio Gonzalez-Fiol, MD - Yale School of Medicine
Zili He, MS - Yale School of Public Health
Hung-Mo Lin, ScD - Yale School of Medicine

#### Background:

Postoperative pain after cesarean section is associated with moderate to severe pain. The Transversus Abdominis Plane (TAP) block, as a component of multimodal analgesic regimen, provided analgesia up to 48 hours after elective cesarean delivery¹. From previous studies, adding of dexamethasone or liposomal bupivacaine to TAP blocks can improve pain relief after cesarean delivery²⁻³. The aim of this study was to compare opioid consumption up to 72 hours after cesarean delivery after TAP block using of plain bupivacaine(PB) or liposomal bupivacaine(LB) or methylprednisolone and dexamethasone(CG). Secondary outcome included pain score and 11-item Obstetric Quality-of-Recovery score(ObsQoR-11).

#### Methods:

A total of 112 parturients undergoing scheduled cesarean section under spinal anesthesia with intrathecal morphine were included in this double-blinded randomized controlled study. After consent, patients were randomized into the three groups. Demographic data, opioid consumption, pain score(at rest, movement, out of bed) and ObsQoR-11 were recorded at 24,48 and 72 hours after delivery. The data was analyzed using mixed-effects models. A p-value of < 0.05 was considered statistically significant.

#### **Results:**

No statistical difference in demographics was noted among the three groups (e.g.age, BMI, gestational age and ethnicity). No opioid consumption group difference was noted, while all 3 groups demonstrated a statistically significant increase in opioid consumption at 48 hours, and a decrease at 72 hours. The details for opioid consumption and secondary outcomes are summarized on Table 1-A and B. The LB group had lower skin pain scores at rest than CG group at 48 hours. For visceral pain, CG group had lesser pain scores than PB group at 72 hours. The LB and CG group also had lower visceral pain scores with movement, as well as out of bed at 72 vs.48 hours. The ObsQoR-11 results demonstrated that the PB group experienced more severe pain and were less comfortable at 48 vs.24 hours. The LB group demonstrated less severe pain than PB at 48 hours, and exhibited higher global health score (GHS) than PB and CG group at 48 and 72 hours. The overall correlation between GHS and ObsQoR-11 was 0.57 and 0.69

at 24 and 48 hours, respectively, and highest for the LB group (0.70 and 0.72, respectively) and lowest for the PB group (0.27 and 0.31, respectively).

#### **Conclusion:**

Although no statistically significant differences in opioid consumption among the groups, our study suggests that TAP blocks with LB enhanced important areas addressed by the OBSQOR-11. LB decreased pain scores, and contributed to key areas related to self-care, feeling in control, and GHS, all important for early recovery and mother's ability to care of her newborn. More research is needed to assess the importance of OBSQOR-11 beyond 24 hours after delivery.

Anakmeteeprugsa(TAP block abstract).pdf

#### Second-Line Uterotonics in Postpartum Hemorrhage: A Multicenter, Double-Blind, Randomized Controlled Clinical Trial

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Paloma Toledo, MD, PPH - Miami University Miller School of Medicine

**Introduction**: Methylergonovine maleate and carboprost are second-line uterotonic medications commonly used to treat uterine atony, but comparative efficacy data are lacking.¹ This multicenter, double-blind, randomized controlled clinical trial evaluated the comparative efficacy of these medications for the treatment of uterine atony during cesarean delivery (CD).

**Methods:** After IRB approval and informed consent, parturients undergoing scheduled and unscheduled CD were enrolled at two tertiary academic centers. Exclusion criteria were contraindications to either medication, coagulopathy, refusal of blood transfusion, or emergent CD. After umbilical cord clamping, oxytocin was administered per standard institutional practice. Patients with ongoing atony as assessed by the operating obstetrician were randomized to receive either 0.2mg methylergonovine or 0.25mg carboprost. Uterine tone was measured using a validated numeric rating scale of 0 (no tone) to 10 (excellent tone) at 0, 5, and 10 min intervals after study drug administration.² If an additional uterotonic was required, the other study drug was administered. A blinded investigator assessed each subject at 2-4h and at 18-24h postpartum for potential side effects.

The primary outcome was uterine tone score 10 mins after study drug administration. Secondary outcomes included uterine tone score at 5 mins, intraoperative blood loss, change in serum hematocrit from admission to 24h postdelivery, blood transfusion, and adverse drug reactions. An *a priori* power analysis determined that enrollment of 100 patients would provide at least 80% power at a 2sided alpha level of 0.05 to detect a 1-point difference in mean uterine tone at 10 mins while allowing for protocol violations. Uterine tone at 10 and 5 mins were compared between groups with adjustment for baseline tone and trial site using the generalized estimating equations method with an identity link. Other outcomes were compared as described in the Table footnotes. Baseline tone and trial site adjusted comparisons were attempted for all outcomes; unadjusted comparisons were performed in instances of model instability. **Results:** From 2019-2022, 950 patients were enrolled and 100 were randomized. Excluding protocol deviations, 48 subjects receiving methylergonovine and 49 subjects receiving carboprost were analyzed. Baseline characteristics were comparable between the groups. No significant differences between methylergonovine and carboprost were detected with respect to uterine tone score at 10 mins (adjusted difference in means [95% CI]: -0.1 [-0.8, 0.6]) or to any secondary outcomes (Table 1).

**Discussion:** This multicenter trial demonstrated no difference in uterine tone score at 10 mins after methylergonovine or carboprost. These results suggest equivalent efficacy of the two uterotonic medications. Power was limited with respect to some secondary endpoints.

Table 1 Uterotonics SOAP Abstract.pdf

# General Anesthesia for Cesarean Birth and its Association with Race: A Retrospective Cohort Study

Presenting Author: Ilhan Eli, MD
Presenting Author's Institution: Duke University Medical Center
Co-Authors: Jennifer E. Dominguez, MD, MHS - Duke University Medical Center
Andrew Padilla, n/a - Duke University School of Medicine

**Background:** Neuraxial anesthesia is the anesthetic technique of choice for cesarean delivery(CD). It avoids many of the complications associated with general anesthesia (GA) including difficult intubation, awareness, placental transfer of drugs to the fetus, and postpartum depression. Furthermore, neuraxial techniques that include neuraxial morphine are associated with improved postoperative analgesia compared to GA. Therefore, neuraxial anesthesia is recommended by the Society for Obstetric Anesthesia and Perinatology (SOAP);a GA rate < 5% is a Center of Excellence benchmark criterion. Previous studies suggested racial and ethnic disparities in rates of GA for CD (1,2). The causes of this disparity are likely multifactorial and have not been well investigated. We therefore performed this retrospective single center study to assess if racial disparities in the use of GA exist in our practice. We also investigated the indications for GA use at our institution.

**Methods:** We conducted a retrospective review using The Multicenter Perioperative Outcomes Group (MPOG) database and institution electronic medical record to identify women who underwent CD under GA during delivery admissions from 2019-2022. We extracted data about age, height, weight, insurance, gravidity, parity, gestational age, race, anesthesia provider, indication for cesarean, urgency, time of day, and weekend or weekday. Indications for GA were identified including contraindication to neuraxial, urgency that precluded placement of de novo neuraxial or activation of existing labor epidural, unsuccessful placement of neuraxial, and failed neuraxial resulting in GA. We extracted data about the MPOG GA-01-OB metric (GA during cesarean deliveries) and the MPOG GA-02-OB metric (GA after neuraxial in cesarean deliveries). Chi-square test was used to compare GA rates between Black and White patients.

**Results:** We identified 6,768 CDs among patients with the following racial demographics: 2,287 Black; 2,698 White; 880 unknown; and 903 other races. Of these, 345 patients (5.4%) received GA. Black patients had a significantly higher GA rate compared to White patients (7% vs. 4.5%, p =0.0002). Interestingly, 2.5% of the total cohort received GA after administration of neuraxial anesthesia. There were no significant differences between Black and White patients in the rates of GA following neuraxial (2.9% vs. 2.3%, p = 0.1). Indications for general anesthesia among a subset of Black and White patients are displayed in the table.

**Conclusion:** We found higher rates of GA for CD among Black patients when compared to White patients. This was not the case, however, among women who had a

prior neuraxial anesthetic. The reasons for this disparity are not clear. Review of medical records is ongoing to understand the indications for GA in this cohort and the reasons for such a disparity. Complete data will be presented at the meeting.

SOAP GA Indications Table.pdf

# Baseline Parameters for Quantra® in Healthy Pregnant Women Undergoing Elective Cesarean Delivery and Comparison to Standard Laboratory Values

Presenting Author: Suthawan Anakmeteeprugsa, MD
Presenting Author's Institution: Department of Anesthesiology, Yale School of Medicine - New Haven, Connecticut
Co-Authors: Antonio Gonzalez-Fiol, MD - Yale School of Medicine
Hung-Mo Lin, ScD - Yale School of Medicine

#### Background:

Postpartum hemorrhage (PPH) remains a leading, yet preventable cause of maternal morbidity and mortality worldwide. Hypofibrinogenemia (< 2g/L) has been shown to be the earliest and best predictor of severe hemorrhage (e.g.need for > 4 units of blood, hysterectomy) with a 100% positive predictive value.¹ Hence the emphasis on early recognition and treatment of hypofibrinogenemia. The slow turnaround of Clauss fibrinogen makes this laboratory inadequate for this task.¹ Quantra® is a novel point-of-care device, which has been designed for automated, rapid, bedside monitoring of hemostasis. It is based on Sonic Estimation of Elasticity via Resonance (SEER) sonorheometry to measure clot time and clot stiffness². The aim of this study was to evaluate the baseline coagulation measures in healthy pregnant women from Quantra® and their correlations to conventional laboratory tests.

#### Methods:

After IRB approval, healthy parturients scheduled for cesarean delivery were approached for this prospective observational study. Two blood samples were obtained, one for analysis by Quantra® and the second for laboratory coagulation tests (PTT, PT, INR, fibrinogen, and platelet count). Demographic data, Quantra® parameters, time of blood draw and time at which fibrinogen were recorded. The parameters were reported as mean ±SD and the time variables were reported as median [IQR]. The correlation between results from Quantra® and conventional coagulation tests was calculated using partial Pearson correlation which adjusted for age, BMI, race, and ethnicity.

#### **Results:**

The study included 85 patients. Demographic data and Quantra baseline parameters were summarized in Table 1. The Quantra® Fibrinogen Clot Stiffness (QFCS), Clotting Time (QCT) and Platelet Clotting stiffness (QPCS) showed a moderately strong correlation to fibrinogen level (r=0.67), and moderate correlation to PTT (r=0.32) and platelet level (r=0.42), respectively. The median [IQR] for obtaining fibrinogen results by Quantra® and Clauss fibrinogen essay were 21 [19, 29] and 50 [43, 63] minutes, respectively. Fibrinogen levels were available 29 [18, 42] minutes sooner with Quantra® when compared with laboratory results, and if we did not account for blood sample Quantra® handling, it will be 37 [31, 52] minutes sooner.

#### **Conclusion:**

Quantra® is a useful point-of-care monitoring device that rapidly provides a measure of the coagulation status in pregnant women. The correlation between Quantra® FCS and fibrinogen level is comparable to that previously reported from other point of care devices. This device can provide a quick estimate of plasma fibrinogen levels.¹ The time of Quantra® results can be considerably reduced if the device is located bedside, as demonstrated by eliminating the handling time. More research is needed to determine its sensitivity and specificity for detecting hypofibrinogenemia.

Anakmeteeprugsa.pdf

# Racial and Ethnic Disparities in Parturients Undergoing General Anesthesia for Cesarean Delivery

Presenting Author: Caroline Thomas, MD Presenting Author's Institution: University of Chicago Medical Center Co-Authors: Jennifer M. Banayan, MD - Northwestern University Feinberg School of Medicine William Grobman, MD, MBA - The Ohio State University Wexner Medical Center Elizabeth Lange, MD - Emory University Feyce M. Peralta, MD, M.S. - Northwestern University Feinberg School of Medicine Yinhua Zhu, BS - Northwestern University

**Background:** General anesthesia for cesarean delivery is associated with increased maternal morbidity.¹ Black and Hispanic women have higher rates of general anesthesia use compared to non-Hispanic white women.² It is unknown whether risk factors for general anesthesia differ among individuals of minority race/ethnicity. The objectives of this study were to evaluate differences in general anesthesia use by race/ethnicity and evaluate the indication for the general anesthetic.

**Methods:** This was a retrospective analysis of 40,168 patients who underwent cesarean delivery at a single academic institution between 2007-2018. Electronic medical records for all patients undergoing cesarean delivery were queried for maternal demographics, including self-identified race/ethnicity, clinical characteristics, obstetric data, the indication for cesarean delivery, and the indication for general anesthesia. The primary outcome was the rate of general anesthesia use by race/ethnicity.

**Results:** Of all cesarean deliveries, 1,145 (2.9%) were performed under general anesthesia. The rates of general anesthesia by race/ethnicity were 2.4% for non-Hispanic White women, 3.4% for Hispanic women, 4.4% for Black women, 2.3% for Asian women, and 3.1% for all other women (P < 0.001). The indications for cesarean delivery and for general anesthesia were different by race/ethnicity (Table 1). The most common indication for cesarean delivery via general anesthesia was non-reassuring fetal status, which occurred more often in Black women. Among all women who required general anesthesia, the most common indication was failed neuraxial conversion. A total of 21,586 (53.7%) individuals were in labor at the time of their cesarean delivery, of whom 19,359 (89.7%) had neuraxial labor analgesia in situ. The rates of labor epidural analgesia use were lower among patients who received general anesthesia (60.9%) when compared to those who received neuraxial anesthesia for cesarean delivery (90.8%) (P< 0.0001). Among women who had an epidural catheter in situ, there were no racial/ethnic differences in the rates of general anesthesia use (P=0.08). Patients undergoing general anesthesia had higher rates of severe maternal morbidity, more ICU admissions, and higher rates of blood transfusion (P< 0.0001). Conclusions: Our results suggest that racial disparities in rates of general anesthesia for cesarean delivery continue to exist; however, for laboring women who had epidural

catheters in situ, there was not a disparity by race/ethnicity. The clinical decision making behind proceeding with general anesthesia is complex, and future studies should be designed such that clinical interventions can be identified that will reduce unnecessary general anesthetic use. Future studies also need to address whether disparities in care occur prior to neuraxial placement leading to higher rates of general anesthesia among minority women.

SOAP Table 1.pdf

# Atrial Fibrillation and Pregnancy: A Retrospective Cohort Study Using the Premier Database

Presenting Author: Liliane Ernst, MD Presenting Author's Institution: Duke University Medical Center Co-Authors: Joan E. Briller, MD, FACC, FASE, FAHA - University of Illinois Chicago Matthew Fuller, MS - Duke University Medical Center Ashraf S. Habib, MBBCh MSc MHSc FRCA - Duke University Medical Center Johanna Quist-Nelson, MD - UNC Chapel Hill Faisal Syed, MBChB - UNC

#### Introduction

Arrhythmias are a frequent manifestation of heart disease in pregnancy and a major cause of cardiovascular maternal morbidity and mortality.¹ Optimizing the management of arrhythmias in pregnancy is a potential target for improving maternal outcomes. Atrial fibrillation/atrial flutter (AF) are common arrhythmias in pregnant people. The prevalence of AF in pregnancy is increasing, yet there is a lack of data about trends in management of AF in pregnancy to guide care.^{2,3} The objective of the study was to describe characteristics of patients with AF who are pregnant and current trends in medical management in this population.

#### Method

A retrospective cohort study was conducted using the Premier inpatient administrative database. Patients who had vaginal or cesarean deliveries between 2016-2020 and a diagnosis of AF present on admission were included. Descriptive statistics were computed and reported as median [IQR] for continuous variables and n (%) for categorical variables.

#### Result

There were 4,789,673 deliveries during the defined timeframe. Of those, 1160 had a pre-existing diagnosis of AF (prevalence of 24/100,000). The median age of the cohort was 31 [27,35], and 24% of the cohort was age 35 or older. Mental health disorders (19%), chronic hypertension (19%), anemia (18%), asthma (16%), and gastrointestinal disease (15%) were the most common comorbidities in the cohort. Preterm delivery (24%) and preeclampsia (16%) were the most common adverse pregnancy outcomes in the cohort. The medical management in this cohort consisted of beta blockers (38.2%), anti-arrhythmic medications (11%), calcium channel blockers (10%), and digoxin (4%). In terms of antithrombotic management 9.6% of patients received aspirin, 20.8% received enoxaparin, 2.2% received warfarin, 8.5% heparin, 0.8% received apixaban, and 0.6% received rivaroxaban. 53% of the cohort had a vaginal delivery, 15% had intrapartum cesarean deliveries, and 33% had cesarean deliveries.

# **Discussion:**

Pregnant patients with AF had a significantly higher burden of comorbidities than patients without AF.⁴ As in non-pregnant patients, rate control was prioritized over rhythm control. Not all patients with AF received rate control, rhythm control, or antithrombotic medication highlighting potential gaps in care. Patients with AF should be managed at centers with a pregnancy heart team and may benefit from cardiology care during pregnancy to ensure adequate treatment of arrhythmias.

# Wide-area in vivo calcium imaging in mouse myometrium

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Acknowledgments: SOAP Young Investigator Award, BWH BIRCWH (K12) Program, Harvard Anesthesia T32 Program.

#### How are uterine contractions coordinated at organ scale?



Sheldon et al Sci Prog 2015, Bru-Mercier et al J Cell Mol Med 2012, Lammers WJ et al Am J Phsyiol Regul Integr Comp Physiol 2008

#### Intrauterine AAV injection of GCaMP8m for wide-area in vivo calcium imaging

GCaMP8m

Smooth Muscle Actin



ochbaum et al Nature Methods 2014



Smooth Muscle Actin DAPI GCaMP8m

# Analysis of calcium event origin, direction, and velocity after video segmentation and registration


## Receptivity is associated with high frequency, low amplitude, coordinated activity.



#### Developing Optical Approach for Organ-Scale Uterine Muscle Calcium Imaging



Comparison of Using Bupivacaine or Liposomal Bupivacaine or Methylprednisolone and Dexamethasone in Transversus Abdominis Plane (TAP) Block for Postoperative Cesarean Delivery Analgesia

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SOAP

#### Background

- Pain severity after cesarean section
  - Moderate to severe pain
- Transversus Abdominis Plane (TAP) block
  - Can provide analgesia up to 48 hours after C-section.
  - Adding additives can improve pain relief and increase the duration of the block.
- The aims of this double-blinded randomized controlled study
  - To compare opioid consumption up to 72 hours after C-section after TAP block using different additives to local anesthetic drugs
  - Secondary outcomes
  - Pain score
  - 11-item Obstetric Quality-of-Recovery score (ObsQoR-11)

Yale school of medicine



Yale school of medicine

#### Methods

- Parturients (N=112)
  - Inclusion criteria:
    - ✓ Age 18-45 years
       ✓ BMI < 45 kg/m²
    - ✓ Not diabetic
    - $\checkmark$  No contraindications to neuraxial anesthesia
    - $\checkmark$   $\,$  No allergies to medications used for pain
    - management
  - No history of anxiety ,recent or chronic opioid use
     Not anticipating needing NICU admission for baby,
  - Scheduled for cesarean sections
  - Under spinal anesthesia with intrathecal morphine

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#### Results

- No statistical difference in demographics was noted among the three groups.
- No opioid consumption group difference was noted.
- All 3 groups demonstrated a statistically significant increase in opioid consumption at 48 hours and a decrease at 72 hours.

Randomization	Mmeq 24 hr	Mmeq 48 hr	Mmeq 72 hr	Total Mmeq	Estimate (standard error) p-value		
groups	Mean (SD)	iviean (SD)	iviean (SD)	wean (SD)	48 vs. 24 hr	72 vs. 48 hr	
PB (n=24)	5.31 (8.12)	15.31 (22.93)	6.56 (14.72)	27.19 (36.19)	10.00 (4.11) p=0.02	-8.75 (3.46) p=0.01	
LB (n=48)	5.16 (10.16)	15.55 (23.18)	7.81 (14.51)	28.52 (39.78)	10.39 (2.90) p<0.001	-7.73 (2.44) p=0.002	
CG (n=40)	5.06 (9.67)	16.59 (18.15)	6.56 (11.16)	28.32 (29.47)	11.53 (3.18) p<0.001	-10.03 (2.68) p<0.001	

Abbreviations: PB = plain bupivacaine; LB = bupivacaine with liposomal bupivacaine; CG = bupivacaine with methylprednisolone and dexamethasone; Mmeq =Morphine milligram equivalents

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#### **Results: Secondary outcomes**









		Assessed for elig	ibility (n=4119)		
				Excluded (n=4019)	2012)
		Enrolli	ment	<ul> <li>→ Declined to participate (n=357)</li> </ul>	2012)
				<ul> <li>Enrolled but not randomized (no s uterotonic needed) (n=850)</li> </ul>	second line
		Randomize	d (n=100)		
Allocated	Allocated to carboprost (n=50)		Allocated to m	ethylergonovine (n=50)	
<ul> <li>Received allocated intervention (n=50)</li> </ul>		Received allocated intervention (n=49)			
Did not	<ul> <li>Did not receive allocated intervention (n=0)</li> </ul>		<ul> <li>Did not receive allocated intervention (uterine tone improved prior to drug administration) (n=1)</li> </ul>		
Primary	utcome not collecte	ed (n=1)	Primary outcom	me not collected (n=2)	
Analyzed (n=50) Complete case analysis (n=49)		Analyzed (n=50	0)		
		<ul> <li>Complete case analysis (n=48)</li> </ul>			
<ul> <li>Multiple imputation analysis (n=50)</li> </ul>		<ul> <li>Multiple imput</li> </ul>	ation analysis (n=50)		

#### Results

	Me	thylergonovine	Carboprost			
Primary outcome	n		n		Effect size (95% CI)	P value
Uterine tone, mean (SD) 10 minutes after administration	48	7.3 (1.7)	49	7.6 (2.1)	-0.1 (-0.8, 0.6)	0.755
Secondary outcomes						
Uterine tone, mean (SD)						
5 minutes after administration	49	6.4 (1.9)	50	6.8 (1.9)	-0.2 (-0.8, 0.4)	0.470
Intraoperative blood loss (mL), geometric mean (95% CI)	50	753 (637, 889)	50	708 (619, 810)	1.05 (0.85, 1.29)	0.635
Nausea, n (%)	49	13 (26.3)	49	14 (28.6)	0.89 (0.36, 2.19)	0.800
Diarrhea, n (%)	49	0	49	2 (4.1)	4.1 (-3.5, 14.3)	0.495
Dyspnea, n (%)	49	1 (2.0)	49	1 (2.0)	0 (-9.1, 9.1)	0.999
Chest pain, n (%)	49	0	49	0		

Brigham and Women's Hospital

Northwes Medicine

HARVARD Brigham and Women's Hospital

HARVARD





#### General Anesthesia Use For Cesarean Birth and Its Association with Race: A Retrospective Cohort Study



Ilhan Eli, MD; Andrew Padilla; Morgan Rosser, MS, Jennifer Dominguez, MD, MHS; Ashraf S. Habib, MBBCh MSc MHSc FRCA

### Š.

#### Background



- · Neuraxial anesthesia preferred for cesarean delivery
- Racial and ethnic disparities in GA rates for CD^{1,2}
- · Causes of disparity unknown and under investigated
- · Aim: examine racial disparities in GA rate indications for GA

Tangel V. J Clin Anesth 2020;65:109821 Butwick A. Anesth Analg 2016;122:472-9



#### **Conclusions and Future Direction**

- GA rate not different in the presence of labor epidural
- GA rate higher in patients with no labor epidural
  - Indications for GA not different

Ο

**1**4.3%

• Further analysis required for high GA rates in Black

## General Anesthesia Use For Cesarean Birth and Its Association with Race: A Retrospective Cohort Study



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**Duke** Anesthesiology



#### Baseline Parameters for Quantra® in Healthy Pregnant Women undergoing Elective Cesarean Delivery and Comparison to Standard Laboratory Values

Suthawan Anakmeteeprugsa, MD^{1,3}; Antonio Gonzalez-Fiol, MD¹; Hung-Mo Lin, ScD¹; Zili He, MS²; Aymen Alian, MD¹

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#### Yale school of medicine



#### Background

- Postpartum hemorrhage (PPH)
  - A leading, yet preventable cause of maternal morbidity and mortality worldwide
- Hypofibrinogenemia (< 2 g/L)</li>
  - The earliest predictor of severe hemorrhage
    Problem: The slow turnaround of Clauss fibrinogen
    - Problem. The slow turnaround
- Quantra®
- A point-of-care device for measuring clot time and clot stiffness
- The aims of this prospective observational study
- To evaluate the baseline coagulation measures in healthy pregnant women from Quantra® and their correlations to conventional laboratory tests

#### Yale school of medicine



# Laboratory Parameters Variables Mean ± SD Median [IOR] Platelets (10⁹/L) 228.38 ± 49.40 223 [197.0 - 256] Fibrinogen (mg/dL) 486.58 ± 83.20 468 [439 - 522] INR 0.91 ± 0.04 0.90 [0.88 - 0.93] PTT (sec) 25.79 ± 1.83 25 80 [24.50 - 27.00] PT (sec) 9.67 ± 0.46 9.70 [9.30 - 9.90] > The time for obtaining fibrinogen results (median [IQR]) Quantra* : 21 [19, 29] mins Clauss fibrinogen: 50 [43, 63] mins



Quantra® Parameters

Yale SCHOOL OF MEDICINE

Clauss fibringen: So (43, 63) mins
 Clauss fibringen: So (43, 63) mins
 29 [18, 42] mins sooner with Quantra®
 By eliminating Quantra® handling time, results can be obtained 37 [31, 52] mins sooner with Quantra®.

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Results



#### Results

- The correlations
- . The Quantra® Fibrinogen Clot Stiffness (QFCS) showed
- Strong correlation to fibrinogen level (r=0.67). • The Quantra® Platelet Clot stiffness (QPCS) showed
- Moderate correlation to platelet level (r=0.42).
- The Quantra® Clotting Time (QCT) showed
- Weak correlation to PTT (r=0.32).







Racial and Ethnic Disparities in Parturients Undergoing General Anesthesia for Cesarean Delivery

> Caroline L. Thomas, MD Jennifer M. Banayan, MD Elizabeth M. S. Lange, MD Barbara M. Scavone, MD William A. Grobman, MD, MBA Yinhua Zhu, BS Feyce M. Peralta, MD, MS Paloma Toledo, MD



#### General Anesthesia for Cesarean Delivery



CHICAGO Medicine

Hawkins JL. Obstet Gynecol 2011; 117(1): 69-74. Lange EMS. Semin Perinatol 2017: 41(5): 293-8.

#### Methods

CHICAGO Medicine

• Electronic medical record

• Exclusion: Perimortem cesarean delivery

• Retrospective cross-sectional analysis from single center

• Inclusion: All cesarean deliveries between 2007 and 2018

• Primary outcome: Rate of general anesthesia use by race/ethnicity

#### Patient Demographics and Primary Outcome

General anesthesia (n= 1145) 32 (28-36) (n= 39,023) 33 (30-37) 0.0001 • Patients were märe likely 22 bave general anesthesia if they had pst ligst surance 4,225 (11%) 194 (17% 61 (5%) 154 (14% General anesthesia rates differed by anace/ethnicity Except for http://www.assindex.lig/m/) 30.3 (27,3-34.4) 29.8 (26.6-34,5), 0.02
 Except for http://apartume.poatients.ww/.epiduratin situ ,382 0.36 0.07 <0.001

CHICAGO Northweste

#### Indications for General Anesthesia and Cesarean Delivery (%) Bleeding/maternal herodocomplete Abruption Contraindication to labor White Scheduled repeat and/oiHighpipina



20 30 40

CHICAGO Northwestern 0 10

#### Conclusions

- Higher rate of general anesthesia in Black patients
- Indications for general anesthesia differed by race/ethnicity
- There was no disparity in general anesthesia use for patients needing intrapartum cesarean delivery with an epidural catheter in situ

CHICAGO Medicine

50

Racial and Ethnic Disparities in Parturients Undergoing CHICAGO General Anesthesia for Cesarean Delivery Why do minorities have higher rates of general anesthesia for cesarean delivery?

Patient characteristics Indication for cesarean delivery Outcomes Indication for general anesthesia		GA rate: • non-Hispanic White: 2.4% • Hispanic: 3.4% • Black: 4.4%		Cesarean indication ↑ Rates in minorities for: • Deteriorating fetal status • Deteriorating maternal status P=0.04	
Retrospective, cross-see analysis of 40,168 cesar	ctional, single-center rean deliveries	GA out 个 SMI 个 ICU 个 Trai	tcomes: M J admission nsfusion P<0.0001	<u>GA indication</u> ↑ Rates in minorities for: • Deteriorating fetal status No difference in rates of failed neuraxial P=0.02	
Rates of GA for Intra No epidural Epidural in situ P<0.0001 0% 5% 107	29%           %           15%         20%         30%         35%		No disparit patients w	ty in rates of GA for ith labor epidural _{Peace}	



#### Atrial Fibrillation and Pregnancy: A Retrospective Cohort Study Using the Premier Database

Liliane Ernst MD ¹, Matthew Fuller MSc ¹, Johanna Quist-Nelson MD ², Faisal F Syed MBChB², Joan Briller MD ³, Ashraf Habib MBBCh MSc MHSc FRCA ¹, Marie-Louise Meng MD ¹

U		COLLEGE OF MEDICINE
	Disclosures: ASH has received research funding from Pacina Biosciences, Inc. and Heron Therapeutics, Inc.; consulting fees from Heron Therapeutics, Inc.; Trevent Inc. and Veters Inc.	
		<b>Duke</b> Anesthesic



**Results** 





**Results** 



**Duke** Anesthesiology



Under Anesthesiology

## Treatment of Post Cesarean Delivery Lower Segment Incision Pain with Topical 5% Lidocaine Ointment: A Clinical Audit

Presenting Author: Luc Saulnier, BA (Hons.), MA
Presenting Author's Institution: BC Women's Hospital and Health Centre - Vancouver, British Columbia
Co-Authors: Susan Bright, MD FRCPC - BC Women's Hospital and Health Centre Anthony Chau, MD MMSc FRCPC - BC Women's Hospital and Health Centre

**Introduction:** Severe post cesarean delivery pain is associated with chronic pain, greater opioid use, delayed functional recovery, and postpartum depression.[1] In post-cesarean delivery patients complaining of burning incisional pain unresponsive to opioid analgesia, we have anecdotally observed a decrease in pain scores following use of topical 5% lidocaine ointment. We aimed to evaluate the pain scores before and after the use of topical 5% lidocaine ointment in post-cesarean delivery patients.

**Methods:** This was a prospective clinical audit and institutional ethics approval was not required. At our institution, all patients undergoing scheduled or unscheduled cesarean delivery are assessed at 24h postoperatively as part of usual care. Patients who described their incisional pain as "burning and/or stinging and/or itching" were enrolled in this audit. Patients were then assessed using the Douleurs Neuropathiques 4 (DN4). A score of  $\geq$ 4 on the DN4 signals the presence of neuropathic pain.[2] Following this, a visual analog scale (VAS) pain score (0=no pain to 10=unbearable pain) was used to rate patients pre-treatment pain. Patients then had a ribbon of approximately 5g of 5% lidocaine ointment applied around the incision with a width of 5-6 cm and allowed to dry. At 1hr after ointment application, patients were asked to rate their pain with the same VAS score. The primary outcome was the difference in VAS scores before and after treatment analyzed by Wilcoxon signed-rank test. Secondary outcomes were the median DN4 scores and the individual frequency of patients describing their pain as burning, stinging or itching.

**Results:** 20 patients were included in this audit. There was a significant reduction in median VAS scores after lidocaine ointment treatment (6.75 vs. 3.00, p< 0.01). The median DN4 score was 4.00 (3.00-4.75 [2.00-6.00]). 19/20 (95%) patients reported burning pain, 9/20 (45%) reported stinging pain, and 3/20 (15%) reported itching pain.

**Discussion:** Topical 5% lidocaine ointment may be beneficial for patients with pain characteristics that are described as "burning, stinging, and itching", as this form of atypical pain was reduced by 56%. A majority of patients (75%) had a DN4 score of  $\geq$ 4, which may suggest a neuropathic component to their pain. The commonest lower segment incision pain characteristic was "burning" (95%). From this audit, a larger randomized control trial is warranted.



Figure 1. Pre-treatment and post-treatment VAS pain score for 5% lidocaine ointment

Pre-treatment VAS pain median: 6.75 (4.00-7.50 [2.00-9.00]); post-treatment VAS pain median: 3.00 (2.00-5.00 [1.00-8.00])

## Association of Heart Rate Variability with Preoperative Anxiety and Postoperative Pain after Scheduled Cesarean Delivery: A Prospective Observational Study

**Presenting Author:** Cyrus Bhiladvala, B.Sc **Presenting Author's Institution:** University of British Columbia **Co-Authors:** Sabina Dobrer, MA - BC Women's Hospital Charles H. Prior, FRCA MBChB - West Middlesex University Hospital

**Introduction:** Preoperative anxiety is a strong predictor of severe post-cesarean pain but is difficult to measure objectively due to interindividual and cultural differences in its expression.(1) Recently, anxiety and acute emotional stress have been found to be associated with reduced heart rate variability in the non-obstetric population.(2,3) Since changes in heart rate variability can be detected quickly and non-invasively, it may be useful in the obstetric population for predicting anxiety during the perioperative periods. We hypothesized that in obstetric patients scheduled for cesarean delivery, heart rate variability, measured using the Analgesia Nociception Index (ANI), has a significant association with preoperative anxiety.

**Methods:** After institutional ethics committee approval and informed consent, 80 healthy women scheduled for cesarean delivery under spinal anesthesia were recruited. All patients completed the three-item validated questionnaire previously used to predict postoperative pain which includes a measure of preoperative anxiety (VAS 0-100mm).(4) ANI electrodes were placed on the patient for at least 10 minutes in the preoperative waiting room. The electrodes were disconnected enroute to the operating room, and reconnected following successful spinal anesthesia until delivery. At 24h and 48h after surgery, all patients completed a VAS (0-100mm) pain scale for resting and evoked pain. Postoperative opioid consumption in morphine equivalents was recorded. The primary outcome was the association between the number of changes in ANI and preoperative anxiety score analyzed using Poisson regression, with sensitivity analyses performed at 4 thresholds of ANI changes (ANI >=10, 20, 30 or 40). Secondary outcomes included the association between the number of changes in ANI with postoperative pain scores and postoperative opioid consumption.

**Results:** A total of 72 patients completed the study protocol, 8 were excluded due to technical issues with the electrodes. The mean(SD) preoperative anxiety score was 21.7(4.3). There were no significant associations between changes in ANI score with preoperative anxiety score, postoperative pain scores or postoperative opioid consumption.

**Discussion:** In obstetric patients scheduled for cesarean delivery under spinal anesthesia, heart rate variability measured by ANI was not predictive of preoperative anxiety scores, postoperative pain scores or postoperative analgesic requirement.

#### **Quadratus Lumborum in Cesarean Section - QUALICS Trial**

Presenting Author: Cristian Arzola, MD Presenting Author's Institution: Department of Anesthesiology and Pain Medicine, Mount Sinai Hospital, University of Toronto - Toronto **Co-Authors:** Shirley Andrade Santos, MD PhD - Department of Anesthesiology and Pain Medicine, Mount Sinai Hospital, University of Toronto Joaquim Edson Vieira, n/a - University of Sao Paulo Rossana Francisco, n/a - University of Sao Paulo Fernando Nani, n/a - University of Sao Paulo Hermann dos Santos Fernandes, MD PhD - Department of Anesthesiology and Pain Medicine, Mount Sinai Hospital, University of Toronto - Toronto

**Background**: Postoperative pain after Cesarean section (CS) has significant impact in the mother and newborn, especially in the first postoperative day (POD-1). Currently, intrathecal morphine (ITM) is the standard for post CS analgesia, however not free from adverse effects. Peripheral regional blocks such as transversus abdominis plane block and quadratus lumborum block (QLB) have emerged as alternatives when ITM is not administered. However, current evidence is not definitive to state whether QLB has equivalent post CS analgesic effect to ITM. The objective of this study is to evaluate the post CS analgesic efficacy of QLB, in comparison with both ITM and ITM associated with QLB.

**Methods**: We conducted a randomized triple-blinded clinical trial including 57 term, healthy parturients scheduled to elective CS. Subjects were divided into three groups: ITM group (spinal morphine with no QLB); QLB group (QLB with no ITM); and QLB-ITM group (both QLB and ITM). The spinal anesthesia included 0.5% hyperbaric bupivacaine (12.5 mg), fentanyl (20 mcg), and morphine (80 mcg) (ITM and QLBITM groups) or placebo (0.4 ml of 0.9% NaCl) (QLB group). After skin closure and still under residual sensory block, an ultrasound-guided bilateral posterior QLB (ropivacaine 0.375%, 20 ml in each side) was performed in the QLB and QLBITM groups (figure 1). For patients in ITM group, only a mock ultrasound scanning was performed under the surgical drapes to mitigate patient bias. Primary outcomes: pain scores (0-100 at rest and movement) and opioid consumption [intravenous morphine (mg)] on POD-1. Secondary outcomes: nausea/vomiting, pruritus, urinary retention and persistent postoperative pain at 3 months. Statistical analyses considered one-way ANOVA (Bonferroni test), Chi-square and Fisher's exact test for comparing groups.

**Results**: Patients' characteristics [median (IQR)]: age 35 (11) years old; weight 78 (15) kg, height 160 (9) cm; BMI 31 (5), ASA 2; and gestational age 38 weeks. The overall sample pain scores [mean(SD)] at rest [12.5 (19)], at movement [43(27)], and opioid consumption [2.7(3.5)mg] showed no difference among groups. Also, no difference in nausea, vomiting and pruritus on POD-1 or persistent postoperative pain. QLB group

showed less incidence for urinary retention (ITM 7.02%; QLB 0%; QLBITM 1.75%, p=0.032).

**Conclusions**: QLB demonstrated no analgesic difference to ITM, and no added benefit when both are associated (QLBITM). Although QLB performed equivalent to ITM for post-CS analgesia, it provided the benefit of causing less urinary retention. QLB can be an alternative when ITM is not administered without compromising postoperative analgesia (CS under general anesthesia, allergy or contra-indication to spinal morphine). The recruitment and final sample size were limited by the COVID-19 pandemic. Larger trials exploring different outcomes are warranted.



Figure 1. Sonoanatomy and technique for posterior quadratus lumborum block (QLB).

## Effectiveness of Post-Cesarean Delivery Transversus Abdominis Plane Blocks on Postpartum Pain and Opioid Use Outcomes Among Mothers with Opioid Use Disorder

**Presenting Author:** Paul Rodriguez Jr., n/a **Presenting Author's Institution:** University of Pittsburgh School of Medicine **Co-Authors:** Catherine Bergeron, MD - UPMC - Magee Womens Hospital Grace Lim, MD, MS - University of Pittsburgh Elizabeth Parsons, n/a - University of Pittsburgh School of Medicine Barkha Patel, n/a - University of Pittsburgh

#### Background

Two prominent public health issues currently affect the United States: the opioid epidemic and poor peripartum maternal outcomes. However, these phenomena are not mutually exclusive. Opioid use disorder (OUD) is a complex comorbidity. Patients receiving medication for OUD (MOUD) have lower risk of overdose events. However, patients receiving opioid agonist therapy for OUD may have more complex pain after labor and delivery compared to those without OUD [1]. Transversus abdominis plane (TAP) blocks after cesarean delivery offer a targeted solution to the postpartum analgesic dilemma and were adopted by our group in 2020 as a routine treatment offering for any patient with complex pain, in accordance with treatment guidelines [2]. The purpose of this study was to explore the effect of post-cesarean TAP blocks in patients with OUD on postpartum pain scores, postpartum opioid dose, and postpartum length of stay.

#### Methods

In this IRB approved retrospective cohort study, patients with OUD treated with opioid agonist therapy (methadone or buprenorphine) who had a scheduled or unscheduled cesarean delivery performed at UPMC Magee from 2020-2022 were studied. Patients with OUD having cesarean delivery and receiving TAP were compared to those not receiving TAP. Inclusion criteria were cesarean delivery and receiving MOUD. Exclusion criteria were cases in which OUD could not be corroborated by the medical record, complicated surgery or hospital stay, and/or missing pain data. Outcomes included postpartum pain scores, postpartum opioid milligram morphine equivalents (MME), and postpartum length of stay. Predictor variables of interest were MOUD type (methadone vs buprenorphine), anesthesia type, postpartum analgesia components, and others (Table 1). Univariate linear regression assessed pain and opioid outcomes between TAP and no-TAP groups. A P< 0.05 was considered statistically significant.

#### Results

There were 172 cases included in final analysis, of which 36 (21%) received TAP. There were no significant differences in demographic characteristics between TAP and no-TAP groups. Univariate regression analysis (Table 1) showed that TAP was statistically

significantly associated with reduced length of stay, reduced maximum postoperative pain scores, and reduced total postpartum opioid MME (Table 1).

#### Conclusions

Among people treated with MOUD having cesarean delivery, abdominal wall blocks (TAP) may be associated with reduced postpartum length of stay, maximum postpartum pain score, or postpartum total opioid requirements. These results are limited by low sample size for patients receiving TAP. Future clinical and research directions will focus on increasing uptake of TAP for eligible patients. Such efforts will clarify the potential role of abdominal wall blocks for patients with OUD having cesarean delivery.

Rodriguez Table1.pdf

#### Buprenorphine vs. Methadone for Postpartum Pain and Opioid Use Outcomes Among Women with Opioid Use Disorder after Cesarean Delivery

Presenting Author: Catherine Bergeron, MD
Presenting Author's Institution: UPMC - Magee Womens Hospital - Pittsburgh, Pennsylvania
Co-Authors: Patricia L. Dalby, MD - University of Pittsburgh
Elizabeth Krans, MD, MS - University of Pittsburgh
Elizabeth Parsons, n/a - University of Pittsburgh School of Medicine
Barkha Patel, n/a - University of Pittsburgh
Paul Rodriguez, n/a - University of Pittsburgh

#### Intro

Buprenorphine and methadone are common medications for opioid use disorder (OUD) in pregnancy. Buprenorphine is a partial agonist with a high affinity to the mu-receptor, potentially increasing opioid needs and complex pain management after surgery. Data suggests people receiving methadone and buprenorphine have similar opioid needs for pain after cesarean delivery [1]. However, pain management disparities of medication for OUD (MOUD) persist [2]. We assessed whether parturients receiving buprenorphine MOUD after cesarean experience higher postoperative pain and opioid dose outcomes, compared to methadone MOUD.

#### Methods

Patients receiving buprenorphine and methadone MOUD who had cesarean delivery at our institution were identified (2018-2022). Patient, delivery, and anesthesia data were collected from medical records. Outcomes included total supplemental milligram morphine equivalents (MME) for pain, and pain scores. Univariable linear regression assessed the relationship between MOUD type and postpartum total MME and maximum pain scores, as well as to explore relationships between postpartum pain and various predictor variables in patients with OUD. Mann Whitney U test assessed the relationship between continued buprenorphine dosing inpatient, and postpartum MME. A P-value < 0.1 was evaluated for significance in purposeful selection of covariates [3].

#### Results

There were 177 patients in final analysis: 59 (33%) received methadone and 118 (67%) buprenorphine MOUD. Methadone was associated with more emergency caesareans (42, 71.2% methadone vs 63, 53.4% buprenorphine, P=0.02). Otherwise, baseline and characteristics were not different between groups.

Postpartum total MME and pain scores were similar between methadone and buprenorphine groups. Univariable regression showed several factors associated with postpartum total MME and pain (Table 1).

All patients receiving methadone MOUD continued it postoperatively (n=59, 100%). Buprenorphine MOUD dosing varied: 25 (29%) received no MOUD during hospitalization; 39 (45%) continued their usual daily regimen as inpatients; 23 (26%) received a least one buprenorphine dose but did not take their usual daily regimens while inpatients. Those receiving their usually daily or at least one dose of buprenorphine during their hospital stay, had significantly lower total MME compared to those who did not receive any buprenorphine (mean total MME 71.0 vs 247.8, P< 0.001).

#### Conclusion

Buprenorphine for MOUD treatment is not associated with increased pain or opioid requirement after a cesarean compared to methadone. Continuing buprenorphine postoperatively appears to reduce total additional postoperative opioid requirements. These findings add knowledge about pain management in people with OUD and suggest a potential need to standardize buprenorphine MOUD after cesarean delivery.

Table1 MOUD Bergeron.pdf

Twenty-four-hour Postoperative Oral Morphine Equivalent Consumption Following Cesarean Delivery Stratified by Race: A Single-Center Retrospective Observational Study

Presenting Author: Michael Campos, B.S.
Presenting Author's Institution: Texas A&M Health Science Center College of Medicine
Co-Authors: Courtney Shaver, M.S. - Baylor Scott & White Research Institute
Joanna Stacey, MD - Baylor Scott & White Medical Center-Temple

**INTRODUCTION:** Postoperative analgesia for cesarean delivery (CD) is provided by a combination of medications that includes neuraxial morphine, intravenous opioids, intravenous and oral non-steroidal anti-inflammatory drugs, acetaminophen, and peripheral nerve blocks. Our primary aim was to determine if there were racial disparities in postoperative oral morphine equivalent (OME) consumption for the first 24 postoperative hours following CD. Our secondary aim was to determine if there were racial disparities in the number of documented pain scores for the first 24 postoperative hours following CD.

**METHODS**: Our hospital's institutional review board waived informed consent for this study. We searched our electronic medical record (EMR) for patients who had a CD between February 1, 2020 and January 31, 2022, did not receive a neuraxial labor analgesic, received 0.2 mg intrathecal preservative free morphine at the time of CD, and self-identified as Black or African-American, Hispanic, or White or Caucasian. We randomized 50 patients from Black or African American, Hispanic, and White or Caucasian cohorts for the period of February 1, 2020 to January 31, 2021 and February 1, 2021 to January 31, 2022 to arrive at 300 patients. A study investigator entered demographic and clinical variables including data on anesthetic technique, oral morphine equivalent consumption, and pain scores from the EMR into REDCap. The White or Caucasian race was considered the reference race for our analysis.

**RESULTS**: For the period of February 1, 2020 to January 31, 2021, 88, 87, and 213 patients were eligible for randomization that were Black or African American, Hispanic, and White or Caucasian, respectively. For the period of February 1, 2021 to January 31, 2022, 75, 112, and 194 patients were eligible for randomization that were Black or African American, Hispanic, and White or Caucasian, respectively. Demographic and clinical data for the cohorts are presented in Table 1. We did not find a clinically or statistically significant difference in OME consumption or the number of documented pain scores in the first 24 postoperative hours between White and Caucasian patients and Black or African American patients or between White or Caucasian patients and Hispanic patients.

**CONCLUSIONS**: We did not detect racial disparities in postoperative analgesia for cesarean delivery with our primary outcome of OME consumption and our secondary outcome of number of pain scores documented for the first 24 postoperative hours following CD.

Table 1.pdf

Comparison of 100 mcg vs. 150 mcg Intrathecal Morphine Doses for Post Cesarean Delivery Analgesia with Regards to Efficacy and Opioid-related Side Effects: A Retrospective Cohort Study

Presenting Author: Ilhan Eli, MD Presenting Author's Institution: Duke University Medical Center Co-Authors: Jennifer E. Dominguez, MD, MHS - Duke University Medical Center Matthew Fuller, MS - Duke University Medical Center Trung Q. Pham, MD - Saint Francis Hospital Tulsa Samantha Rubright, MD - University of Utah

**Background:** Intrathecal morphine (ITM) is now considered the gold standard for postcesarean analgesia. However, ITM can result in side effects such as pruritus, nausea, and vomiting. The ideal dose that provides optimal postop analgesia with the lowest incidence of side effects is not clear. Previous meta-analysis suggested that doses of 50-100 mcg ITM were associated with less opioid side effects but with similar opioid consumption to doses of >100-250 mcg. Currently, we use a standardized postop analgesic regimen that includes: neuraxial morphine; NSAIDs; acetaminophen; and oral oxycodone for rescue. Patients receiving a spinal or combined spinal epidural anesthetic, our protocol previously included the use of 150 mcg ITM, but was reduced in January 2022 to 100 mcg without any other changes in our analgesic regimen. This retrospective study was performed to compare analgesia and side effects between 100 and 150 mcg doses of ITM. We hypothesized that 100 mcg ITM will provide comparable analgesia to the 150 mcg dose with less opioid related side effects.

**Methods:** We searched the EMR for patients over the age of 18 that underwent cesarean delivery with a neuraxial technique including ITM from January2020-October2022. We excluded patients with chronic pain, received truncal blocks with liposomal bupivacaine, and doses of ITM other than the two doses of interest. We collected data about patient demographics, OB history, need for and dose of rescue opioids, and need for antipruritic and antiemetics at 24,48 and72hrs. Opioid use was compared using zero-inflated negative binomial models and antiemetic and antipruritic use was compared using logistic regression models. Models were adjusted for known clinical risk factors including age, race, history of anxiety, history of depression, repeat vs. primary cesarean delivery, and surgical priority.

**Results:** Total of 3,293 patients were included in the main analysis. Patient demographics, OB details and the unadjusted outcomes are displayed in the Table. In the adjusted analysis, there was no difference between the groups in the need for rescue opioids at 24h(OR, 0.94 [95% CI, 0.81, 1.10]; P=0.451), Interestingly, women who received the 100 mcg dose were more likely to not require rescue opioids within 48h(OR, 1.31 [95% CI, 1.10, 1.56]; P=0.003) or 72h(OR, 1.37 [95% CI, 1.15, 1.65]; P=0.001). There was also no difference between the groups in the dose of rescue

opioids received at 24h and 48h, though the 100 mcg group required less opioids at the 72h timepoint(OR, 0.91 [95% CI, 0.85, 0.97]; P=0.004). At all 3 timepoints, the 100 mcg group was less likely to require rescue antiemetics(OR at 72h, 0.60 [95% CI, 0.52, 0.71]; P< 0.001) or antipruritic(OR at 72h, 0.39 [95% CI, 0.31, 0.50]; P< 0.001).

**Conclusion:** The 100 mcg ITM dose was associated with less need for rescue opioids, antiemetics, and antipruritic and lower opioid consumption over 72h compared with the 150 mcg ITM dose.

SOAP Table for IT Morphine Study.pdf

#### Low Dose Intrathecal Morphine is Inferior for Post-Cesarean Analgesia

Presenting Author: Andrew Sprowell, MD Presenting Author's Institution: Beth Israel Deaconess Medical Center Co-Authors: Maria Borrelli, DO - Beth Israel Deaconess Medical Center Mohammed Idris, MD - John R. Oishei Children's Hospital John J. Kowalczyk, MD - Beth Israel Deaconess Medical Center Yunping Li, MD - Beth Israel Deaconess Medical Center Anna Moldysz, MD - University of Iowa Hospitals and Clinics

BACKGROUND: Intrathecal morphine (ITM) is the gold-standard for pain control after cesarean delivery. Prior studies assessing quality of analgesia after varying doses of ITM^{1,2} have not used an Enhanced Recovery After Cesarean (ERAC) protocol. We hypothesized that with optimized ERAC perioperative management, lower doses (50mcg and 150mcg) of ITM would provide non-inferior duration of analgesia compared to a higher dose (250mcg).

METHODS: We studied ASA 2 women undergoing scheduled cesarean delivery under spinal anesthesia. Randomization and drug preparation was performed by the research pharmacy to ensure blinding. Subjects were assigned to receive either 50, 150, or 250mcg of preservative-free ITM injected with 11.25mg hyperbaric bupivacaine and 25mcg fentanyl. Postoperatively, patients scored their pain using a Visual Analog Scale (VAS) at PACU arrival, 2 and 24 hrs, and the Obstetric Quality of Recovery Score (ObsQoR-11) questionnaire at 24 hrs. The primary outcome was time to first request for supplemental analgesia. Our initial protocol was designed to assess the first 24 hrs; however, to complete the protocol the observation timeframe was extended to 72 hrs. Secondary outcomes included ObsQoR-11, VAS pain, nausea, pruritus, side effects requiring treatment, and the need for rescue regional blocks. The primary outcome was analyzed using a non-inferiority design with a 4h non-inferiority border. Secondary outcomes were compared using the Kruskal-Wallis test with Dunn's test for pairwise comparisons, and the Bonferroni adjustment for multiple comparisons. Significance determined at  $p \le 0.05$ .

RESULTS: 72 patients completed the trial. There were no differences in demographic and obstetric characteristics between groups. Both 50mcg and 150mcg of ITM were inferior in duration of analgesia compared to 250mcg (24.5h [3.5-34.4] vs 29.4h [24.5-72] vs 32h [30.5-72]). More patients in the 50mcg group required supplemental opioid medications in the first 24 hours as compared to the 250mcg group, with no difference in pain medication use between the 150 and 250mcg groups. No differences in PONV were noted between groups. The 150mcg and 250mcg groups showed more pruritis than the 50mcg group at 2 and 24 hours. On the ObsQoR-11 (Fig1b), more patients in the 50mcg group endorsed severe pain, and fewer endorsed feeling comfortable, being able to mobilize independently, or being able to hold their baby unassisted. A notable finding in our study is that 86% of patients did not require supplemental opioids in the first 24 hrs, and 51% remained opioid-free at 72 hrs (Fig 1a).

CONCLUSION: In the setting of a multimodal ERAC protocol, lower doses (50 and 150mcg) are inferior to 250mcg when measuring time to first rescue analgesic. While 50mcg produced less pruritis, patients were more likely to remain uncomfortable. The quality of pain control and side effects with 150 and 250mcg were similar.

Figures 1a and 1b Morphine SOAP Abstract 2023.pdf

## Predictors of Postpartum Inpatient Opioid Requirement in Patients with Concern for Placenta Accreta Spectrum

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Mahyar Heydarpour, PhD - Brigham and Women's Hospital Department of Medicine/Harvard Medical School

Hope Y. Yu, MD - Brigham and Women's Hospital Department of Obstetrics and Gynecology

#### Introduction

The most effective postoperative analgesic regimen for patients with suspected placenta accreta spectrum (PAS) is unknown.¹ Compared to uncomplicated cesarean delivery (CD), PAS patients have variable anesthetic plans, greater surgical complexity, and longer operations.² Our aim was to identify antenatal and operative details correlating with increased postpartum analgesic requirements in patients undergoing CD for suspected PAS.

#### Methods

After IRB exemption, the 50 most recent patients at our institution who underwent CD for sonographic or clinical concern for PAS were identified. Demographic, obstetric, and anesthetic data were abstracted from the medical record. A blinded expert obstetrician evaluated third trimester ultrasounds (US) and operative notes. Patients were assigned a Placenta Accreta Index (PAI) score combining US and patient factors using a previously described scale.³ Univariate analyses were performed using the Wilcoxon test for categorical variables and a generalized linear model with log link for continuous variables, followed by a multivariate analysis of variables associated with total postpartum morphine milligram equivalents (MME).

#### Results

All 50 patients delivered between July 2021-December 2022. The mean gestational age was 36.6 weeks and mean number of prior CDs was 1.2. All patients received neuraxial anesthesia with morphine, 30 (60%) had intraoperative epidural dosing, 25 (50%) received sedation and 1 (4%) had conversion to general anesthesia. Of 23 (46%) who underwent hysterectomy, all but 1 had confirmed PAS on pathology. Of 27 non-hysterectomy patients, 1 had clinical PAS with placenta left in-situ and 4 had Stage 2 basal plate myometrial fibers suggestive of PAS.

All patients received postoperative acetaminophen and 49 (98%) received ketorolac followed by ibuprofen. One patient received a truncal block. Inpatient postpartum analgesic requirements ranged from 0 to 361.5 MME, with a median of 41.25 MME. Eighteen (36%) required no opioid, 6 of whom underwent hysterectomy. Six categorical variables were significantly associated with MME (Table). Both blood loss (b= +0.0002,P< 0.0001) and operating room time (b= +0.0032,P< 0.0001) had a significant positive relationship with MME, but PAI score did not (b = -0.0095,P=0.157). Only BMI  $\geq$ 40 retained significance after multivariate analysis (p = 0.0001).

#### Discussion

In this retrospective contemporary cohort of patients with antenatal PAS risk, there was substantial heterogeneity in postpartum opioid requirements, with only increased BMI impacting total MME after multivariate analysis. A larger sample size may reveal more correlations, but these findings point to the multifaceted experience of pain and encouragingly suggest that standard multimodal analgesia with neuraxial opioid, acetaminophen, and NSAIDs is largely effective for post-CD pain control irrespective of surgical complexity.

Pate PAS analgesia table.pdf

#### Postoperative Pain Following Open Intrauterine Repair of Fetal Myelomeningocele at a Single Institution: A Case Series

**Presenting Author:** Annastacia Woytash, DO **Presenting Author's Institution:** Vanderbilt University Medical Center **Co-Authors:** Kelly Bennett, MD - Vanderbilt University Medical Center Holly Ende, MD - Vanderbilt University Medical Center

Introduction: Myelomeningocele is the most common type of neural tube defect which affects approximately 3 per 10,000 live births per year in the United States and results in lifelong disability¹. Prior studies confirmed the association between intrauterine repair of fetal myelomeningocele and improved neonatal neurological outcomes². However, a consensus on the optimal analgesic regimen for postoperative maternal analgesia has not been established. In this case series, we aimed to describe the pain experience and postoperative analgesic course of women who underwent open myelomeningocele repair at a single institution over an 11 year period.

Methods: We performed a retrospective review of patients who underwent open intrauterine fetal myelomeningocele repair at our institution between March 2011 and March 2022. Patients were identified using an institutional registry (n = 89). Exclusion criteria included diagnosis of opioid use disorder and long term opioid use in the 6 months prior to surgery. Demographic data, pain scores, opioid consumption, treatment for opioid side effects, use of regional analgesia, and adjuvant pain medication administration were collected through manual chart review. Summary statistics were computed using IBM SPSS Version 27.0.1.

Results: Postoperative pain was managed with a combination of epidural analgesia, intravenous opioid patient controlled analgesia (PCA), IV and oral opioid medications, and other nonopioid medications. Epidural analgesia was continued for a mean duration of 22 hours postoperatively. Once patients were able to tolerate oral intake, PCA was transitioned to oral opioid and nonopioid medications. Median pain scores and opioid use were low in the initial 0-24 hours (median morphine milligram equivalents [MME] 0 [IQR 0,10]) and increased to a peak at 48-72 hours (median MME 26 [IQR 10,38]). In the first 7 postoperative days, patients reported a median pain score of 1 [IQR 0,2] and consumed a median of 112 MME [IQR 45,187]. The most common nonnarcotic analgesic used was acetaminophen (99% of patients, 7-day median total dose 6750mg [IQR 3600, 12025], followed by ketorolac (60% of patients, 7-day median 120mg [IQR 90,240]), ibuprofen (31% of patients, 7-day median 3000mg [IQR 1200,5400]), and gabapentin (15% of patients, 7-day median 4200mg [1400,4800]).

Discussion: Our results demonstrate acceptable reported maternal analgesia after open myelomeningocele repair when using a multimodal analgesic regimen consisting of neuraxial anesthesia, opioids, and nonnarcotic analgesics. Opioid consumption in the

first 7 days postoperatively is similar to that reported after other pelvic surgeries.³ Additional work is needed to understand optimal postoperative analgesic strategies for this important surgery.

Woytash, A SOAP Abstract Table 1.pdf

A Comparison of Postoperative Recovery Between Subjects Who Had Activation and Removal of Labor Epidural Catheter for Unscheduled Intrapartum Cesarean Delivery: A Prospective Survey-Based Study

Presenting Author: Alyson Win, B.S.

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**Introduction:** Anesthesia for intrapartum cesarean deliveries (CD) can be facilitated by administration of concentrated local anesthetic medication through an indwelling labor epidural catheter. Alternatively, an indwelling labor epidural catheter can be removed and a new neuraxial technique such as a combined spinal epidural (CSE) or single injection spinal (SSS) can be performed. The primary aim of our study was to compare postoperative recovery after CD between patients who had an activation of their labor epidural catheter and patients who had removal of their labor epidural catheter followed by a SSS or CSE technique. The secondary aim of our study was to compare 24-hour postoperative oral morphine equivalent (OME) consumption between the two cohorts.

**Methods:** Our hospital's institutional review board approved this study. We searched our electronic medical record for patients with an indwelling labor epidural who had an unscheduled intrapartum CD from July 1, 2022 to December 31, 2022. Subjects were eligible for inclusion if regional anesthesia was attempted, they were English speaking, if wound closure had taken place between 24 and 72 hours prior, and were 18 years of age or older. Informed consent was obtained at the bedside and the ObsQoR-10 survey¹ was administered. A study investigator entered data from the questionnaire into REDCap along with demographic and clinical data from the electronic medical record.

**Results:** Twenty-eight patients who had activation of their labor epidural catheter and 37 patients who had removal of their labor epidural catheter provided informed consent and completed the ObsQoR-10 survey. Demographic and clinical data for the two cohorts are displayed in Table 1.

**Discussion:** The mean ObsQoR-10 scores of the activated labor epidural cohort and the new neuraxial cohort did not have a clinically or statistically significant difference. The mean values of 24-hour OME consumption did have a potentially clinically significant difference of approximately 12 mg between the cohorts but was not statistically significant. A limitation of our study was that we might have been underpowered to detect a clinically meaningful difference in 24-hour OME consumption

between the cohorts. Another limitation of our study was that patients in the activated catheter cohort were more likely to have fetal distress as the indication for CD and had a shorter time from placement of a labor epidural catheter to entering the operating room.

Table.pdf

## When Does Laboring Pain Become Front of Mind: Timeline of Antenatal Care Concerns From Patients' Perspectives

#### **Presenting Author:** Pamela Huang, MD **Presenting Author's Institution:** University of California, San Francisco **Co-Authors:**

Kiana C. Nguyen - University of California, San Francisco Ronald B. George MD FRCPC - University of California, San Francisco Joanne Gras DO - University of California, San Francisco Christine Blauvelt MD - University of California, San Francisco Won Lee MD- University of California, San Francisco

#### Background:

In obstetric care, a critical piece of shared decision making and informed consent is effective and timely dialogue on risks, benefits, and appropriate expectations. Discussion on laboring pain management is an important component, both because it is a significant concern for women approaching delivery and because it is a potential source for either patient empowerment or a sense of dissatisfaction surrounding birth (1, 2). Prior research suggests that women often are interested in and prefer to have education about laboring pain management options – including neuraxial – during antepartum visits, but further data on optimal timing has never been elucidated (3). We hypothesized that pregnant patients only develop concerns for pain of childbirth in the latter part of their pregnancy, namely in their third trimester.

#### Methods:

This is the qualitative portion of a mixed-method study using semi-structured interviews with primiparous parturients at various gestational ages. An interview script was created and used for this study to ask about patients' predominant thoughts, worries, and hopes surrounding their pregnancies. Interviews were recorded, transcribed, and subjected to deductive thematic analysis. Recruitment goal for this qualitative portion of the mixed-method study is 15 patients, 5 in each trimester.

#### Results:

Our preliminary results include 5 primiparous parturients ranging from 25 to 33 years old and gestational age ranging from 24 to 36 weeks. Predominant topics of concern elucidated included maternal and fetal wellbeing, daily functioning, bodily changes, pregnancy discomforts, antenatal tests and milestones, laboring pains and management, birthing outcomes, postpartum recovery, breastfeeding, and knowledge and outside resources. Patients at all gestational ages expressed having concerns regarding pain of childbirth and most had made a preliminary decision on whether or not they desired labor epidural analgesia.

#### Conclusions:

It is important to capture the times at which parturients are most engaged and interested in learning about laboring epidurals to understand the resources available at that time and to ensure informed and shared decision making. We find that parturients in both second and third trimester expressed having concerns and had already formulated strong opinions about laboring pain management, suggesting a role for prenatal counseling and decision-making aids on neuraxial analgesia as early as the second trimester. Our study will further elucidate timing of labor pain concerns using longitudinal surveys in the quantitative phase of our mixed-method study, ultimately aiming to improve timing and implementation of prenatal counseling and decision aids for laboring analgesia.

Nguyen.pdf

## Abstract #: SUN-Case Reports and Research Abstracts 4- Room 2– General Anesthesia-01

Impact of COVID-19 pandemic on the use of video laryngoscopy versus direct laryngoscopy for tracheal intubation for cesarean delivery in a tertiary obstetric centre: a retrospective analysis

Presenting Author: Fabricio B. Zasso, MD,MHSc, MBA Presenting Author's Institution: University of Toronto - Toronto Co-Authors: Luz Bueno, MD, PhD - University of Toronto Jose A. C.A. Carvalho, MD PhD - Department of Anesthesiology and Pain Medicine, Mount Sinai Hospital, University of Toronto Shirley A. Santos, MD, PhD - University of Toronto Kong Eric You-Ten, MD, PhD - University of Toronto

**Introduction:** Airway management in obstetrical patients is often a subject of concern for providers due to the increased risk of failed intubation and critical events.¹ Video laryngoscopy is becoming more popular for airway management, especially in difficult airway scenarios. The Obstetrics Anaesthetists' Association and Difficult Airway Society guideline suggests that a video laryngoscope might be the best device for intubation in the obstetric population.² During the COVID-19 pandemic there was a strong recommendation by airway societies that video laryngoscopy should be the method of choice for tracheal intubation to reduce exposure to aerosols.³ In this study, we aimed to investigate if the COVID-19 pandemic impacted the choice of anesthesiologists to use video laryngoscopy or direct laryngoscopy for tracheal intubation in cesarean deliveries in a tertiary obstetric centre.

**Methods:** This study was a retrospective, single-centre study evaluating all cesarean deliveries performed under general anesthesia at Mount Sinai Hospital, Toronto, Canada. It was approved by the Hospital Research Ethics Board. The pre-COVID period was comprehended from January 2018 to February 2020, and the COVID period from March 2020 to March 2022. Data were obtained from the patient's electronic charts.

**Results:** 320 cesarean deliveries under general anesthesia were identified on medical records search. 30 cases were excluded due to a lack of airway data or not meeting the inclusion criteria. 290 cases were included in the analysis, 153 pre-COVID and 137 during COVID. In the pre-COVID period, video laryngoscopy was used as the first choice in 36 (23.5%) and direct laryngoscopy in 117 (76.5%) intubations. In the COVID period, video laryngoscopy was used as the first choice in 98 (71.5%) and direct laryngoscopy in 39 (28.5%) intubations. These results showed a significant change in the device choice for intubation in cesarean deliveries (p < 0.01).

**Conclusion:** Our study demonstrates that the COVID-19 pandemic caused a shift from using direct laryngoscopy to video laryngoscopy as the first choice for intubation in cesarean sections under general anesthesia in our institution.

## Abstract #: SUN-Case Reports and Research Abstracts 4- Room 2– General Anesthesia-02

## High Cesarean Section Rates are Not Always Related to High Post-Partum Hemorrhage Rates

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**Co-Authors:** Ingrid Browne, n/a - Department of Anesthesiology, National Maternity Hospital

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Marina C. Rizzo, n/a - Director of Anesthesiology, Hospital e Maternidade Santa Joana Michael Robson, n/a - Obstetrics Department, National Maternity Hospital

**Background:** Postpartum hemorrhage (PPH) is a major cause of maternal morbidity and mortality that has increased for reasons not fully clarified. Settings with high overall cesarean section (CS) rates are expected to have higher PPH rates since delivery by CS is considered a classic risk factor for PPH. The Ten Group Classification system (TGCS) categorizes women into 10 totally inclusive and mutually exclusive groups based on parity, previous CS, gestational age, number of fetuses, fetal presentation and pathway to delivery (spontaneous, induced or prelabor CS). The TGCS is recommended by WHO and FIGO to analyze CS rates and other outcomes, including PPH "on an intention to treat basis". However, most studies that assessed PPH using the TGCS were from high-income countries with relatively low CS rates.

**Objective:** To assess the rates of CS and PPH using the TGCS in a setting with a very high CS rate compared with a setting with lower CS rates.

**Methods**: This cross-sectional study included all electronic patient records of women who gave birth in 2020-2022 to infants  $\geq$  500g at a single private Brazilian tertiary maternity hospital (HMSJ). Records without information on Robson group, birth route or volume of blood loss were excluded. Blood loss was objectively measured (weighing drapes + laparotomy sponges + volume in suction canisters) up to women's discharge from the delivery unit. PPH was defined as blood loss  $\geq$  1000ml. We compared the rates of CS and PPH at HMSJ with those reported by the 2021 annual report of a large Irish maternity hospital (NMH).

**Results:** During the study period, there were 23,564 deliveries at HMSJ and 7694 at NMH. Although the overall rate of CS at HMSJ was almost three times higher than that of NMH (87.5% versus 31.3%), the overall rates of PPH were similar: 3.7% (range 2.8-18.0%) at HMSJ versus 4.0% (range 2.0-12.2%) at NMH (Table 1). In Group 1 (nulliparas, single cephalic, term, in spontaneous labor), CS rates were much higher at HMSJ than at NMH (64.5% x 10.4%) yet the rates of PPH were similar (4.3% x 3.9%, respectively).

The same occurred in Group 5 (multiparas with  $\geq$  1 CS, single, cephalic, term) where CS rates at HMSJ x NMH were 95.8% x 82.4%, and PPH rates were 2.8% x 2.7%, and in Group 8 (multiple pregnancies) where CS rates were 98.9% x 67.3%, and PPH rates of 12.7% x 12.2%. In Group 2 (nulliparas, single, cephalic, term, labor induced or prelabor CS), despite the much higher CS rate at the Brazilian than the Irish hospital (92.5% x 42.2%), the rate of PPH was actually lower at HMSJ than at NMH (3.1% x 6.6%).

**Conclusion:** Our findings suggest that settings with high CS rates (overall and in specific TGCS groups) do not necessarily have higher PPH rates than settings with lower CS rates. We look forward to further explore the association between CS rates and PPH rates by comparing our results with other maternity units.

Siaulys.M.M-CS-x-PPH-rates.pdf
## Abstract #: SUN-Case Reports and Research Abstracts 4- Room 2– General Anesthesia-03

#### Preoperative Fasting Times and Patient Experience for Elective Cesarean Delivery: Round 2 of a Quality Improvement Project Using the Plan-Do-Study-Act (PDSA) Method

**Presenting Author:** Angus Royal, MB BS FRCA **Presenting Author's Institution:** Imperial School of Anesthesia, BC Women's Hospital and Health Centre - London, England **Co-Authors:** Luc Saulnier, BA (Hons.), MA - BC Women's Hospital and Health Centre

**Introduction**: ERAS guidelines recommend women may eat a light meal up until 6 hours and be encouraged to drink fluids for up to 2 hours prior to elective cesarean delivery¹. In 2018, we found long mean fasting times for both solids (12.5 hours) and liquids (8.5 hours) in women undergoing elective cesarean delivery at our institution, and that overall maternal experience was poor with over 50% complaining of thirst and hunger. Based on these findings, a patient information leaflet was introduced in addition to verbal instructions given a day prior to the operation. Herein, we sought to re-evaluate the impact of this change on fasting times and patient experience.

**Methods**: This was a quality improvement study and ethics committee review was waived. Women scheduled for elective cesarean delivery at our institution between March to July 2022 were invited to complete a 13-item paper survey preoperatively to determine their experience of the fasting process. The primary outcome was the mean instructed vs. actual fasting times for solids and liquids analyzed using paired t-tests. Secondary outcomes included patient perception of preoperative fasting instructions, factors that influenced their fasting behavior, and patients' preference for fasting instructions.

**Results:** A total of 125 women were approached and surveyed with a 100% response rate. There was a significant difference between mean instructed vs actual fasting times for solids (8.8 hours vs 12.1 hours, p< 0.001) and liquids (3.7 hours vs 4.7 hours, p< 0.001). Approximately 25% of women believed that the actual fasting times were too long; however, only 82 (66%) understood the rationale for fasting. Surprisingly, only 8 women (6%) reported having received the patient information leaflet. 39 women (31%) stated that they opted for longer fasting times to fit around their sleep cycle and daily routines with respect to their scheduled time of surgery. 96 women (77%) stated they would prefer preoperative fasting instructions sent to them by e-mail.

**Conclusion:** There was an improvement in fasting times for liquids compared to 2018. However, many patients continued to have long fasting times for solids. Although this may be related to poor dissemination of the patient information leaflet, we also found the timing of the surgery and personal factors such as sleep/wake routines affected how long patients decided to fast beyond instructed times. Our next step is to involve better use of technology, such as electronic distribution of the patient information and improving patient education on the rationale for fasting.

# Abstract #: SUN-Case Reports and Research Abstracts 4- Room 2– General Anesthesia-04

## Incidence of General Anesthesia for Cesarean Delivery before and during the COVID-19 Pandemic at BC Women's Hospital: A Retrospective Clinical Audit

Presenting Author: Luc Saulnier, BA (Hons.), MA Presenting Author's Institution: BC Women's Hospital and Health Centre -Vancouver, British Columbia **Co-Authors:** Vit Gunka, MD FRCPC - BC Women's Hospital and Health Centre Simon Massey, MB BCh, MRCP, FRCA, FRCPC - BC Women's Hospital and Health Centre

Maisa Samiee, Undergraduate Student - University of British Columbia

**Introduction**: General anesthesia (GA) for Cesarean delivery (CD) is associated with significant maternal complications and poorer neonatal outcomes (1). In reaction to the COVID-19 pandemic, our institution increased our spinal anesthesia (SAB) 0.75% bupivacaine dose to minimize the rate of conversion to GA and to avoid aerosol generation with intubation. We aimed to compare annual incidences of GA before and during COVID at our institution, which has a CD rate of 35-38%.

**Methods**: Institutional ethics approval was not required for this clinical audit. We retrospectively analyzed data from all 94 GAs for CD between the April 01, 2018 to March 31, 2019 fiscal year (pre-COVID) and all 64 GAs for CD between the April 01, 2021 to March 31, 2022 fiscal year (intra-COVID). The primary outcome was the overall incidence of GA between pre-COVID and intra-COVID time periods. Secondary outcomes were the difference of incidence of GA for elective CD between pre-COVID and intra-COVID, the difference in incidence of all SAB to GA conversions for CD between pre-COVID and intra-COVID, and the difference in average dose of SAB 0.75% bupivacaine between pre-COVID and intra-COVID.

**Results**: The incidence of GA for all CD decreased from 3.9% in pre-COVID (94/2403) to 2.5% in intra-COVID (64/2535) periods. Incidence of GA for elective CDs decreased from 1.3% to 0.7% during this same time period and the conversion rate for all SAB to GA was reduced from 1.12% to 0.04%. SAB dose increased from 1.58 mL (11.85 mg) to 1.78 mL (13.35 mg) t(33)= -2.81, p= .008 [-.35, -.06].

**Discussion**: We observed that the incidence of GA for all CD in our institution before and during COVID pandemic was below the 5% SOAP benchmark metric for Center of Excellence certification. Furthermore, during COVID-19 we detected a 36% reduction of overall GA for CD, a 46% reduction of GA for elective CD, and a 96% reduction of SAB conversion to GA. We conclude that the increase of SAB bupivacaine dose may have contributed to a marked reduction of GA for all categories of CD during the COVID-19 pandemic.



Figure 1. Incidence of all GA for CD cases, elective CD cases, and cases with conversion to GA from SAB: 2018/2019 compared to 2021/2022

Figure 1. GA ratio for all CD cases - **2018/2019**: 94/2403; **2021/2022**: 64/2533 (36% decrease) GA ratio for elective CD cases - **2018/2019**: 12/893; **2021/2022**: 8/1100 (46% decrease) GA ratio for CD cases converted from SAB - **2018/2019**: 27/2403; **2021/2022**: 11/2533 (96% decrease) COE= Center of Excellence

# Abstract #: SUN-Case Reports and Research Abstracts 4- Room 2– General Anesthesia-05

Enhanced Induction and Recovery Using Total Intravenous General Anesthesia for Patients Undergoing Transvaginal Cervical Cerclage

**Presenting Author:** Tianyue Mi, PhD **Presenting Author's Institution:** Brigham and Women's Hospital **Co-Authors:** Danran Zhou, BS, RN - Brigham and Women's Hospital

#### Background

Transvaginal Cervical cerclage is an important procedure to prevent or treat cervical incompetence or insufficiency. The procedure usually lasts no more than 30 minutes and is traditionally performed under spinal anesthesia. With the increased demand for enhanced recovery, the application of deep sedation or intravenous general anesthesia (IVGA) has emerged. The purpose of this study is to review the cervical cerclage cases performed under different anesthesia methods.

#### Methods

The retrospective cohort study was based on electronic health records (EHR) data of 1,300 women who underwent transvaginal cerclage placement at a multi-center tertiary healthcare system between June 3, 2015 and January 27, 2023. Anesthesia types were categorized into total intravenous (TIVA) general and neuraxial. Linear regressions were employed to examine if anesthesia type predicted the duration of anesthesia induction period (from anesthesia start time to procedure start time) and the anesthesia recovery period (from anesthesia end to patient discharge). Age at procedure, race and ethnicity were controlled in the models.

### Results

Participants were racially/ethnically diverse (38.0% non-Hispanic White, 27.7% non-Hispanic Black, 20.9% Hispanic, 8.8% Asian, and 4.6% other race) with a mean age of 33.1 (SD=5.1) at the time of the cerclage procedure. The majority of participating women received neuraxial anesthesia (n = 1089, 83.8%) rather than TIVA general anesthesia (n = 127, 9.8%). Compared to women who had neuraxial anesthesia (Mean=27.1 minutes, SD=10.3), women who had TIVA general anesthesia (Mean=18.3 minutes, SD=8.0) experienced significantly shorter anesthesia induction duration (from anesthesia start to procedure start) ( $\beta$ =-.27, p< .001). Similar result was also found in terms of duration between anesthesia end and patient discharge ( $\beta$ =-.21, p< .001). Compared to women who had neuraxial anesthesia (Mean=298.6 minutes, SD=204.5), women who had TIVA general anesthesia experienced significantly shorter recovery duration from anesthesia end to discharge (Mean=162.1 minutes, SD=183.9).

### Discussion

Previous studies indicated that cervical vaginal cerclage is often performed under spinal anesthesia. Our results indicated that IVGA general approach in transvaginal cervical cerclage could be advantageous due to significantly reduced induction time and

recovery time. Therefore, parturients could benefit from quick return to home. This study implied that IVGA could be effective in performing cerclage operations with enhanced induction and recovery (EIR).

# Abstract #: SUN-Case Reports and Research Abstracts 4- Room 2– General Anesthesia-06

# Concordance of Anticipated Difficult Airway with Difficult Neuraxial Placement in the Obstetric Population: A Prospective Observational Study

Presenting Author: Diego Villela Franyutti, MD

**Presenting Author's Institution:** Brigham and Womens Hospital - Harvard Medical School, Massachusetts

**Co-Authors:** Kara G. Fields, MS - Brigham and Womens Hospital - Harvard Medical School

Samuel Justice, PhD - Brigham and Womens Hospital - Harvard Medical School

#### Background

The risk of difficult intubation in the obstetric population has been estimated to be as high as 1 in 49 (1), which has favored neuraxial labor analgesia and anesthesia. However, difficult and failed neuraxial techniques are not uncommon.(2) Whereas the airway and back of all parturients should be routinely examined, only the airway examination is commonly performed. A number of studies have determined predictors associated with an increased risk of having a difficult intubation(3) and difficulty with neuraxial placement.(4) We sought to determine if a relationship between the "difficult airway" and "difficult back" existed, and whether these predictors correlated to actual difficulty with neuraxial placement.

### Aims

- 1. To determine the concordance of predicted difficulty in airway management with predicted difficulty in neuraxial placement in the obstetric population.
- 2. To determine the concordance of predicted difficulty in airway management with actual difficulty with neuraxial placement in the obstetric population.

#### Methods

Predictors of difficult airway management and difficult neuraxial placement were prospectively assessed in patients presenting for labor and delivery. An independent coinvestigator collected data on the placement of neuraxial techniques in each parturient. Difficult placement was defined as requiring more than 10 minutes to insert, 3 or more attempts, requiring a second operator, replacement of the epidural catheter or resulting in patient discomfort at 30 minutes.

### Results

We collected data on 298 parturients prior and during neuraxial technique. A total of 29.3% (95% CI 23.6, 35.7) of patients with predicted difficult airway had a difficult epidural placement; 32.1% (95% CI 26.4, 38.5) of patients with a predicted difficult back had a difficult epidural placement (Table 1).

### Discussion

Our findings illustrate that predictors of a difficult airway are highly correlated with predictors of a "difficult back" and actual difficulty with neuraxial placement. Our results indicate that an airway examination may have relevance for predicting difficulty with neuraxial placement; moreover, it highlights that the parturient with both a "difficult airway-difficult back" may be more common than expected. For patients with predictors of a "difficult airway," obstetric anesthesia care teams should consider that the neuraxial placement may be difficult as well.

	Estimate (95% CI)
Concordance of Anticipated Difficult Airway with	<b>80.0</b> (74.1, 84.8)
Anticipated Difficult Back	
Concordance of Anticipated Difficult Back with	<b>76.8</b> (70.8, 81.8)
Anticipated Difficult Airway	
Concordance of Anticipated Difficult Airway with	<b>29.3</b> (23.6, 35.7)
Difficult Epidural placement	
Concordance of Anticipated Difficult Back with	<b>32.1</b> (26.4, 38.5)
Difficult Epidural placement	

# Abstract #: SUN-Case Reports and Research Abstracts 4- Room 2– General Anesthesia-07

# Rethinking Reversal: Quantitative Twitch Monitoring and Postoperative Pulmonary Complications in Fetal Surgery Patients

Presenting Author: Claire Naus, MD

**Presenting Author's Institution:** Texas Children's Hospital/Baylor College of Medicine **Co-Authors:** Rebecca Johnson, BA - Texas Children's Hospital/Baylor College of Medicine

David Mann, MD, DBe - Texas Children's Hospital/Baylor College of Medicine

<u>Introduction</u>: Postoperative pulmonary complications (PPCs) are well-known risks of fetal surgery, including fetal neural tube defect (NTD) repair. The most commonly implicated PPC is pulmonary edema, which is often attributed to the use of tocolytic medications, such as magnesium sulfate.¹ In our high-volume fetal center, we noted that despite a highly restrictive fluid management approach, more patients than would be expected had an oxygen requirement on postoperative day 1 (POD1). As a result, we broadened our differential for PPCs, which we defined as an oxygen requirement to keep O2 >94% on POD1.

After identifying atelectasis as a possible contributor to PPCs, we hypothesized that despite our use of qualitative neuromuscular blockade (NMB) monitoring, our patients may experience residual NMB (TOF ratio < 90%) given the known interactions between magnesium sulfate and NMB agents.² We designed a quality improvement project using quantitative NMB monitoring to evaluate the impact on PPCs.

<u>Methods</u>: After incorporating quantitative NMB monitoring into our protocol, we found that patients who received vecuronium per our usual protocol (0.1 mg/kg after recovery from succinylcholine and additional doses as indicated based on qualitative twitch monitoring) had residual NMB even after multiple attempts at reversal with both neostigmine and sugammadex. This led us to reduce our vecuronium dose (0.05 mg/kg after recovery from succinylcholine with no additional doses given); however, patients still had residual NMB despite multiple attempts at reversal. As a result of the significant residual NMB as demonstrated by quantitative twitch monitoring, we changed our protocol to avoid long-acting NMB administration after RSI with succinylcholine, using a remifentanil infusion during initial dissection and exteriorization/replacement of the uterus to preserve operating conditions.

<u>Results</u>: Prior to this change, 18 out of 51 (35%) patients who underwent fetal NTD repair required O2 on POD1. However, since this change, only 3 out of 19 (16%) patients required O2 on POD1, and, notably, one of these patients smoked 1 pack/day. Although the difference is not statistically significant, the data is trending toward improvement, and we will continue to monitor for statistical significance as we do additional cases according to the new protocol.

<u>Discussion</u>: Our findings suggest that fetal surgery patients are at particularly high risk of residual NMB when magnesium sulfate is used for tocolysis, even when quantitative NMB monitoring is used. We will continue to evaluate the impact of quantitative NMB monitoring in reducing the incidence of PPCs in patients who undergo fetal surgery.

SOAP Figure 2023.pdf

## Abstract #: SUN-Case Reports and Research Abstracts 4- Room 2– General Anesthesia-08

## Cesarean Section Under General Anesthesia: Incidence Rising Since Height of Covid Pandemic

Presenting Author: Taylor Leathers, MD
Presenting Author's Institution: University of Kansas Medical Center - Kansas City, Missouri
Co-Authors: Karishma Shah, BS - University of Kansas Medical Center
Grace Shih, MD - University of Kansas Medical Center

**Background**: A retrospective review at our institution revealed a 14.8% rate of cesarean sections (CS) under general anesthesia (GA) in 2019. In 2020, the height of the COVID-19 pandemic, the rate of CS under GA dropped to 4.3%, an overall decrease of 10.5%. The reason for this decrease was thought to be due to COVID-19 conditions and the avoidance of intubation to improve outcomes for patients with COVID-19 and reduce practitioner exposure¹. We continue to aim for CS under GA rate of < 5% to accomplish SOAP Center of Excellence designation. Here, we evaluated whether the incidence of CS under GA increased following the downtrend of COVID-19 incidence between October 2021 and March 2022.

**Methods**: IRB approval was waived for this QI project. A retrospective chart review was conducted of all parturients undergoing GA for CS from October 1, 2021 to March 31, 2022. Data were compared to previous historical trends from 2019 (pre-pandemic) and 2020 (beginning of pandemic). Data collected included: anesthesia and obstetric faculty, procedure urgency, fetal heart rate (FHR) tracing category, prior indication of FHR changes, pre-existing epidural status, and arterial cord gas values. Descriptive and comparative statistics were calculated.

**Results**: The total rate of CS under GA over our 6-month study period was 6.86% (24/350). 41.7% of CS under GA were due to emergent indication (10/24), 25% were due to neuraxial anesthesia contraindications (6/24), 16.7% were due to failed epidural (4/24), 8.3% were due to prolonged procedure requiring MTP and airway protection (2/24), 4.17% were due to patient refusal (1/24), and 4.17% were due to failed spinal (1/24). Arterial cord blood gas averages were pH 7.25, PaCO2 55.5, and base deficit 5.1. There were two incidences of emergent indications for CS with previous concerning FHT. However, one of these patients had a working labor epidural that was unable to be dosed to surgical analgesia for CS.

**Conclusion**: Our center's rate of CS under GA decreased by 10.5% at the beginning of the COVID-19 pandemic but has now risen by 2.56% as we have moved further out. While our rate rose slightly, it is still lower than that observed in 2019. This could be due to a lower concern for morbidity and mortality with induction of GA as well as lower concern for provider exposure to the virus. However, as we know, the administration of GA is riskier to the patient and fetus compared to neuraxial techniques. The more we

can emphasize early neuraxial anesthesia in labor, the more we will be able to avoid GA for emergent indications. Future directions include education for obstetric and anesthesiology services to continue to optimize neuraxial anesthesia and analgesia as well as identification of ethnic/racial disparities that may contribute to the rate of CS under GA.

CS under GA QI Chart.pdf

# Severe Neck, Interscapular, Upper Back, and Shoulder Pain During Labor Analgesia: Recognition and Management

Presenting Author: Rachel A. Achu-Lopes, MD Presenting Author's Institution: Brigham and Women's Hospital Co-Authors: Michaela K. Farber, MD, MS - Brigham and Women's Hospital Department of Anesthesiology Sagar Patel, MD - Brigham & Women's Hospital Noor Raheel, MBChB, MPH - Brigham and Women's Hospital Lawrence C. Tsen, MD - Brigham and Womens Hospital - Harvard Medical School

#### Background

Severe pain (SP) in the neck, interscapular region, upper back, and shoulders has been reported in women receiving epidural analgesia, with an incidence of 0.46%.¹ The etiology and optimal management of SP is unknown, yet it may negatively impact delivery outcomes and the birth experience.² Here we report a division-wide protocol for the identification and management of patients with SP.

#### Methods

Women receiving neuraxial techniques and programmed intermittent epidural bolus (PIEB) for maintenance of labor analgesia at a single tertiary center who developed SP were prospectively identified from October 22, 2022-January 17, 2023. A stepwise treatment protocol was concurrently initiated (Figure). Patient demographics and response to treatment were recorded.

### Results

Thirteen of 1091 patients (1.2%) reported SP in the 3-month period. Compliance with the protocol was 62% (8/13), with pain resolution occurring in 63% (5/8); one patient required the second line treatment, and another required the third line treatment. The initial median numeric pain score was 9/10 with a decrease to 3/10 after protocol initiation. In women not receiving the protocol, resolution occurred in 40.0% (2/5). Among all SP patients, pain distribution was interscapular (69.2%), neck (54%), and shoulder (54.0%), with bilateral upper extremity radiculopathy also reported in 15%. Pain was associated with patient controlled epidural analgesia (PCEA) boluses (62%) and physician administered boluses (46.2%). Average epidural volume and duration of infusion at pain onset was 147 mL and 8.6 h, respectively. The average patient body mass index was 32.5 kg/m². Patients delivered via cesarean delivery (CD; 54%), vaginal delivery (39.0%), and forceps assisted vaginal delivery (7.0%). Because of epidural associated SP pain, de novo spinal anesthesia was performed for 2/7 CD patients.

### Conclusion

In our preliminary cohort of parturients, the incidence of SP was higher than previously reported, was associated with a higher CD rate than our institutional CD rate (30%),

with the need for de novo spinal anesthesia despite having an epidural catheter in place. Our treatment plan offered an algorithm by which providers can assist parturients experiencing SP. Further studies identifying the patient and procedural risk factors, etiology and best management are warranted.

<u>Treatment Protocol for Severe Neck.Interscapular.Upper back and Shoulder Pain with</u> <u>Labor Analgesia 2.1.23.pdf</u>

# Pilot Study: Using Handheld Ultrasound for Epidural Placement in the Obese Laboring Patient

Presenting Author: Jasveen Chadha, MBBS
Presenting Author's Institution: University of Kentucky
Co-Authors: Greeshma Allareddy, MD - University of Kentucky
James Conwell, DO - University of Kentucky Department of Anesthesiology

#### Introduction

Epidural placement is usually achieved by palpating surface landmarks. This blind technique is more difficult in obese patients. Using conventional ultrasound for epidural blocks has been limited by bulkiness and poor imaging of bony structures. A pocket-size ultrasound addresses these limitations by providing 3D overlay for recognition of midline and intervertebral space using an AI algorithm¹.

#### Method

We performed a pilot prospective randomized study of full-term laboring women with BMI 35-59.9 who requested a labor epidural. 25 patients were randomized to palpation or ultrasound (US) groups with stratification into WHO Group II & III classes of obesity. All procedures were performed in the sitting position using LOR technique. A test dose was given, followed by 8-10cc bolus with 0.125% bupivacaine. Analgesia was maintained with PIEB and PCEA. Time taken for palpation or US performance and time from local anesthetic skin injection to removal of the Tuohy needle was recorded. The number of passes, redirections and interspaces attempted, Visual Analogue Scale pain scores just before and 30 minutes after epidural placement and any complications were recorded.

### Results

Of the 25 subjects, there were 4 dropouts. The average BMI overall was 41.7. This was a pilot study, and accordingly significant differences were not found between groups. We did see a trend of shorter preparation time for the palpation group vs the US group (113.9 vs 151.4 secs, p=0.07). There was a trend toward shorter placement time in the palpation vs US group (266 vs 338.5 secs, p=0.30). We found no difference in number of passes (1.3 for palpation, 1.6 for US, p = 0.42) and redirections (2.4 for palpation, 1.8 for US, p=0.51). There were 1 vs 3 subjects with additional interspaces attempted in the palpation vs US group (p=0.31). The VAS pain scores decreased in both groups after epidural placement, with the mean decrease slightly more in the palpation group vs 6 (54.5%) in palpation group with p=0.06 (Table 1). Our power calculation showed that to find a significant difference between US and palpation groups for time to epidural placement we need 38 subjects per group, for number of passes we need 44 subjects per group and for a difference in clinician bolus requirements, 16 subjects per group.

#### Conclusion

This pilot study was undertaken to determine how many patients should be enrolled to compare palpation and US techniques for epidural placement in obese parturient. While the trend we found was that palpation had a shorter preparation and placement time as well as less passes and redirections, there were less clinician boluses required in the US group. With the power calculation performed, we plan to do a larger definitive study comparing US and palpation for epidural placement in the obese.

Table 1. VAS I all Scoles and chincian bolds Requirements for 05 vs I alpation oroup	Table 1: VAS	S Pain Scores a	nd Clinician I	Bolus Reg	uirements	for US v	s Palpat	tion Groups
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	US Group (N=10)	Palpation Group (N=11)	p-value
Pain score before epidural [A]	7.6 (1.8)	8.5 (1.5)	0.23
Pain score after epidural [B]	1.0 (1.8)	0.5 (1.0)	0.44
Pain score improvement [A-B]	5.3 (3.2)	8.0 (1.5)	0.02
Clinician boluses needed	1 (10%)	6 (54.5%)	0.06

A Comparison of Number of Physician Administered Rescue Analgesia Boluses Between Patients Who Received Patient Controlled Epidural Analgesia and Programmed Intermittent Epidural Boluses

Presenting Author: Dylan Grote, B.S.

**Presenting Author's Institution:** Texas A&M Health Sciences Center College of Medicine

**Co-Authors:** Ryan Russell, MD - Baylor Scott & White Medical Center-Temple Courtney Shaver, M.S. - Baylor Scott & White Research Institute Cole Sorrels, B.S. - Texas A&M Health Science Center College of Medicine Jack Zeitz, B.S. - Texas A&M Health Science Center College of Medicine

**Introduction**: Two common modalities for maintenance of labor epidural analgesia are patient controlled epidural analgesia (PCEA) and programmed intermittent epidural bolus (PIEB) protocol. There is evidence to suggest that the latter allows for a superior distribution of analgesic throughout the epidural space that could lead to improved analgesia.¹ In August 2022, our hospital switched from PCEA to PIEB for labor epidural analgesia maintenance through the acquisition of new infusion devices. We hypothesized that patients who received PIEB would have a lower epidural catheter replacement rate and number of rescue analgesia doses administered compared to patients who received PCEA for labor epidural maintenance.

**Methods**: Our hospital's institutional review board waived informed consent for this study. We searched our electronic medical record for patients who delivered vaginally who received PCEA for labor analgesia maintenance at our hospital between Aug 1, 2021 and December 31, 2021, and patients who had PIEB for labor epidural analgesia maintenance between Aug 1, 2022 and December 31, 2022. A study investigator entered demographic and clinical data from our electronic medical record into REDCap.

**Results**: Seven hundred fifty-nine and 23 patients had PCEA and PIEB maintained labor epidural analgesia, respectively. Demographic and clinical data are presented in Table 1.

**Discussion**: Our abstract represents an incomplete data set. We estimate that approximately 53% of the data has been collected with 47% remaining. Extrapolating the results from our limited PIEB cohort, we predict a clinically and statistically significant difference in physician administered rescue analgesia boluses between the PCEA and PIEB cohorts. We were unable to perform bivariate analyses between the cohorts due to the limited data collection of the patients who received PIEB. Our remaining data collection strategy will adhere to our protocol established a priori and will include patients who delivered vaginally at our hospital through December 31, 2022.

Table 1.pdf

## Management and Outcomes of Obstetric Patients Who Decline Allogeneic Blood Transfusion

Presenting Author: Emmarie Myers, MD Presenting Author's Institution: Johns Hopkins University School of Medicine -Elkridge, Maryland Co-Authors: Janet Adegboye, MD - The Johns Hopkins Hospital, Department of Anesthesiology and Critical Care Medicine Jamie Murphy, MD - Johns Hopkins University School of Medicine Anjana Sekaran, MD - The Johns Hopkins Hospital Mellany A. Stanislaus, MD - The Johns Hopkins Hospital Ananda Thomas, BA - The Johns Hopkins Hospital, Department of Anesthesiology and Critical Care Medicine

**Background:** For the Jehovah's Witness parturient, the right to decline blood products should be honored but necessitates a multi-disciplinary effort to provide optimal care (1). This study describes management strategies and clinical outcomes in this population.

**Methods:** We conducted a retrospective chart review of obstetric patients at our institution presenting to Labor and Delivery from 2012-2022 and identified 88 patients (124 deliveries) who declined allogeneic blood transfusions. Information about comorbidities, delivery methods, maternal/fetal outcomes, and blood management techniques were analyzed.

**Results:** The median age of the patient sample was 30 years. Risk factors for postpartum hemorrhage (PPH), defined as blood loss greater than 1000 mL, included obesity (64%, median BMI of 33), labor augmentation with oxytocin (53%), hypertensive disorders of pregnancy (35%), diabetes (11%), and uterine overdistension from polyhydramnios, macrosomia, or twin gestation (cumulatively 10%). Of the 100 patients with prenatal anemia (81%), 53 were treated with oral iron, 16 with intravenous iron, and 12 with vitamin B12 or folate. Among the 124 deliveries, 79 (64%) were vaginal deliveries (VDs) and 45 (36%) were cesarean deliveries (CDs). The median blood loss was 300 mL for VDs and 800 mL for CDs. No VDs met criteria for PPH, however, 18 of the CDs (40%) did. All 124 patients received oxytocin. Additional peripartum strategies to control bleeding included second-line uterotonics (44%), intraoperative cell salvage transfusions (4%) and tranexamic acid (5%). From admission to discharge, the average hemoglobin decreased from 11.7 to 11.0 g/dL for VDs, and from 11.2 to 9.4 g/dL for CDs. The lowest nadir hemoglobin of the sample was 8.4 g/dL and 6.4 g/dL in the VD and CD cohorts, respectively. There were no unplanned hysterectomies or peripartum mortalities.

**Conclusion:** Our hospital's Bloodless Medicine program has optimally managed Jehovah's Witness obstetric patients for the past decade with no mortalities. Patient blood management techniques such as prenatal optimization with iron and vitamin B12/folate, utilization of second-line uterotonics, cell salvage, tranexamic acid, and careful monitoring of bleeding are crucial in managing obstetric bleeding while respecting the patient's choice to decline transfusion.

SOAP Abstract fig.pdf

# Incidence and Management of Post Dural Puncture Headache (PDPH) at the University of Washington Medical Center

**Presenting Author:** Emily Dinges, MD **Presenting Author's Institution:** UWMC **Co-Authors:** Kayla Cayton - University of Washington Medical School Shane Mandalia - University of Washington Medical School

#### Background

Post Dural Puncture Headache (PDPH) is a recognized frequent complication of neuraxial labor analgesia. After accidental dural puncture PDPH incidences with an epidural needle vary from 50-80%, and 0.5- 10% with a spinal needle. ¹ A therapeutic epidural blood patch (EBP) of 20ml blood (if tolerated) is the recommended treatment, while the severity of symptoms determines the ideal timing of the EBP.^{2,3} An internal audit of our institutional PDPH incidence and EBP practice is presented here.

#### Results

Over 19 months, 66 cases of PDPH were identified from 2339 performed neuraxial (Incidence 2.82%).

68% (n= 45) received an EBP during primary admission. The failure rate of the first EPB was 9% with 4 patients needing a second EBP, no third EBP were needed.

A CSE and SSS were initially attempted in 62, resp. 4 patients.

After a wet tap, 15 CSEs were converted to: 5 LEP, 6 IT catheters and 4 SSS. The average injected blood volume was 22.2ml (12-30ml) and for the repeat EBP 21.3ml (18-22.5ml).

The most initial blocks were placed at the L3-L4 level and 49% of EBP were performed at the same level, 22% a level lower and 29% a level higher.

A MRI was performed in one case due to severe back pain and bilateral sciatica following an EBP.

After the EBP, 78% (36/46) of women reported complete resolution and 17% (8/46) reported partial resolution. One patient had her initial blood patch performed at an outside hospital; her data is not included.

5 repeat blood patches were performed, in which complete resolution was reported in 3 of 5 cases partial resolution in 2 of 5 cases. No third blood patches were performed.

### Discussion

This audit aimed to compare local practice with the published literature.

Our local incidence of PDPH is 2.82% is in line with comparable (teaching) institutions. Anecdotally, wet taps happen more frequently at the beginning of new resident rotations.

Further analysis may shed light of temporal trends and show opportunities to improve.

After witnessing a wet tap, 76% of patients experienced a headache, which is higher than historically cited and may be due to a more medically complex patient population treated at our tertiary referral center; common comorbidities included migraine, pre-Eclampsia, and anxiety.

This retrospective data set may under-report events due to incomplete reporting of witnessed wet taps and failure to capture patients who developed PDPH after hospital discharge. Further, prospective analysis is warranted.

Table 1 PDPH :EBP.pdf

Incidence of Post-Dural Puncture Headache after Combined Spinal or Dural Puncture Epidural. Does Size of the Spinal Needle Matter? Presenting Author: Michael S. Balot, DO Presenting Author's Institution: Mount Sinai West - New York, New York Co-Authors: Ghislaine C. Echevarria, MD, M.S. - Mount Sinai West

#### Introduction

Post-dural puncture headache (PDPH) is an adverse event commonly seen in obstetric patients following neuraxial anesthesia. An important consideration when performing a combined spinal epidural epidural (CSE) or dural puncture epidural (DPE) is the size of the spinal needle used. There is limited data and conflicting evidence when comparing PDPH rates between 25 vs 27 G spinal needles for CSE or DPE. We performed a retrospective review to determine if there was a difference in PDPH occurrence rate between 25 vs 27 G spinal needles used during CSE or DPE for labor analgesia.

#### Methods

We performed a retrospective chart review of electronic records of all labor encounters who received neuraxial analgesia (n=10,459) between 2019 and 2022 at our academic medical center. For each encounter we retrieved basic obstetric and demographic data, in addition to the neuraxial technique used. The occurrences of PDPH in patients without a documented inadvertent dural puncture were identified through custom search queries, based on symptoms and medications used. Those identified records were then reviewed to confirm a clinical diagnosis of PDPH. All subjects who had a recorded inadvertent dural puncture were excluded from data analysis.

### Results

Table 1 shows all cases grouped by mode of delivery, neuraxial technique, and spinal needle size. PDPH occurred in 26 patients with a 25 G needle (0.73% incidence) and in 28 patients with a 27 G needle (0.41% incidence). The odds of developing a PDPH in patients without an inadvertent dural puncture were predicted to be 1.8 times higher with a 25 G compared to a 27 G needle (OR 1.8; 95%CI 1.06, 3.08, p=0.031). The significance persisted after adjusting for type of delivery (vaginal vs laboring to cesarean delivery) (OR 1.76; 95%CI 1.03, 3.02, p=0.038).

### Discussion

Our retrospective review demonstrated that there is a small statistically significant increased risk of PDPH development with the use of a 25 G spinal needle for CSE or DPE analgesia. However, these risks must be weighed against the clear advantages of utilizing a 25 G needle, especially for DPE. Prior studies have shown that the larger dural puncture created by a 25 G needle leads to superior analgesic quality with better sacral coverage due to a greater subarachnoid flux.¹ Ultimately, additional studies are needed to better ascertain the PDPH risk to help guide optimal CSE/DPE practices. Balot PDPH Table.pdf

#### Management of Epidural-Associated Interscapular Pain

**Presenting Author:** Christine Chen, MD **Presenting Author's Institution:** Mount Sinai West **Co-Authors:** Michael S. Balot, DO - Mount Sinai West Ghislaine C. Echevarria, MD, M.S. - Mount Sinai West Brian Taussig, MD - Mount Sinai West

#### Introduction

Interscapular pain is a common yet infrequently discussed complication of epidural analgesia. The exact etiology of epidural-associated interscapular pain is unknown. Some postulate that rapid epidural infusion of fluid may cause pain by stretching the meninges, while others suggest epidural air entrapment may lead to the discomfort.¹ Here we present our institution's technique for managing this complication and review its effectiveness in the setting of 9 affected parturients.

#### Methods

After placement of neuraxial anesthesia, all laboring parturients are started on a patient controlled epidural analgesia (PCEA) infusion. A standard solution of bupivacaine 0.0625% with fentanyl 2 mcg/mL is infused at a rate of 12 mL/hr with a demand dose of 6 mL and a 10-minute lockout interval. When parturients endorse interscapular pain, they are immediately evaluated by the anesthesia team. If the symptoms are consistent with epidural-associated interscapular pain, a new PCEA infusion is started consisting of bupivacaine 0.0625% with fentanyl 4 mcg/mL. The PCEA settings are adjusted to an infusion rate of 6 mL/hr, demand dose of 3 mL, and a lockout interval of 10 minutes. Following infusion adjustment, parturients are continually reevaluated for improvement in interscapular pain as well as any changes to their uterine contraction pain.

#### Results

Table 1 depicts the BMI, neuraxial technique, and pain scores of the 9 parturients identified as having epidural-associated interscapular pain. Eight parturients had complete resolution of their interscapular pain 2 hours after infusion adjustment, however two of these parturients endorsed worsening labor contraction pain. One parturient had no improvement and developed worsening interscapular and contraction pain after the adjustment.

#### Discussion

This case series describes the management of interscapular pain associated with an epidural infusion. By utilizing our treatment method, the volume that is infused into the epidural space is decreased. This decrease in volume may lead to a reduction in pressure within the epidural space resulting in an improvement in interscapular pain.² A limitation of our technique is the possibility that the decrease in the volume of anesthetic delivered may lead to an inadequate analgesic level for uterine contractions, as

demonstrated in two of our patients. Given the lack of medical literature regarding the management of this topic, we hope that our case series can help guide providers who encounter this problem.

Table 1 Interscapular pain.pdf

# Identifying Barriers to Performing Sphenopalatine Ganglion Block and Developing an Institutional Block Kit

Presenting Author: Neil Mackie, MBChB FRCA Presenting Author's Institution: BC Women's Hospital and Health Centre -Vancouver, British Columbia Co-Authors: Sadiq Abdulla, MD FRCPC - BC Women's Hospital

#### Introduction

When an epidural blood patch is refused or contraindicated in a patient with postdural puncture headache, a sphenopalatine ganglion (SPG) block may offer symptomatic relief beyond conservative measures[1,2]. However, SPG blocks are not routinely used at our institution. Our primary objective was to understand perceived barriers to performing SPG blocks in our department. The secondary objectives were to identify knowledge gaps relevant to SPG block and to assemble an institutional block kit. *Methods* 

Following written consent, all obstetric anesthesiologists at our institution underwent a one-to-one structured interview and competency assessment of transnasal SPG block on a mannequin. The interview consisted of 28 standardised questions to assess baseline clinical knowledge, procedural knowledge, and barriers to SPG block use. First, participants were asked to list and rank any perceived barriers of performing SPG block in their practice. Next, they were asked to rate their own knowledge, skill and interest in performing SPG blocks using a NRS scale (0=lowest, 10=highest). Finally, participants' block competency was assessed using a 17-item checklist developed by the study investigators following literature review. Checklist scoring was done by direct observation of simulated block administration, including essential pre- and post-procedure elements. Each item on the competency assessment was scored 0-2 (0=not observed, 1=incomplete, 2=skilled) giving a maximum score of 34. Descriptive statistics were performed.

### Results

18 anesthesiologists participated in the study. The most important barriers to SPG block use were a lack of efficacy data and masking symptoms of intracranial hypotension. Median (IQR) self-reported knowledge, skill and interest scores were 4.5 (3-6), 4 (1-6) and 6.5 (3.5-8) respectively. The median (IQR) competency assessment score was 22 (20-26) out of 34, or 65%, but much higher scores were gained when domains assessing pre and post procedure checks were excluded (median 9 out of 10, IQR 8-10).

### Discussion

Concerns over a lack of efficacy data and masking intracranial hypotension (rather than definitively treating with blood patch) are significant barriers to the adoption of SPG block at our institution. Simulated SPG blocks were delivered well, even by participants with no prior experience, indicating that transnasal blocks are simple to perform. However, low self-reported knowledge and skills scores, coupled with a moderate self-

reported interest in learning about SPG block, suggest there is value in developing inhouse education sessions, institutional protocol, and equipment provision to facilitate its use in appropriate clinical contexts.

Additional image: Contents of proposed SPG block kit



Association of Second Stage Labor with Epidural Blood Patch Placement Following Dural Punctures - A Retrospective Cohort Study

**Presenting Author:** Thomas Yang, BMBS FANZCA **Presenting Author's Institution:** BC Women's Hospital - Vancouver, British Columbia

#### Introduction:

Epidural blood patch (EBP) is indicated for patients with moderate to severe postdural puncture headache (PDPH), or those with mild headaches unresponsive to conservative treatment.[1] The heterogeneity in severity of PDPH may be related to the variable losses in cerebrospinal fluid (CSF) volume. Specifically, the degree of CSF loss following a dural puncture may be higher in women who experienced Valsalva, pushing and expulsive efforts during second stage of labor. We sought to investigate the risk of epidural blood patch placement in women who did or did not experience second stage labor.

#### Methods:

Following institutional ethics approval, patients with documented accidental dural puncture with an epidural needle or dural puncture with a spinal needle diagnosed with PDPH following an anesthesia consultation from 2020 to 2022 were identified using an administrative database. Details on the anesthetic technique, labor and delivery course, PDPH severity and outcomes were retrospectively collected. The primary outcome was the association of second stage of labor with epidural blood patch placement analyzed using a multivariable logistic regression model, controlling for dural puncture needle gauge (17G vs. 25G vs. 27G) and BMI. Secondary outcome was the time to first recognition of PDPH and pain score on initial recognition in women who did or did not experience second stage of labor analyzed using Mann-Whitney test.

### **Results:**

A total of 46 patients met inclusion criteria for review. 24 (52%) women experienced second stage labor, the remaining women did not: they had either first stage dystocia requiring emergency caesarean delivery or a scheduled cesarean delivery. Women who experienced second stage of labor and developed PDPH had a significantly increased odds of needing an EBP (OR 4.4; 95%CI 1.098 to 19.60, p=0.042). The median pain score on initial recognition of PDPH were similar but the median[IQR] time to first recognition of PDPH significantly earlier in women who underwent second stage of labor (17.5h [12.8-25.9] vs. 29.4h [26.2-81.3], p=0.0003).

#### **Discussion:**

In women with accidental dural punctures from an epidural needle or PDPH following dural punctures from a spinal needle, maternal exposure to second stage labor was significantly associated with the need for EBP and earlier recognition of PDPH. This may be related to greater CSF efflux from the intrathecal to epidural space and greater severity of PDPH.

Retrospective Analysis of the Potential Effects, Both Positive and Negative, of Replacing Fentanyl with Dexmedetomidine in a Labor Epidural on Peripartum and Postpartum Pain Management.

#### Presenting Author: Brenna Katz, MS3

**Presenting Author's Institution:** University of South Alabama Children & Women's Hospital

**Co-Authors:** Mary Andrews, MS4 - University of South Alabama Children & Women's Hospital

MengJie Hu, MS4 - University of South Alabama Children & Women's Hospital Hayden Kassels, MD - University of South Alabama Children & Women's Hospital Jacob Letson, MS4 - University of South Alabama Children & Women's Hospital Lauren Lopansri, MS4 - University of South Alabama Children & Women's Hospital

#### **Background**

Dexmedetomidine (DEX) is a sedative-analgesic drug that is commonly used in the intensive care unit setting for sedation. It acts as an alpha-2 adrenergic agonist, providing both sedative and analgesic effects. In recent years, DEX has been evaluated for use in other clinical settings, including labor epidural anesthesia, as it has the potential to provide improved pain control, decreased need for additional analgesics, especially adjuvant opioids. Typically our epidurals in the United States include a local anesthetic with an adjuvant, usually an opioid. The most commonly used opioid being fentanyl. Side effects from fentanyl in epidurals are one of the main barriers to a rapid postpartum recovery in an uneventful delivery. This study delves into the examination of the potential effects, both positive and negative, of replacing or reducing fentanyl use through the utilization of DEX in a labor epidural on peripartum and postpartum pain management.

#### **Methods**

Retrospective chart review of 184 laboring women who received labor epidurals from January 1, 2022 through April 30, 2022 was completed. 86 (47%) were identified as having received a labor epidural infusion containing DEX instead of our traditional fentanyl dose or labor epidural infusion containing DEX with supplemental bolus dosing of fentanyl for additional pain relief if needed. The remaining 98 (53%) received a standard labor epidural infusion containing fentanyl. Patient post delivery opioid usage was determined by review of their post-op/post-delivery hospital records. All narcotic use in the peripartum and postpartum period was recorded and standardized to morphine milligram equivalent (MME) units to account for use of varying opioids. Subjective pain scores (0-10 scale) from the period post delivery to discharge were reviewed. Systolic blood pressure, diastolic blood pressure, and pulse were recorded at baseline (prior to start of labor epidural infusion) as well as at the 5 min mark post infusion. Additionally, the rate and reason of needing to convert to cesarean section was recorded and analyzed.

#### **Results/Discussion**

The results of this analysis showed that replacing fentanyl with DEX in a labor epidural and utilizing bolus dosing of fentanyl only when needed for additional pain control resulted in improved pain control during the peripartum and postpartum period compared to the control group. The majority of patients who received the DEX epidurals reported lower levels of pain in the postpartum period and reduced need for additional opioids. Additionally, there was no change in patients' vitals or increased need to convert to cesarean section after starting the infusion of DEX labor epidurals.

# Abstract #: SUN-Case Reports & Research Abstracts 4- Room 4– ECV, EXIT, NTG and N2O- 01

#### Spinal Anesthesia for Cesarean Delivery Following Spinal Fusion and Fixation With Harrington Rods- Case Reports

Presenting Author: Borislava Pujic, Anesthesiologist Presenting Author's Institution: CCV - Novi Sad, Vojvodina Co-Authors: Slavica Krusic, Anesthesiologist - Ob & Gyn Hospital Narodni Front, Belgrade

Craig M. Palmer, Anesthesiologist - University of Arizona college of medicine, Tucson

**Summary:** Spinal anesthesia (SA) for cesarean delivery (CD) for the parturient following scoliosis correction surgery can often be safely used.

**<u>Case 1</u>**: A G1 P0 parturient, EGA 38+6 wks, 28y old, BMI 24.3 kg/m² presented for emergent CD. She had previous spine surgery (age 16y) with placement of Harrington rods (HR). At presentation, no radiographs were available, only a written report of her back surgery. She had been told she could only have general anesthesia (GA) for CD, due to her previous surgery, but she encouraged by anesthesiology team to try with SA. SA was performed on the first attempt, with pencil point 25G needle, and bupivacaine 12mg and fentanyl 25mcg. Block level was satisfactory for the surgery. A healthy baby boy, 3430g, with Apgar scores 9/9 (at 1 and 5 min) was born. The postoperative course was unremarkable and she was discharged home on POD 3.

**<u>Case 2</u>**: A G3 P2 parturient, EGA 38+6 wks, was scheduled for CD. She had corrective spine surgery at age 15y with HR (from Th5- L1) and a CD 8y prior under GA. On presentation, she brought radiographs that helped with identification of spinal anatomy. SA was performed on the first attempt as in Case 1 above, and a baby boy, 3820g was born with Apgar scores 10/10. Postoperative course was uneventful and she was discharged home on the POD 3.

**<u>Case 3</u>**: A 37yo G2 P1 parturient, EGA 38+3wks, with breech presentation, presented for emergent CD with BMI 26 kg/m². She had undergone several prior corrective spine surgeries at age of 14y, 15y, and 16y, also with HR. She was offered GA, but refused; her first CD was performed with SA and she insisted again on regional anesthesia, which was successfully performed on the third attempt with a 25G needle bupivacaine/fentanyl. A healthy baby boy 3590g was born, with Apgar scores 10/10.

Patient was discharged home on POD 4.

**<u>Case 4</u>**: A 29yo G1 P0 parturient, EGA 38+5wks, with ruptured membranes was presented for emergent CD. She had HR placed 10 yrs prior. She was encouraged to undergo SA, and it was performed on the second attempt bupivacaine and fentanyl (25g needle). A healthy baby boy, 3000g, with Apgar scores 10/10, was born. Postoperative course was uneventful and she was discharged on POD 3.

All 4 patients received a QLB for post-op analgesia at the end of surgery; 2 were enrolled in an ERAS protocol for recovery.

**Conclusion:** OB anesthesia care in Serbia has undergone significant changes over the past decade. 10 years ago, all these patients would have delivered with GA, but thanks to the involvement of the Kybele program and U.S. Fulbright program support, Serbian

anesthesiologists have enhanced their skills and are more confident when faced with challenging cases.

# Abstract #: SUN-Case Reports & Research Abstracts 4- Room 4– ECV, EXIT, NTG and N2O- 02

#### Identifying Factors that Influence Epidural Satisfaction

**Presenting Author:** Emiley Tou, MD

**Presenting Author's Institution:** Cedars-Sinai Medical Center **Co-Authors:** Rommy Coutelin Johnson, MPH - Cedars-Sinai Medical Center Naomi Greene, MPH, PhD - Cedars-Sinai Medical Center Kimberly Gregory, MD, MPH - Cedars-Sinai Medical Center Samia Saeb, MPH, CCRP - Cedars-Sinai Medical Center Zhaoyi Tang, MD - Cedars-Sinai Medical Center

#### Introduction

Maternal satisfaction during labor and delivery is multifactorial and multifaceted. There is a paucity of literature about satisfaction related to the labor epidural experience. Literature suggests satisfaction is influenced by 4 primary domains: control and self-efficacy, involvement in decision-making, maternal expectations, and pain level [1]. We sought to determine baseline patient satisfaction at our hospital and potentially modifiable factors to improve satisfaction of patients' labor epidural experience.

#### Method

Based on literature review and patient focus group feedback, a multidisciplinary team developed a survey to explore the association between the 4 domains and satisfaction with the labor epidural experience. The survey included patient demographics, pregnancy and labor characteristics, expectations and experience of the labor epidural, patient-provider interactions, and overall satisfaction. Satisfaction was based on a 5-point Likert scale, and satisfied was defined as 4 or 5. The survey was conducted anonymously online from October 2021 to November 2022. Postpartum patients who received neuraxial anesthesia were invited to participate. Those who received a walking epidural, CSE, or spinal were excluded. Univariate and bivariate analyses were performed and chi-square tests reported. This quality improvement study was deemed not regulated after IRB consultation.

#### Results

Of the 363 participants who completed the survey, 266 were included after exclusions. Patient demographics, personal control and involvement in decision-making showed no statistically significant association. Satisfaction was associated with maternal expectations of the epidural. Epidural procedural pain and post-epidural placement pain represent "pain" variables that had statistically significant association with less satisfaction. Among patients who reported being less satisfied, the majority still reported that the epidural met their expectations, allowed them to rest post-epidural and would recommend an epidural to others.

#### Discussion

The majority (89.9%) reported being satisfied with their labor epidural experience. Those less satisfied were more likely to report more pain during epidural placement and post-epidural. These factors can be used to develop quality improvement initiatives. Labor epidurals are performed in 73.1% of births, yet little is known about patient reported outcomes [2]. Further studies are needed to elucidate modifiable factors that can influence patient satisfaction.

Identifying Factors that Influence Epidural Satisfaction Table Tou.pdf

# Abstract #: SUN-Case Reports & Research Abstracts 4- Room 4– ECV, EXIT, NTG and N2O- 03

# Motivations and Demographic Differences among Laboring Patients in the Decision to Participate in Research

Presenting Author: Talia Scott, MD

**Presenting Author's Institution:** Icahn School of Medicine at Mount Sinai - New York, New York

**Co-Authors:** Hung-Mo Lin, ScD - Yale School of Medicine Cynthia Mercedes, M.S. - Icahn School of Medicine at Mount Sinai

#### Introduction:

Medical research is imperative to advance the field of medicine. Although many patients agree to participate in trials, many decline. The decision of whether or not to participate is especially complex in the pregnant patient, where patients may not only be concerned for themselves but also for the fetus. Prior studies have interviewed cohorts of up to 50 pregnant women to assess their reasons for participating or not participating in an RCT. There is limited research examining whether there are associations between demographics and participation. As such, we conducted a survey-based study to understand patient reasoning for and demographic associations with participation in an RCT surrounding the utility of epidural preservative free morphine after successful vaginal delivery.

#### Methods:

This study was approved by the IRB as a modification of the original study. In the original study, parturients in labor were approached and consented to participate in a study where they would be randomized to a placebo or a 2mg dose of epidural morphine prior to catheter removal after a vaginal delivery. Within 36 hours following delivery patients were approached for a follow-up voluntary survey.

#### Results:

400 patients participated in the study, 109 of whom participated in the parent study and 291 did not. Having a 4-year post-high school degree was associated with participating in the study (p = .03, OR = 1.97 [1.07, 3.64]). Participants were asked about their reasons for participating or not, and they could select more than one response. Those who participated in the parent study selected reasons of Active Participation (95%) and Passive Participation (52%). Those who did not participate selected reasons of Ambivalence (46%), Aversion (48%), Miscommunication (26%), Clinical Difficulty (4.1%), Unwilling to Receive Placebo (1.7%), and Screening Failures (3.8%). Participants who self-identified as Black or White were less likely to select reasons of Ambivalence compared to non-Black and non-White (p = .011, OR .382 [.18, .82] for Black; p = .03, OR = .48 [.24, .93] for White). Non-multiparous women were more likely to select reasons of Aversion for why they did not participate in the study (p = .038, OR .56 [.33, .97]). Participants who self-identified as Black were also more likely to select

reasons of Aversion (p = .049, OR = 2.6 [1.00, 6.75]); 73% of participants who selfidentified as Black and declined to participate selected Aversion, compared to 31% of non-Black. Additionally, 71% of participants who self-identified as Hispanic and declined to participate selected Aversion, compared to 32% of non-Hispanic.

Conclusion: These findings can help us identify areas where we can improve participation in research studies. With improved communication with participants, we may have been able to increase participation as much as 26%. Additionally, there are demographic associations that may influence participation and reasons for participation.

# Abstract #: SUN-Case Reports & Research Abstracts 4- Room 4– ECV, EXIT, NTG and N2O- 04

#### Influence of Neuraxial Anesthesia on Outcomes of External Cephalic Version

**Presenting Author:** Samantha Armstrong, BS **Presenting Author's Institution:** Beth Israel Deaconess Medical Center **Co-Authors:** Tallulah Doeringer, n/a - Beth Israel Medical Center Phil E. Hess, MD - Beth Israel Deaconess Medical Center Jo Ann Jordan, n/a - Beth Israel Deaconess Medical Center Yunping Li, MD - Beth Israel Deaconess Medical Center

#### Introduction:

A delivery with breech presentation carries excess risk for neonatal morbidity (1), thus cesarean delivery (CD) is often chosen. External Cephalic Version (ECV) may help avoid CD and has a success rate of up to 60% (2). Several, but not all, randomized control trials (RCTs) show that ECVs are more successful when performed under neuraxial anesthesia (NA) (3). RCTs select for specific population which may not generalize to a mixed cohort. We examined the impact of NA on success rate of ECV in the general population.

#### Methods:

This was a retrospective chart review. In addition to all relevant obstetric and patient characteristics, including fetal weight, gestational age, we also collected the type and dosage of NA. Low dose spinal was defined as ≤9mg of bupivacaine, high dose was > 9mg. If the patient was discharged to home, we calculated the duration of time spent in recovery. Fishers Exact and t-test were used to analyze the data.

#### **Results:**

Total of 301 scheduled ECVs were reviewed dating from between 12/22/2016 and 8/1/2022. Of these, 32 were found to be vertex preprocedural, thus 269 were analyzed. Successful version occurred in 111 (41.3%) of cases, with yearly rates varying from 27.8% to 58.6% (P=0.14). Terbutaline was used in 169 (62.8%) and associated with success (73% v. 27%; P=0.004). NA was used for 235 cases (87.4%), with spinal or CSE used in 193 (81.8%). We found no difference in obstetric or patient characteristics with the use of anesthesia, except terbutaline was less commonly used with anesthesia (60.9% v. 76.5%; P=0.08) but not statistically significant.

NA was associated with a small but not statistically significant increase in success (42.1% v. 35.3%; P=0.45). We found no difference in success between low dose ( $\leq$ 9mg, n=101) vs. high dose (>9mg, n=87) spinal bupivacaine (44.6% v. 37.9%; P=0.36), nor between spinal and epidural anesthesia (42.5% v. 40.5%; P=0.81). Among patients discharged home after ECV, low dose d/c time was shorter by 40 minutes, but not statistically significant (227±176 v. 267±151; P=0.45). We had 34 (12.6%) urgent CD after ECV. Of the patients who did not receive anesthesia, 6% (2/34) required a CD the same day.
#### Conclusion:

We did not find a statistical difference between success rates with and without use of NA and could not identify any obstetric or patient characteristics that would account for this finding. This may be due to the general population being a mixed cohort rather than a selected group found in RCTs. There is also potential for selection bias; when choosing to use anesthesia or not; we could not identify any such characteristic. We found that using low dose spinal did not decrease the success rates of ECV but also did not statistically reduce the time spent in PACU.

abstract figure SOAP 2023.pdf

### Abstract #: SUN-Case Reports & Research Abstracts 4- Room 4– ECV, EXIT, NTG and N2O- 05

### Improved Management of Medication Syringes for Parturient with Labor Epidural

**Presenting Author:** Yuta Kashiwagi, MD **Presenting Author's Institution:** Cleveland Clinic Foundation **Co-Authors:** Arthur Calimaran, MD - Cleveland Clinic Foundation

### Backgrounds:

Around 4500 parturient have deliveries in our hospital and most of them request labor epidural for their pain control. Obstetric anesthesia providers take care of them 24/7. There are fifteen LDRs at the labor and delivery ward where we have four secured "epidural carts" containing all the required stuff for epidural catheter placement. For epidural procedures, premade syringes for loading dose which include local anesthetics and opioid are required for each patient. After induction of epidural analgesia, patients occasionally become hypotensive. Then, anesthesia providers treat it with vasopressors as needed. All of these medications are taken out from Pyxis at L&D and used to be left in one of the epidural carts for taking care of breakthrough pain and hemodynamical changes. Patient stickers are attached to all the syringes but they look alike. Sometimes a lot of syringes with different patients were left in the carts and some of them were for patients who already had been discharged from the ward. So, there were potential two risks. First, using the syringe for the wrong patient could have happened. Second, opioids included syringe could be left despite the patient being discharged, which leads to inappropriate narcotics management.

Improvement:

We have changed the way to manage these syringes for patients having labor epidural. Each patient room has an epidural infusion pump which is locked in a secured plastic box. We noticed these boxes have enough space to contain several syringes. So, we changed the rule that all the syringes to be placed in the box. As a result, when an anesthesia provider gets a call from each room, they don't have to search for syringes for the patient from the cart. This can avoid misuse the syringes for wrong patients and save time until the medication is given. In addition, when epidural analgesia is finished and the catheter is removed, all the syringes as well as epidural infusion bags in the box can be taken out by the caregivers and wasted appropriately. Since we frequently get several calls from different rooms at the same time, this small management change helped the patient safety and narcotics control, and made our daily practice more efficient.

Outcome:

- Anesthesia providers don't need to search for the syringes from epidural carts
- No more risk to use the syringes for wrong patients
- No syringes are left in the epidural cart after completing the labor epidurals

### Abstract #: SUN-Case Reports & Research Abstracts 4- Room 4– ECV, EXIT, NTG and N2O- 06

### Nitroglycerin as the Primary Uterine Relaxant for EXIT Procedures

Presenting Author: Jie Zhou, MD, MS, MBA

**Presenting Author's Institution:** University of Massachusetts Chan School of Medicine, USA

Co-Authors: Danran Zhou, BS, RN - Brigham and Women's Hospital

### Background:

Ex Utero Intrapartum Treatment (EXIT) procedures usually are performed for fetal anomalies involving airway. Fetal exposure under maternal placental circulatory blood supply is the key element of these procedures. Extremely large interdisciplinary teams including Maternal-Fetal Medicine (MFM), Pediatric ENT Surgeon, Cardiac Surgeons, Neonatologists, Maternal and Pediatric Anesthesiologists, Perioperative Nurses, Social Workers, and other supporting teams, all need to work together. Over the past several decades, fetal surgery has made significant progress. However, little has been achieved on the subject of uterine relaxation. Traditional uterine relaxation has been accomplished using high dose of volatile anesthesia agent. However, such practice has been associated with significant fetal cardiac dysfunction and bradycardia. We have been piloting the practice of using titration of high-does intravenous nitroglycerin infusion for uterine relaxation during EXIT procedures. This retrospective study was to analyze the utility of such practice.

### Methods:

Retrospective review of fetal EXIT procedure was conducted. A series of cases during which nitroglycerin was administered as primary uterine were identified. Immediately after the skin incision was made, the infusion of nitroglycerin at 100 mcg/min was started. At the same time, a phenylephrine infusion at 40 mcg/min was started with titration to maintain the blood pressure at the preoperative level. Uterine relaxation will be confirmed by MFM Attending before hysterotomy was made. Once fetus was partially exposed, a pulse oximetry was applied to the fetus to monitor fetus oxygen saturation. Maintenance of continued uterine relaxation will be confirmed by surgeon. Nitroglycerin infusion will be stopped at the time of cord clamping, followed by oxytocin bolus and infusion. At the time of SOAP submission, we are still completing the data extraction. Descriptive facts of the fetal EXIT details will be summarized at the SOAP meeting.

### **Results:**

In all cases, uterine relaxation was satisfied by surgeons. Maternal and fetus hemodynamics were stable. All maternal anesthesia went successfully. Patient covered with no complications.

### **Discussion:**

Grunewald et al demonstrated that nitroglycerin improved placental circulation in severe preeclampsia. Maternal mean arterial pressure could be easily maintained through alpha-adrenergic agonist, phenylephrine. High serum concentration of nitroglycerin in the mother and fetus may produce methemoglobinemia. Fortunately, it has been confirmed repeatedly that nitroglycerin rapidly extracted and metabolized from the maternal serum across a vascular bed of lungs and mesenteries in a dose-dependent manner. High dose nitroglycerin infusion can be used as the primary uterine relaxation agent.

### Abstract #: SUN-Case Reports & Research Abstracts 4- Room 4– ECV, EXIT, NTG and N2O- 07

#### No Laughing Matter: Nitrous Oxide in Labor and Delivery and the Environment

**Presenting Author:** Courtney R. Hood, MD **Presenting Author's Institution:** University of North Carolina - San Antonio, Texas **Co-Authors:** Andrea Fritz, MD - University of North Carolina

**Introduction:** Currently, our world is contending with a crisis: global warming. In the US, healthcare contributes about 10% of our country's greenhouse gases, which makes anesthesiologists poised to help curb climate change.¹ A potential area of intervention is the use of nitrous oxide as a labor analgesic. Nitrous oxide is a greenhouse gas that lasts for over 100 years in the atmosphere and has a global warming potential about 300 times that of carbon dioxide.¹ Thus, we sought to educate healthcare workers about the potential environmental implications of nitrous oxide, so that patients may also be better informed. Since research has shown that parturients receive information about labor analgesia from many sources, including their L&D nurses, we focused on nurses in this pilot project.²

**Methods:** Our intervention was an emailed educational PowerPoint about nitrous oxide and its effect on the environment, which was embedded in a survey and presented at an L&D nursing meeting. Survey questions included length of nursing career and pre- and post-intervention Likert scale questions about comfort with counseling on the environmental effects of nitrous oxide and thoughts about whether the environmental effects of nitrous oxide should be discussed with patients. Analysis included descriptive statistics and paired t-testing.

**Results:** We had 26 survey respondents. Of those, 19.23% (n=5) had 10+ years of nursing experience, 30.77% (n=8) had 5-10 years, and 50.00% (n=13) had < 5 years. On the pre-intervention survey, the average Likert scale score (0-100) for comfort counseling on environmental effects of nitrous oxide was 34.50 compared to 52.71 on the post-intervention survey, p< 0.05. The average Likert scale score (0-100) for thinking that environmental effects of nitrous oxide should be discussed was 70.43 pre-intervention and 70.43 post-intervention, p >0.05.

**Conclusion:** The results showed that our intervention significantly improved nurses' comfort counseling patients on this topic but did not influence their belief that environmental implications should be included in analgesia discussions, although most indicated this was a relevant consideration for patients. This study was limited by a small sample size, but future educational efforts could be targeted at obstetric and anesthesiology providers in an effort to improve shared decision making with patients. Future research is also warranted to better categorize the environmental impacts of nitrous oxide as a labor analgesic.

Cesarean Section in a Parturient with Severe Cardiomyopathy requiring Mechanical Support and utilization of Intraoperative Transesophageal Echocardiogram

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**Introduction:** Delivery in patients with severe peripartum cardiomyopathy can lead to many challenges even with coordinated pre-delivery multidisciplinary planning. Long term morbidity and mortality of PPCM has been observed to be around 20%¹. In this case, we present a parturient who presented in labor with previously undiagnosed severe peripartum cardiomyopathy who required emergent Cesarean section due to fetal terminal bradycardia and the subsequent management during the perioperative period.

Case Report: A 28 y.o G1P0 at 36w3d presented to an outside hospital for shortness of breath and rupture of membranes. She reported new & progressive lower extremity edema and dyspnea on exertion. She was found to be hypoxic with pulmonary edema on chest X-ray, with an elevated BNP of 3892, and an echocardiogram showed LVEF of 15-20%. The decision was made to transfer to our institution for higher level of care. For this parturient with severe decompensated cardiomyopathy our multidisciplinary team formulated delivery plan of vaginal delivery with EKG and arterial line monitoring, early epidural placement, and milrinone administration if lactate >1.7. Epidural was placed without complication; however initial bolus was deferred due to concerns for hemodynamic compromise. Several hours later patient was unable to lie flat and noted to have decreased urine output despite aggressive diuresis. Shortly thereafter terminal fetal bradycardia was noted and emergent cesarian section was initiated. Upon arrival to OR patient underwent initiation of general anesthesia. She was intubated and 9Fr RIJ CVL was placed. Intraoperative Transesophageal Echocardiogram was utilized showing severe biventricular dysfunction with estimated EF of 15%. The Cardiogenic Shock Team was activated regarding possible mechanical support (VA ECMO vs Impella). Ionotropic support was initiated with subsequent improvement of right ventricular function. Given her ongoing shock the decision was made to transport her to the Cath Lab for emergent Impella placement. Following initiation of MCS her end organ perfusion improved and she was transported to our

CVICU. She required mechanical support for 7 days and was subsequently discharged home on continued ionotropic support.

**Discussion**: Delivery in patients with severe peripartum cardiomyopathy requires multidisciplinary planning, however the need for emergent cesarian section can arise at any time. Intraoperative esophageal echocardiogram can help guide not only intraoperative ionotropic management but also decisions for possible mechanical support in cases of severe decompensated cardiomyopathy. In addition, multidisciplinary cardiogenic shock team allows for rapid coordination of care in the acutely decompensated patient.



# Shocking the System: Interdisciplinary Care and Anesthetic Management for a Cesarean Delivery in a Patient with Hypertrophic Cardiomyopathy and Recurrent Ventricular Arrhythmias

Presenting Author: James Conwell, DO
Presenting Author's Institution: University of Kentucky Department of Anesthesiology, Kentucky
Co-Authors: Regina Fragneto, MD - University of Kentucky
Chandler Johnson, BS - University of Kentucky College of Medicine

Introduction: Hypertrophic obstructive cardiomyopathy (HOCM) poses unique anesthetic challenges. The physiologic changes of pregnancy and hemodynamic changes of a cesarean complicate this challenge. We present a case of a patient with HOCM and recurrent ventricular tachycardia (VT) who required an urgent operative delivery.

Case: A 28-year-old G2P1 female at 28/2 weeks gestation with HOCM presented with recurrent VT with appropriate implantable cardioverter defibrillator (ICD) shocks. Transthoracic echocardiogram (TTE) demonstrated a left ventricular ejection fraction of 60-80%, severe asymmetric septal hypertrophy and peak left ventricular outflow tract gradient of 42mmHg at rest. Due to recurrent arrhythmias and hypotension despite treatment, delivery at 34 weeks was proposed by an interdisciplinary team of cardiology, maternal fetal medicine, as well as both a cardiac anesthesiologist and an obstetric anesthesiologist.

Prior to surgery the patient was adequately hydrated, and volume status was confirmed with TTE. An arterial line was inserted for hemodynamic monitoring and two large bore peripheral intravenous catheters were placed. A lumbar epidural was placed and slowly dosed with 2% lidocaine. A phenylephrine infusion was empirically initiated to maintain preload and afterload. Following establishment of surgical anesthesia, the patient delivered a viable infant. Oxytocin was administrated with early utilization of intramuscular methylergometrine and carboprost to minimize uterine atony and subsequent postpartum hemorrhage and hypovolemia.

The patient was admitted to the cardiac intensive care unit for monitoring after delivery, and was discharged home one week later on appropriate medical therapy.

Discussion: HOCM is a leading cause of sudden cardiac death in young adults and cardiovascular disease is the leading cause of maternal death in the United States. This patient's HOCM and arrythmias gave her a CARPREG II score of 5, with >40% risk of cardiac events [1], and interdisciplinary care was required to develop a safe delivery plan. Due to her unstable cardiac status, this patient necessitated pre-term cesarean delivery. To minimize the outflow tract obstruction, the management of HOCM includes maintenance of preload, increased afterload, with avoidance of tachycardia and excess contractility [2]. A spinal anesthetic with its rapid drop in SVR was avoided. General anesthesia was also avoided given the risks of hypotension and aspiration. A slowly

titrated epidural was chosen as the safest anesthetic to maintain favorable hemodynamics for this high-risk patient during her operative delivery.



### Cardiovascular Collapse During Urgent Cesarean Delivery

Presenting Author: Rebecca Myers, MD
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36-year-old G6P3 at 32 4/7 weeks twin gestation with cHTN, anxiety, and preeclampsia requiring urgent cesarean section for NRFHT. Upon arrival to OR, patient with profound anxiety, tachycardia to 140s, and normotension. Due to obesity and twin gestation, planned for combined spinal epidural following IVF bolus. Neuraxial performed in lateral position due to fetal intolerance. Epidural space easily accessed with Tuohy needle, but unable to obtain CSF on dural puncture with spinal needle. Epidural catheter inserted and secured five cm into epidural space. Patient positioned supine with left uterine displacement. Epidural dosed slowly with 2% lidocaine with epinephrine following negative aspiration/test-dose. Sensory level T7 bilaterally and appropriately rising toward target of T4. Anxiety persisted and HR increased to 160s. Patient then reported feeling "funny," followed by LOC, profound hypotension and PEA arrest. Obstetric team quickly prepped patient's abdomen for incision. Obstetric CPR/ACLS initiated, neonates delivered within minutes of event onset, ROSC achieved within 2 minutes of incision. Upon delivery of twins, patient awoke spontaneously. Patient awake, calm, and comfortable for remainder of case. Postop cardiac evaluation with ECHO revealed reduced LVEF and septal wall akinesis, consistent with stress cardiomyopathy (SCM). Patient monitored in ICU overnight, with transition to routine postoperative care and subsequent discharge home. Follow up 6-week TTE improved with LVEF 50%, mild global hypokinesis and increased apical trabeculations, suggesting possibility of stress CM vs noncompaction CM vs peripartum CM. Follow-up with 14-week cardiac MRI showed full resolution. Etiology most likely secondary to stress cardiomyopathy given the patient's risk factors, presentation and acuity of the CV collapse, and rapid resolution of CM upon removal of instigating factors. Patient's collapse likely precipitated by vasovagal reaction, peripheral vasodilation related to epidural dosing, tachycardia related to anxiety, and vena cava compression thus impeding venous return, in the setting of acute myocardial dysfunction. This case report seeks to educate on this uncommon complication in the parturient population.

Ischemic cardiomyopathy discovered during pregnancy

**Presenting Author:** Jessica Merrill, MD **Presenting Author's Institution:** The Ohio State University **Co-Authors:** Kasey Fiorini, MD - Ohio State University

### Introduction

Cardiovascular disease among pregnant women is increasing and now a leading cause of maternal mortality. Ischemic heart disease is not the most common etiology but incidence is increasing as maternal obesity, age and comorbities rise1. These patients pose challenges for the anesthesiologist predelivery optimization and intrapartum. Increasing oxygen demand/consumption in pregnancy further exacerbate underlying cardiac ischemia2. Further issues arise as many therapies are contraindicted in pregnancy.

### Case

43 year old G3P1 transfer at 25w5d from OSH in cardiogenic shock (EF 20-25%) complicated by left apical thrombus and acute left CVA. History of hypertension, suspected pre-gestational diabetes and substance use (meth, opioids, tobacco). Previous CS x 1. Initially presumed to be peripartum cardiomyopathy. Developed polymorphic VT prompting cardiac catheterization which showed severe triple vessel disease (100% mid LAD, 90% diagonal, 100% RCA) not amenable to percutaneous intervention, suggesting underlying etiology more likely ischemic in the setting of CAD and recent meth use. Given substance use, not a candidate for advanced therapies nor future transplant. Medical management with heparin drip for thrombus. Lidocaine drip for arrhythmia. Nitroprusside for afterload reduction. Furosemide for diuresis. Continued to decompensate. Right heart catheterization showed persistently elevated filling pressures. Milrinone added for inotropy with improved cardiac output in anticipation of delivery given persistent cardiogenic shock on maximum medical therapy. Delivery via CS under GA. Slow induction with modified RSI. Intraop TTE and continuous cardiac output used to guide resuscitation. Post op returned to ICU intubated. Extubated POD1. Inpatient for 2 weeks postop while vasoactive drips weaned and oral goal directed management therapy initiated. Post op course complicated by infection, delirium and AKI.

### Conclusion

For patients who present with acute heart failure in pregnancy, it is important to consider evaluation for underlying atherosclerotic disease when risk factors are present. Patients with decompensated ischemic cardiomyopathy and cardiogenic shock require multidisciplinary care coordination with frequent communication. It is important to weigh risks of further hemodynamic stress from ongoing pregnancy with fetal maturity when delivery planning. If able, discussion of advanced therapies should occur prior to delivery to best prepare for possible decompensation. During delivery measuring

continuous cardiac output and/or TTE can help guide titration of vasoactive drips. Neuraxial should be used with extreme caution given need for tight control of many hemodynamic parameters. It is vital to monitor these patient closely in the immediate postpartum stage as the rapid rise in cardiac output and SVR puts them at high risk for further decompensation.

### A Primigravida with Senning Atrial Switch and Residual Severe Left Ventricular Outflow Tract Obstruction and Thrombocytopenia

**Presenting Author:** Lisa M. Corbett, MD, CPE **Presenting Author's Institution:** Oregon Health & Science University - West Linn, Oregon **Co-Authors:** 

#### Background:

Women with complex congenital heart disease (CHD) are surviving and becoming more commonplace on L&D units. We discuss a complicated case of a parturient born with Transposition of the Great Arteries (TGA) with a Senning atrial switch procedure, presenting with systolic anterior motion (SAM) of the mitral valve (MV) creating severe subpulmonic LVOT obstruction. In addition, patient has a history of NSVT and a recent onset of thrombocytopenia.

### Case:

A G1P0 at 37 3/7 weeks presents for induction of labor in the CVICU due to her CHD with significant residual components. A multidisciplinary conference was held at 35 weeks to discuss delivery plan specifics of location (CVICU), mode of delivery (vaginal with possible assisted 2nd stage and labor epidural for analgesia), and plan for emergency contingencies (C/S in main OR). A Zio cardiac monitor at 24 weeks shows 9 episodes of NSSVT and 2 episodes of NSVT. Echo during 1st trimester shows SAM of MV with severe LVOT obstruction with peak gradient of 162 mmHg. Patient takes metoprolol and ASA 81 mg daily and is currently asymptomatic.

On admission, platelets are 86k so early epidural is planned prior to further progression of thrombocytopenia to ensure adequate analgesia to prevent tachycardia and increases in myocardial contractility with labor pain. Two 18ga IVs and an a-line are placed. A defibrillator and pads are readily available. Labor epidural is placed without difficulty and initiated with 8 ml of 0.125% bupivacaine given in 2 ml aliquots + fentanyl 100 mcg. Hemodynamics unchanged. A PIEB program with PCEA using bupivacaine 0.0625% + fentanyl 2 mcg/ml is used and 2nd stage lasts 95 minutes. The patient is monitored in the CVICU postpartum for 12 hours without event.

### Conclusion:

Parturients with CHD pose significant challenges based on residual effects following surgical correction. Optimal outcomes use a proactive multidisciplinary approach with planning and take into consideration mode of delivery (vaginal vs. C/S), location for laboring (L&D vs. ICU), and recovery phase (postpartum unit vs. ICU). Emergency contingencies are planned ahead of time in case emergency C/S is required. Knowing how to activate all parties quickly and transporting the patient to the correct location for

the procedure is key for both mother and infant best outcomes. Agreement on IV access, cardiac monitoring needs, arterial and central line access, and other specific items should be determined prior to the admission of the patient and tailored to the patient's specific condition. Arrhythmias and heart failure are the most common adverse outcomes so prevention must be strongly considered when formulating the delivery plan.1

### Cesarean Deliver for an Achy Breaky Heart: Urgent cesarean section for a parturient with recurrent peripartum cardiomyopathy

#### Presenting Author: Samuel Pettigrew, MD

**Presenting Author's Institution:** University of Tennessee Medical Center Knoxville **Co-Authors:** Stephanie Deford, MD - University of Tennessee Medical Center Knoxville Justin Swengel, MD - University of Tennessee Medical Center Knoxville

Introduction: Cardiovascular disease is the leading cause of death in pregnant women in the United States. Peripartum cardiomyopathy (PPCM) is a rare contributor to this cause of death with an 11% mortality at 8 years. Etiology is thought to be secondary to vascular dysfunction and genetic predisposition. PPCM can be complicated by ventricular tachycardia (VT), systolic heart failure, stroke, and death. While 70% of patients' LVEF will recover within 6 months post-partum, chronic systolic heart failure (CHF) with LVEF < 35% can persist. Risk of PPCM is higher in women who have previously had PPCM, especially if their LVEF did not return to baseline. Recurrent PPCM carries an increased mortality of 16% in pregnancy, particularly during the time of delivery1.

Case: A 32-year-old female G3P1101 at 28.2 weeks with CHF secondary to recurrent PPCM (previous LVEF 35%), ICD implantation due to multiple cardiac arrests after sustained VT, atrial fibrillation, mitral regurgitation (MR), and a BMI of 55 presented with decompensated CHF and syncope. Evaluation demonstrated LVEF of 25%, moderate MR, and multiple episodes of VT. The decision was made to perform an urgent cesarean section with tubal ligation. An amiodarone infusion was started for VT, and the ECMO team was consulted. The patient was brought to the cardiac operating room where defibrillation pads were placed, and a magnet was applied to her ICD. An epidural was placed with loss of resistance technique and titrated to a surgical level of analgesia with fentanyl, 2% lidocaine, epinephrine, and sodium bicarbonate. Left femoral central venous and right femoral arterial lines were placed for quick wire access if emergent ECMO was required. The procedure proceeded without complication. IV oxytocin and epidural morphine were administered after delivery of the neonate, and the patient maintained hemodynamic stability throughout.

Discussion: While early delivery of neonates is not routinely advised in patients with PPCM, the risks and benefits of early delivery to both the mother and fetus should be considered. In this case, the risk of adverse cardiac outcomes including cardiogenic shock and death outweighed the risks of prematurity to the fetus. In patients with recurrent arrhythmias and decompensated CHF secondary to PPCM, multidisciplinary team preparation and anesthetic management can be lifesaving for both mother and fetus. All efforts should be made to maintain homeostasis in unstable cardiac patients by utilizing slow titration of epidurals, invasive blood pressure monitoring, and

defibrillation pads. Preparation for ECMO should be considered for parturients at high risk of cardiogenic shock and death during delivery.

### Multidisciplinary Management of a Pregnant Patient with Pulmonary Hypertension

### Presenting Author: Kristine Villegas, MD

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### Introduction

While the incidence of pulmonary hypertension (pHTN) in pregnancy is rare, it is steadily climbing and maternal mortality from pHTN remains high. Early termination is recommended, but if a pregnancy is continued, multi-specialty management is required to reduce adverse outcomes. The peripartum period is particularly tenuous and patient-specific factors require complex decision-making, as in the case we present here.

### **Case Report**

A 36-year-old G8P6017 presented at 36+3 wga with cough, shortness of breath, and lower extremity edema. Past medical history was notable for HIV on antiretroviral therapy, polysubstance abuse disorder on suboxone, methadone-induced Torsades de Pointes, asthma and vocal cord immobility. Obstetric history included 2 prior cesarean sections.

She was previously hospitalized at 35+1 wga at an outside hospital with pneumonia, cardiomegaly, and elevated BNP. TTE demonstrated normal LVEF, RV dilation, septal flattening, and 43mmHg PASP. She was treated for pneumonia and signed out AMA. She then re-presented with orthopnea, 2+ pitting edema and diminished breath sounds. Repeat TTE revealed newly reduced LVEF, RV overload, and 52 mmHg PASP. Despite diuresis, TTE revealed worsening RV overload and function. She was transferred to the cardiac ICU for further optimization and invasive monitoring. Right heart catheterization showed near-systemic PAP and positive vasoreactivity testing to inhaled epoprostenol. Cesarean delivery was performed under combined spinal epidural with intrathecal opioids, and slowly titrated epidural with 2% lidocaine with epinephrine. Shock team was on standby for acute mechanical circulatory support. Vasopressors, milrinone, IM oxytocin, and inhaled epoprostenol were available; the latter was uptitrated following delivery due to increasing PAP.

Postoperative course was notable for continued epoprostenol requirement, dopamine for chronotropic support, and ongoing diuresis with improvement of PAP and RV function. Intravenous and inhaled support were weaned to oral medications and she was discharged on POD4.

### Discussion

Peripartum management of factors contributing to increased PAP and RV strain include avoidance of labor pain, volume overload, reduced afterload, hypoxia, and hypercapnia. Medical optimization with pulmonary vasodilators is necessary and delivery should occur at a center with mechanical circulatory support capabilities. This patient presented in right heart failure with worsening pHTN likely related to both her pregnancy and pneumonia. This was also complicated by her history of C-sections, substance abuse, and likely difficult airway. Multidisciplinary planning can optimize care delivery to afford the mother and fetus the best chance for survival.

Why is the VAD Still There if the Heart is Better? Laparoscopic Tubal Ligation in a Patient with Left Ventricular Assist Device (LVAD) Placement and Subsequent Percutaneous Exclusion

**Presenting Author:** Ashley Lewis, MD **Presenting Author's Institution:** Vanderbilt University Medical Center - Nashville, Tennessee **Co-Authors:** Laura L. Sorabella, MD - Vanderbilt University Medical Center

**Introduction**: LVADs were developed in the 1960s as a bridge to heart transplant. These devices have moved from pneumatic to continuous flow. The HM3 is implanted inside the pericardium and uses a magnetic impellar to provide centrifugal flow.¹ LVAD placement becomes relevant in pregnancy as a treatment for peripartum cardiomyopathy (PPCM). It is well-described as either destination therapy or as a bridge to transplant in these patients. The pathophysiology of PPCM remains largely unknown but likely involves oxidative stress-mediated cleavage of prolactin.² PPCM is unique from other cardiomyopathies (CM) in that PPCM has a higher rate of recovery with standard management. ²⁻⁴ Subsequent pregnancy with an LVAD in place is relatively contraindicated and carries a high risk of maternal morbidity and mortality.

**Case Presentation**: A 20-year-old G1P1001 delivered a preterm infant via an emergent cesarean delivery due to non-reassuring fetal heart tones. She presented 7 weeks postpartum (PP) with heart failure symptoms. An echocardiogram showed global hypokinesis with a left ventricular ejection fraction (LVEF) of 15-20%. She was initially managed with inotropic support but required HM3 placement at 8 weeks PP. 18 months post placement she underwent a VAD turndown study which demonstrated a LVEF of 40%. She underwent a percutaneous LVAD exclusion and subsequent driveline removal, both uneventful. Almost 2 years after her emergent cesarean delivery, she presented for tubal ligation as the risk of significant heart failure in subsequent pregnancies was unacceptably high to this patient. She underwent general anesthesia without complication.

**Discussion**: Cardiovascular disease remains the number one cause of maternal death in the U.S with incidence and prevalence depending on race and region.² PPCM may lead to profoundly decreased LVEF and cardiogenic shock. Management of PPCM trends toward temporary therapy than permanent therapy due to likelihood of recovery, but patients in cardiogenic shock may require mechanical support.² For patients that demonstrate LVEF recovery, two options exist. The first is VAD explantation. This involves a redo sternotomy, LV patch, and requires cardiopulmonary bypass. The other option is percutaneous decommissioning, involving occlusion of the outflow graft, and surgical excision of the driveline. Patients who have their LVADs percutaneously decommissioned have a mild to moderate decrease in LVEF that stabilizes by 6 months post-decommision.^{4,5} There is no consensus on anticoagulation for decommissioned VADs.⁶ This case highlights the importance of familiarity with procedures used to treat PPCM, as these patients may present later in their lives for care.

### Learning Objectives:

PP management of heart failure LVAD management after recovery Anticoagulation options for LVAD exclusion patients Importance of contraception



### A Case of Asymptomatic Sustained Ventricular Tachycardia During Latent Labor

### Presenting Author: Laura O. Ibidunni, n/a

**Presenting Author's Institution:** Vanderbilt University Medical Center **Co-Authors:** 

### Introduction

Cardiovascular disease and, specifically, cardiac arrhythmias are the most common contributors to maternal mortality in the United States^{1,2,5}. Pregnancy induces cardiovascular changes that can lead to new or worsening cardiac conditions that can ultimately result in death of the mother and fetus^{3,4,5}. This is a case report of new onset ventricular tachycardia (VT) identified in a woman during active labor.

### Case

Ms. C is a healthy 23-year-old G2P0010 who presented at 40 weeks for induction of labor. Her pregnancy was complicated by late entry to care. Oxytocin infusion was started and as she progressed in her labor course, episodes of tachycardia were noted on pulse oximetry. When placed on telemetry, she was found to have frequent ventricular bigeminy with periods of sustained ventricular tachycardia with heart rates in the 130's. During these episodes she remained hemodynamically stable and denied any chest pain, shortness of breath, palpitations, or syncope. A chemistry panel was overall unremarkable, except for a Mg level of 1.6 mg/dL, which was repleted. Cardiology consultation was obtained. Transthoracic echo demonstrated left ventricular ejection fraction of 60-65%, a moderately dilated left ventricle (5.99cm), normal right ventricle and systolic function, and no valvular abnormalities. She was started on metoprolol tartrate 12.5mg q6h with plans for additional metoprolol or adenosine pushes during episodes of sustained or symptomatic NSVT. No further episodes of sustained VT were noted during labor. She received an early epidural for pain management. She underwent a cesarean delivery due to arrest of dilation. The patient suffered a postpartum hemorrhage with a Hgb nadir to 6.5 g/dL requiring a blood transfusion. She was transitioned to oral metoprolol and was discharged on POD2 with a Holter monitor for 30 days. During her cardiology clinic follow-up 3 months later, Holter monitor showed 37% pre-ventricular complex (PVC) burden. A cardiac MRI showed normal biventricular size and systolic function, LVEF 55-60% and no valvular abnormalities. Two months after her clinic visit, she underwent a cardiac ablation with successful ablation of her septal and left ventricular outflow tract PVC's. Her three month follow-up demonstrated no recurrence of PVC's.

### Discussion

The exact mechanism of new arrythmias during pregnancy still remains unknown with speculation thought to be secondary to hormonal, autonomic, and circulatory changes^{3,5}. Ventricular tachycardia is rare during pregnancy with a prevalence of 2 in 100,000³. Treatment of tachyarrhythmias during pregnancy include antiarrhythmic

medications, electric cardioversion, and cardiac ablation though there is limited data^{3,5}. It is important for early recognition and interdisciplinary collaboration between anesthesiologists, obstetricians, and cardiologists to optimize management of these patients in the peripartum and postpartum period. <u>SOAP_References_pdf</u>

### Non-Ischemic Dilated Cardiomyopathy in Cesarean Delivery

Presenting Author: Julie-Ann Thompson, n/a

**Presenting Author's Institution:** Ochsner Clinic Foundation - New Orleans, Louisiana **Co-Authors:** Roneisha McLendon, n/a - Ochsner Health

#### Introduction:

Cardiovascular disease is the leading cause of maternal mortality in the United States¹. Heart failure is commonly associated with peripartum cardiomyopathy. Those patients who have preexisting cardiomyopathy are at risk of developing worsening systolic dysfunction as physiologic changes of pregnancy begin to manifest.

### Case Presentation:

The patient is a G1P0 who presented at 22w6d EGA with left sided chest pain and dyspnea. Medical history is significant for diabetes mellitus type II, hypertension and non-ischemic dilated cardiomyopathy diagnosed one year prior after a bout of COVID-19.

Physical exam showed decreased breath sounds bilaterally and pitting edema. Echo showed an ejection fraction of 25%, grade III LV diastolic dysfunction and moderate pulmonary hypertension. Patient was admitted for heart failure exacerbation and after diuresis, she was discharged.

Seven days later, the patient re-presented with chest pain and dyspnea. Physical exam was significant for jugular venous distension, 4+ pitting edema and bilateral crackles. CXR showed pulmonary edema and labs revealed increased BNP to 2527 [1348 at previous admission]. This admission did not produce the same diuretic success despite escalation. Echo showed a worsening of the ejection fraction to 15%, moderate RV enlargement with severely reduced RV function, PA pressures of 57, CVP of 15 and moderate tricuspid regurgitation. In the setting of heart failure exacerbation, the decision was made to proceed with elective C/S at 25 weeks.

Intraoperatively, an epidural was placed and a right radial arterial line. 20 mL of 2% Lidocaine was administered via the epidural over the course of 20 minutes and an epinephrine infusion was started at 0.02 mcg/kg/min. The C/S proceeded without incident. Nitric oxide was applied via face mask immediately after delivery of the infant and remained on until the procedure was complete. She was then transferred to the critical care unit on 0.02 mcg/kg/min of epinephrine with stable vitals. Discussion:

An increase in cardiac output and total blood volume may cause increased myocardial stress, eccentric hypertrophy and a subsequent decline in cardiac function on an already weakened heart². In patients with dilated cardiomyopathy and severely depressed ejection fraction, it is critical that neuraxial anesthesia is titrated slowly as to avoid a significant sympathectomy. Additionally, after delivery of the fetus, cardiac output can increase up to 80% proposing a hemodynamic challenge³. Most important

for these patients are preservation of inotropy and avoidance of large variations in blood pressure in order to ensure stability in the immediate postpartum period¹.

### Case of a successful awake Caesarean section using epidural anesthesia in a patient with Class 3 Obesity and moderate pulmonary hypertension

Presenting Author: Jordan A. Francke, MD, MPH

**Presenting Author's Institution:** University of California, Los Angeles (UCLA) - Los Angeles, California

**Co-Authors:** Brittany N. Burton, MD, MHS, MAS - University of California, Los Angeles (UCLA)

### Introduction:

Pulmonary hypertension, obesity, and pre-eclampsia present challenges to the safe care of parturients; those challenges increase when all three are combined. Patients with super morbid obesity (BMI > 60 kg/m²) represent 2% of all pregnancies, and have a >95% chance of having obstructive sleep apnea (OSA).¹ Severe OSA can lead to or worsen pulmonary hypertension (PH). PH in pregnancy carries a mortality rate ranging from 3-43% depending upon the severity and etiology of PH.¹⁻² PH in pregnancy represents a very high risk state, requiring careful coordination between critical care, maternal-fetal medicine, and obstetric anesthesia teams in order for patients to safely carry these pregnancies to term.

#### **Case Description:**

We present a case of a 32-year-old G5P2 female with a past medical history of chronic hypertension, weight of 190 kg (BMI 75 kg/m²), and moderate PH secondary to severe OSA and a COVID infection prior to pregnancy. The patient required 4 liters/minute of supplemental oxygen at home.

The patient was admitted to the cardiothoracic ICU, where Swan Ganz and arterial catheters were placed. A transthoracic echocardiogram after admission showed moderately elevated pulmonary artery systolic pressure of 60 mmHg and moderate tricuspid regurgitation. She was placed on 40% oxygen CPAP in the ICU. The patient's blood pressures climbed into the range of pre-eclampsia with severe features, meriting a nicardipine infusion in the ICU and an induction of labor. A labor epidural catheter was successfully placed at the L3-L4 level. Due to recurrent variable decelerations during induction of labor, the patient was emergently transferred to the main surgical operating room for a Caesarean section. The patient was bolused a total of 20 mL of 2% lidocaine with epinephrine and sodium bicarbonate prior to incision, and had a bilateral T4 level. The surgery began while the patient spontaneously ventilated using 15 liters/minute supplemental oxygen via a non-rebreather mask. Upon delivery, patient's systolic pressure decreased to the mid-70s on invasive monitors, and phenylephrine and vasopressin infusions were started to maintain systolic pressures > 100 mmHg, with max infusion rates of 60 mcg/min and 0.06 U/min respectively. The patient's oxygen saturation remained 96-100% throughout the surgery's entirety. To minimize respiratory depression from systemic opioids, epidural analgesia was utilized for 24 hours postpartum and then discontinued.

**Discussion:** Awake Caesarean sections in parturients with severe morbid obesity and moderate pulmonary hypertension can be successfully completed with epidural anesthesia and complex coordination of care.

### Successful Delivery Post COVID-ECMO: Beating the Odds

**Presenting Author:** Madison J. Phillips, DO **Presenting Author's Institution:** University of Kentucky - Lexington, Kentucky **Co-Authors:** Jasveen Chadha, MBBS - University of Kentucky

### Introduction:

Anesthetic management of patients who have recovered from COVID-19 is becoming a mainstay in elective surgery and the peripartum environment alike. These 'recovered' patients may pose significant anesthetic challenges due to multi-organ sequalae and post-COVID syndrome. Current clinical evidence suggests parturients who have had COVID-19 associated pneumonia have an increased risk of C-section, PROM, preeclampsia and preterm labor¹. These patients require careful preoperative evaluation of sequalae and residual symptoms as well other co-morbidities.

### Case:

This is a 35-year-old G2P0 female at 34+2 weeks gestation with ankylosing spondylitis presenting for elective C-section in September 2022. Her pregnancy was complicated by GDM, pre-eclampsia, fetal growth restriction and AEDF on dopplers. She had COVID-19 ARDS only eleven months prior, requiring VV ECMO for 6 days, mechanical ventilation, tracheostomy, and hemodialysis. On review, no significant ongoing cardiorespiratory sequalae were identified and she had not required any further dialysis for over 6 months. Her ankylosing spondylitis was stable, with no biological treatment for several years. She had normal vital signs and labs significant for positive antibody screen. She had an uneventful C-section with a combined spinal epidural and available crossmatched blood.

### Discussion:

This case demonstrates some of the perioperative concerns in managing a post-COVID obstetric patient, who had a severe infection with multi-organ involvement.

- Difficult intubation, especially following prolonged intubation and/or tracheostomy. In this patient, ankylosing spondylitis may make intubation more difficult with neck involvement.
- Pulmonary fibrosis and reduced FRC
- More pronounced supine hypotension syndrome, hypotension with neuraxial placement, COVID sequalae including cardiomyopathies, strokes and arrhythmias
- COVID-19 increases thrombosis risk, may require interruption of ongoing anticoagulation use
- Approximately 35% of the patients recovered from COVID-19 may have a decreased GFR for up to 6 months¹
- Difficult venous access due to thrombosis/scarring
- Positive antibody screens in the setting of transfusion history
- PTSD and anxiety related to recent hospitalization

Management strategies for the post-COVID patient include careful recognition of multiorgan sequelae, preoperative optimization and avoidance of GA where possible. This along with careful pre-oxygenation, lung protective ventilation, readily available difficult airway equipment and ultrasound, goal-directed fluid therapy and early communication with the blood bank are important strategies to avoid complications and achieve favorable outcomes in pregnant women post-COVID.

### Anesthetic Management and Extracorporeal Membrane Oxygenation for Pregnant Patient with Mediastinal Mass

Presenting Author: Madison J. Phillips, DO Presenting Author's Institution: University of Kentucky - Lexington, Kentucky Co-Authors: Douglas Dauer, MD - University of Kentucky Regina Fragneto, MD - University of Kentucky Karl Hillenbrand, MD - University of Kentucky Chandler Johnson, BS - University of Kentucky College of Medicine Peter Yarger, MD - University of Kentucky College of Medicine

#### Introduction:

Anesthetic management of mediastinal masses poses significant risks and challenges. Physiological changes of pregnancy compound these challenges. The following case offers robust opportunity for review and discussion of these topics.

#### Case:

23-year-old G1P0 morbidly obese female at 32 wks gestation presented to outside hospital with cholecystitis, progressive SOB, and widened mediastinum on CXR. Scheduled for C/S and CCY. Preop CT showed 12x11cm anterior mediastinal mass, narrowing of SVC, and compression of tracheobronchial tree. Bilateral femoral sheaths placed prior to induction for potential ECMO support. Smooth induction of GA with easy intubation, but progressive ventilation difficulty encountered. C/S quickly performed, CCY aborted. Patient kept sedated and intubated with ongoing ventilation issues in PACU, prompting VV-ECMO initiation.

Admitted to ICU and transferred to our center for ECMO management. On arrival, patient stabilized and treatment for B-cell lymphoma initiated. Taken to OR on POD7 for tracheobronchial stenting with ECMO and jet ventilation support due to concern for post-obstructive pneumonia. After stenting, successfully weaned and decannulated from VV-ECMO on POD9. After a protracted hospital course, patient eventually expired on POD24 due to pneumonia and sepsis.

### Discussion:

Much controversy surrounds this pathophysiology, with little clear evidence to guide optimal management. In this case, high risk features included SVC compression and dangerous symptomatic distal airway compression. Physiologic changes of pregnancy compounding these risks include gravid respiratory requirements and physiology, risks of airway difficulty, aortocaval compression, and increased oxygen consumption potentially outpacing ECMO capabilities.

This combination of challenges requires thorough individualized multidisciplinary planning. Management strategies often include avoidance of GA, if possible, with careful neuraxial/regional techniques +/- pre-induction vascular access in case ECMO is needed. If GA is required, avoidance of NMB while maintaining spontaneous ventilation,

if possible, use of reinforced ETT, lower extremity vascular access, fiberoptic/rigid bronchoscopy + jet ventilation +/- TEE on standby, and rescue positioning plans have been recommended. Some emerging literature calls into question traditional dogma including NMB and positive pressure ventilation effects on airway patency during GA. But controversy remains and the challenges of these cases necessitate careful individualized management.



A. Preop CT showing severe SVC narrowing (near occlusion), and carinal/MSB compression

B. Preop CT showing significant tracheal narrowing (>50%)

C. Preop CT coronal slice showing SVC narrowing (near occlusion)

D. Postop CT s/p tracheal stent

### Uncorrected Atrial Septal Defect with Secondary Pulmonary Hypertension in the Parturient

**Presenting Author:** Milad Javaherian, MD **Presenting Author's Institution:** Cedars-Sinai Medical Center **Co-Authors:** Katherine Gelber, MD - Cedars-Sinai Medical Center Andrew Geller, MD - Cedars-Sinai Medical Center Emiley Tou, MD - Cedars-Sinai Medical Center Tina Yu, MD - Cedars-Sinai Medical Center

### Introduction:

Atrial septal defect (ASD) is the second most common congenital acyanotic heart defect, and accounts for 25-30% of congenital heart defects diagnosed in adulthood. ASD may be asymptomatic for years, remaining undiagnosed and uncorrected. Pregnancy's hyperdynamic state may unmask ASD due to increased left to right shunting, RV overload and pulmonary arterial hypertension (pHTN). pHTN in pregnancy is associated with high morbidity and maternal mortality of 25%. Longstanding pHTN has pulmonary vasculature remodeling, with difficulty tolerating the increase in plasma volume and cardiac output in pregnancy. A pregnant patient presenting at term with dyspnea led to newly diagnosed pHTN secondary to a large, uncorrected ASD.

### Case:

A 41-y.o. G4P3 with uncomplicated NSVDx3 presented at 39w6d with worsening dyspnea at community hospital found severely dilated RA and RV, thus transferred to our ACOG Level IV hospital. TTE showed a 20-25mm ostium secundum ASD. left-toright shunt, severe RV dilation, EF of 60-65%, and no evidence of Eisenmenger's syndrome. Multidisciplinary team decided to obtain a cardiac Catheterization which showed RV systolic pressure in the mid to high 50s and a L- >R shunt fraction of 2.2:1. PA catheter was placed in cath lab for close monitoring of PA and RV pressures throughout labor. ICU RN helped monitor during labor. An L4-L5 epidural catheter was placed prior to induction of labor. Epidural was activated with slow loading of 10 ml bupivacaine 0.125%/Fentanyl 100 mcg and PCEA Ropivacaine 0.15% at 8ml/h, with stable BP and PA 50s/30s. Continuous non-invasive BP was via Edwards ClearSight®. She received furosemide prior to induction and immediately prior to delivery to prevent acute RV failure from fluid accumulation during labor and increased central blood volume after delivery. Goals to minimize increase in pHTN included comfort and shortening second stage labor by vacuum-assisted vaginal delivery. She was monitored overnight in ICU, as the highest central cardiac volume and output demands occur after delivery. Discharged postpartum day 4 on ASA and furosemide with ASD repair at 6 months postpartum.

### **Discussion:**

Pregnancy is relatively contraindicated in patients with moderate-severe pHTN. Our patient had 3 prior NSVD without cardiac symptoms. A large, uncorrected ASD may remain asymptomatic until the CV changes of pregnancy. In the absence of pHTN, ASD is generally well tolerated in pregnancy. cardiac Cath confirms pHTN as ECHO may overestimate PA pressures. The diagnosis of pHTN must be made before delivery to avoid fluid overload and triggers that would worsen pHTN (hypoxia, hypercarbia, hyperthermia, acidosis) and potentially cause right-to-left (cyanotic) shunting, which may cause FHR changes and emergency cesarean.



### BUILDING STRONGER CARE SYSTEMS AND TEAMS: PURSUING PERSONALIZED MATERNAL CARE

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