SOAP
Society for Obstetric Anesthesia and Perinatology

NEWSLETTER

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President's Message

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"The secret of change is to focus all your energy, not fighting the old, but on building the new."   -Socrates

It is just over two months since I took over as President of the Society for Obstetric Anesthesia and Perinatology (SOAP). The privilege of being elected to lead this incredible organization is one of the highlights of my professional career, and I am honored to serve as the SOAP President this year.

SOAP is an amazing organization developed and sustained by incredibly passionate, intelligent and committed members. However for the society to grow, remain financially viable, and become a more relevant and influential medical society, SOAP needs to evolve through innovation and some reorganization. The primary aim during my tenure as SOAP President, is to help facilitate this change and transformation. Specifically, I will try accomplish two goals: 1) Promote the development and implementation of the SOAP strategic plan; and 2) Create bylaws changes that allow change to occur in a timely and considered fashion.

The strategic plan is based on the nine key priorities identified during the SOAP strategic retreat. The priorities of the strategic plan include: identifying SOAP centers of excellence; stimulating fellowship growth and interest; increasing the size and reach of membership; establishing a stronger brand and online digital presence; fostering closer inter-societal relationships; delivering more obstetric anesthesia content for practitioners and patients; creating a multi-center research network; evaluating and updating meeting formats; and reorganizing the SOAP governance structure. Taskforce leaders have already

The First Chinese Symposium on Obstetric Anesthesia at the 49th SOAP Annual Meeting

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The First Chinese Symposium on Obstetric Anesthesia was held on May 10, 2017 at the 49th Annual Conference of the Society of Obstetric Anesthesia and Perinatology (SOAP) in Bellevue, WA. SOAP's mission includes helping to educate anesthesia providers in all countries, to help improve pregnancy-related outcomes and anesthesia experiences. By all accounts the Chinese symposium was a great success!

Dr. John Sullivan and Dr. Brendan Carvalho opened the general session by extending a special welcome to the Chinese attendees. A group of US-based anesthesiologists provided simultaneous translations of SOAP lectures to the Chinese audience. SOAP paid a special tribute to a pioneer in obstetric anesthesia in China, Dr. Guangbo Zhang, who performed the first epidural labor analgesia in China in 1963. In greeting the SOAP and the Chinese Symposium attendees via video, Dr. Zhang expressed her gratitude to Peking Medical University for supporting her initial work as well as a group of American physicians for helping promote labor analgesia in China in recent years as part of the No Pain Labor & Delivery Global Health Initiative.

Dr. Cynthia Wong from the University of Iowa gave an opening presentation on the history of obstetric anesthesia, highlighting key milestones in the Western and Chinese history of the practice. Dr. Shanglong Yao, head of the Chinese Society of Anesthesiologists – Obstetric Anesthesia Division,

Greetings via video from Dr. Guangbo Zhang.

presented a keynote speech on the special challenges Chinese physicians face with the "second-child policy" after nearly four decades of the "single-child policy." Since 2015, the demand for anesthesia services has increased due to a sharp increase in older women (advanced maternal age) with preexisiting medical condition having babies (mostly repeat cesarean delivery) combined with an increasing demand for labor analgesia in nulliparous women. Providing safe and effective anesthesia and managing maternal and fetal complications while dealing with larger volumes of patients are the immediate challenges for Chinese physicians.

Four other Chinese anesthesiologists presented their work to the international audience. Dr. Xiaofeng Shen from Nanjing Provincial Women and Children's Hospital shared her experience in providing epidural labor analgesia to 95% of women with a delivery volume of over 24,000/year. Dr. Haiya Yan from Ningbo Women and Children's hospital presented data on intraoperative cell salvage during cesarean delivery in over 1400 women, totaling over 600,000 mL of salvaged red blood cells transfused. Dr. Duomao Lin and Dr. Mingjun Xu shared their experience in managing women with cardiac conditions and intrathecal analgesia, respectively.

The Chinese Symposium with simultaneous translation played an important role in encouraging attendance to

Dr. Sullivan and Dr. Carvalho welcome Dr. Yao at the opening of SOAP meeting's general session.

Editor's Corner

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In this SOAP summer newsletter, we talk strategy and celebrate accomplishments. As the new President of the Society, Dr. Carvalho clearly delineates the societal goals and initiatives for the upcoming year to make our society more streamlined, relevant and organized. Likewise, Drs. Moaveni, Sadana and Vogel discuss how to care for patients with post-traumatic stress disorder as well as abnormally adherent placentas. In the Patient Safety Committee "This is How We Do It", Drs. Kacmar, Abola, Ituk, Kountanis and Sharpe give practical guidance on how to approach Quality Assurance on the Labor and Delivery Unit.

Finally, Dr. Weike Tao remarks on the successes of the First Chinese Symposium at our recent annual meeting and Dr. Schabel discusses some education award winners.

Please let us know if you have any announcements you would like to share or recommendations for future articles or educational pieces. Please send them directly to hnixon1@uic.edu.

Thank you!
Heather C. Nixon, MD

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been elected to develop these strategic areas of focus, and I anticipate their implementation over the next few months and years.

To fulfill our mission of improving pregnancy-related outcomes of women and neonates through the support of obstetric anesthesiology research, the provision of education, and the promotion of excellence in clinical anesthetic care, we need to create a modernized mechanism that allows necessary bylaws changes to be enacted promptly and thoughtfully with input from all stakeholders. I look forward to discussing some of these proposed bylaws and governance structure changes with you in the coming months. My term as SOAP President is only one year, but I hope to make a difference in the time I have, and promise to continue working beyond my tenure to help move the society forward.

Chinese Symposium continued from previous page

the SOAP annual meeting. The ability to understand the presentations significantly increased the educational value of SOAP meeting to over 50 Chinese delegates. The number of Chinese attendees and their level of participation reached an unprecedented level. The group is likely to bring home this positive experience which will encourage attendance of future meetings and increase the international footprint of SOAP.

SOAP plans on offering more international symposium at the Annual Meetings in the future. The 2018 SOAP Annual Meeting will have the 4th Latin American Symposium in Miami, with simultaneous translation.

Speakers, translators, and some delegates at the Chinese Symposium.

Education Committee: The Need for *Trauma-Informed Care* on Labor and Delivery

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A patient admitted to our labor and delivery suite was diagnosed with pre-eclampsia. Her clinical status was deteriorating quickly, yet standard treatment options were limited due to a complicating factor – patient refusal.

The patient, transferred from a midwifery service, was now refusing medications, epidural catheter pain relief, and surgical delivery, even at the risk of harm to her child. This patient's "irrational" behavior prompted requests for emergency consultation with social services, psychiatry, the ethics committee, and the hospital's legal department.

She had no other medical or psychiatric history that would explain her current behavior, except for a mention of "possible abuse" in her past. No one had attempted to elucidate the reason behind her refusal of a cesarean delivery.

Post-traumatic stress disorder (PTSD) is a very real and potentially devastating condition that can not only occur for the first time during childbirth, but can be preexisting when a patient presents to the labor and delivery suite.[1] PTSD from childhood trauma of any type, especially sexual trauma can be incredibly challenging when the survivor of this trauma enters labor and delivery. The labor process can be a strong trigger for many survivors of childhood trauma. Certain circumstances surrounding the birth process can be "triggers" for survivors such as lack of control over what is done to their bodies, the unpredictability of labor itself, the smells and sounds of an operating room, and even the lack of respect for a woman's modesty. A patient's response to these stressors can be as unique as the triggers themselves, including emotional dissociation, overt distrust of caregivers with directed anger, and other "irrational" behaviors.[2]

As providers, we are well trained to identify risks, diagnose signs and symptoms of physical disease processes and to implement the best evidence-based therapies. Unfortunately, we are ill equipped to identify the risks, signs and symptoms for psychological disease processes such as PTSD. As a consequence of these shortcomings in our training, we may misdiagnose these patients as "difficult" and unintentionally place them at an increased risk of "re-traumatization" resulting in a negative birth experience, post-partum depression and possible impaired neonatal bonding.[2]

The Substance Abuse and Mental Health Service Administration (SAMHSA) outlines a "trauma –informed" approach to medical care using "4R's" (similar to many of our recent obstetric bundles):

Realize the impact of the trauma

Recognize the signs and symptoms of trauma

Respond by integrating trauma knowledge into policies, procedures, and practices

Resist re-traumatizing individuals

Although the source of our patient's prior trauma was not revealed, it was clear through our discussions that her irrational fear of surgery stemmed from childhood trauma. She had been "re-victimized" during two prior orthopedic surgeries in which she remembers being "strapped down" and having an oxygen mask that "suffocated her".

Ultimately she did have a cesarean delivery. She had her significant other in the room the entire time, the arm boards were removed from the operating room table and she kept her arms on her chest throughout the case. She received small doses of midazolam upon her request, and had no face mask. She enjoyed "skin-to-skin" bonding with her baby, and was tremendously grateful for what we helped her to do.

Through early identification, multidisciplinary care plans can be developed that allow for optimal understanding and respect for the patient's situation, and may pave the way for possible healing.[3]

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*"When Survivors Give Birth" is a informative book that discusses the effects of early sexual abuse on childbearing women and offers detailed information on how to apply trauma-informed care and begin the healing process.

Patient Safety Committee: "How We Do It" Expert Opinion
Quality Assurance on Labor and Delivery

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Introduction

Tracking and measuring quality in healthcare is a challenging endeavor but is increasingly a focus of individual providers, clinical departments, hospital systems, and governing bodies such as Centers for Medicare and Medicaid (CMS). CMS started the Physician Quality and Reporting System (PQRS) in 2007 with a stated goal to give clinicians the chance to assess the quality of patient care they provide as well as quantify how often they satisfied certain quality metrics.[1] Providers who fail to meet benchmarks for quality metrics or who simply do not report metrics are assessed a payment penalty on reimbursement for care, and this factors heavily into the idea of a value-based purchasing model. Unfortunately, many physicians do not believe that quality assurance (QA) initiatives are worth the associated administrative cost and do not believe that reporting on quality measures actually leads to realized quality improvement (QI) or improved patient care.[2]

Quality metrics for labor and delivery units are usually centered on obstetric care – i.e. rates of elective cesarean deliveries (CD) prior to 39 weeks[3], antenatal steroids, and exclusive breastfeeding.[4,5] Currently, there are no defined national standards for quality metrics in obstetric anesthesiology, although anesthesiology as a specialty is required to participate in quality reporting for CMS and reimbursement purposes. In 2014 the Maternal Quality Improvement Program (MQIP) was initiated as a joint effort between ACOG and the ASA to act as a national outcome registry for obstetric care and a way for clinicians to measure the overall quality of maternal care provided by their institutions.[6] The anesthesia metrics for inclusion in MQIP are not yet finalized and SOAP leadership is now helping to tailor the metrics to current obstetric anesthesiology practice.

Because we still lack standardized metrics for OB anesthesia, individual institutions must decide the metrics they wish to measure, how quality care should be monitored and reviewed and what should be done with those results. Certain quality items may lend themselves to monthly reporting (i.e. correct antibiotic administration for CD), while others require lengthier discussion and/or extensive review via root cause analysis (i.e.

unexpected neonatal demise shortly after delivery). Below are personal experiences from members of the SOAP Patient Safety Committee regarding quality assurance on labor and delivery. Table 1 provides an overview of current QI/QA practices at several institutions.

Examples of quality data collected for obstetric patients (including OB anesthesia metrics)

University of Iowa

QA surveillance data collected includes: perinatal core measures such as cesarean delivery rate, surgical site infections, catheter associated urinary tract infections, central line associated blood stream infections, breastfeeding and formula supplementation rates, patient care plan audits, patient falls, hand hygiene and patient satisfaction. Anesthesia related QA data reported via the anesthesia QA database includes, neuraxial block complications, drug errors (including near misses), unexpected drug reactions, airway management events, positioning related injuries, neurologic deficits, cardiovascular and respiratory events, equipment failures or any unsafe equipment related events.

Mayo Clinic

We collect specific obstetric anesthesia quality data abstracted

Table 1. Obstetric Anesthesiology Quality Assurance				
	University of Iowa	**University of Michigan**	**Mayo**	**Stony Brook**
Do you have a automatic quality report generated from EMR data?	Yes	Yes	No	No
Do you have a quality nurse available on labor and delivery?	Yes	Yes	Yes * ** We have a quality advisor; the position is not held by an RN.*	Yes
How often is quality data collected for providers?	Monthly	Monthly	Quarterly	Never
Is quality data reported to all providers? Is it deidentified?	Yes/Yes	Yes/Yes	Overall numbers for practice are provided. It is not separated out by provider.	No
Are the quality metrics used on L&D different than the general OR?	Yes	Yes	Yes	N/A
Is there financial incentive tied to meeting quality metrics?	No	Not from department, but from insurance payers	No	N/A
Do you discuss quality data with the OB and L&D nursing teams?	Yes	Yes	No	No
Do you have multidisciplinary quality metrics? If so, what?	No	No	No	No

from the Electronic Medical Record (EMR) (which is currently proprietary Mayo Clinic software). This information is collected from the anesthesia record and the "Post-Obstetric Assessment" form that is completed on the first postpartum day for every patient that receives anesthesia. For all CD we collect the number of general anesthetics (GA), failed regional techniques resulting in GA, and number of difficult intubations. For regional anesthesia we collect the following metrics: repeat/failed neuraxial techniques, accidental dural punctures, post-dural puncture headaches, epidural blood patches performed, high spinal or epidural requiring intubation, neuraxial infections, neuraxial hematomas, neurologic injury, and evidence of central nervous system toxicity. In addition, we track maternal events including maternal blood transfusion, postpartum intensive care unit (ICU) admission, and maternal cardiac arrest.

Stony Brook Medicine

Our obstetrical colleagues have a more robust QI program measuring clearly defined obstetric goals such as CD rate, successful vaginal birth after cesarean (VBAC) rate, and 3rd and 4th degree vaginal lacerations. Currently technological limitations do not allow full data collection of OB anesthesia quality metrics, but ideally our list would include: anesthesia complications (high spinal, cardiac arrest, infection, neuropathies), accidental dural puncture rate by provider, epidural failure/replacement rate in labor, neuraxial failure rate for CD, occurrence of GA for delivery, vasopressor need for labor epidural, incidence of postpartum hemorrhage (PPH) and blood transfusion practices.

University of Michigan

Data collection is accomplished by extraction from a combination of self-reported events and a predetermined list of measures that are documented in the anesthesia operative record, postoperative visit documentation, patient laboratory record, and an anonymous hospital-wide risk management reporting system. Reported items vary from causes of delayed case starts

to sentinel events. Currently, commonly reported events on our labor and delivery unit include medication errors, equipment malfunction, blood not being readily available, disruptive behavior, unanticipated difficult intubation, communication errors, causes of delayed cases starts, nerve injury, postdural puncture headache, inadvertent dural puncture, and infiltrated intravenous lines arriving from the labor floor to the OR.

OB Anesthesia quality item reporting techniques

University of Iowa

There is a quality officer assigned to the L&D unit and this individual is responsible for auditing of the electronic medical records to extract QA data. There also exists a hospital wide electronic self-reporting portal, where any healthcare provider can submit QA concerns and these concerns are addressed by the hospital quality office in liaison with the unit safety officers. Within the anesthesia department there is an electronic QA reporting system, the system sends out daily emails to all anesthesia providers soliciting reports of QA events including near misses.

Stony Brook Medicine

At the Labor and Delivery unit at Stony Brook Medicine, QA referrals can be made through the computer hospital patient safety reporting system called "SB Safe." This referral will trigger a review by a QA nurse with referral to appropriate departments (i.e. nursing, obstetrics or anesthesiology). Each QA referral will include patient information, description of the event, category of event and the participants. Additionally, QA referrals can be made directly to the Anesthesiology Department QA committee or the OB Anesthesia representative on this committee. The case is then reviewed with the goal of process changes to improve patient safety. The OB/Gyn department has a separate QA committee. Members of the OB anesthesia team attend these monthly meetings.

University of Michigan

At University of Michigan, the Department of Anesthesia utilizes their Anesthesia Quality Improvement Program (AQIP), which is comprised of anesthesiologists, project managers, administrative assistants and research personnel, to monitor and improve patient safety. Quality assurance metrics are obtained by electronic medical record data collection and reported as departmental, divisional, as well as individual provider performance statistics.

OB Anesthesia quality metric review

University of Michigan

Obstetric anesthesiologists will receive monthly reports on division requested metrics that are believed to ensure a safely run labor and delivery unit as well as identify potential arising issues. These metrics are customizable based on physician feedback, and are followed over time to observe trends. Current monthly reported metrics included the above mentioned metrics as well as operational information such as number of times two or more operations are running concurrently during the weekday 4pm-7am and on weekends and incidence of PPH. Monthly meetings are held to review the data with a project manager, and add or delete followed metrics to satisfy the division's changing needs. When a metric falls below an acceptable threshold, the team will create a corrective action plan, develop a process for implementation and assessment of outcomes.

Anesthesiology attendings, residents, and nurse anesthetists also receive monthly reports on their individual performance compared to others in their division. University of Michigan uses the program Anesthesiology Performance Improvement and Reporting Exchange (ASPIRE) to display nationally defined metrics such as gaps in vital sign monitoring > 10 minutes, failure to check train of four prior to reversal, transfusion without hematocrit documentation for estimated blood loss <2500ml, failure to treat glucose derangements, post-operative hypothermia, and over-transfusion defined as post transfusion hematocrit > 30%.[7] The program allows for assessment of variation in practice and patient outcomes.

Mayo Clinic

Our goal with our obstetric anesthesia data is to collect it quarterly and discuss the information during an OB Anesthesia division meeting and by email for those unable to attend. The metrics are presented as sum total for the practice and are not separated out by individual provider. In addition to reviewing that specific quarter's data, we also compare it to the data from the preceding quarters and years to analyze for trends in the recorded metrics.

Multidisciplinary quality initiatives

University of Iowa

Quality assurance data is analyzed monthly and the data is available electronically on tableau (Tableau Software, Seattle, WA) for review by individual healthcare providers. The data is also reviewed by the labor and delivery unit quality team. This team which comprises of obstetricians, midwives, anesthesiologists, nurses and the quality officer meets monthly and the collected QA data is used to drive quality changes or monitor implementation of goals.

Anesthesia related data submitted via the anesthesia QA database is reviewed by the anesthesia department quality officer and other members of the department's QA committee and some of the data is presented at the weekly clinical case conference.

Mayo Clinic

There is a monthly meeting of the Quality and Event Review Subcommittee to review cases that meet "trigger criteria" and then the committee decides what events require further analysis through a Multidisciplinary Process Review. The triggers include, maternal death, intrapartum or neonatal death (unexpected), hypoxic ischemic encephalopathy, uterine rupture, maternal ICU admission (unplanned), birth trauma, return to OR/Labor & Delivery (unplanned), admission to NICU (at term or >2500g), 5 Minute APGAR <7, blood transfusion (for post-partum hemorrhage), 3°or 4° laceration, rapid response calls, and maternal codes. After the events are reviewed, key learning points about the case are distributed to all providers who provide care on labor and delivery.

Stony Brook Medicine

One system that we have in place is a "Daily Charge Sheet." The L&D charge nurse will write down obstetric, neonatal or anesthetic complications or safety issues that had occurred during that day on L&D. This form is scanned and a PDF is sent to nursing, obstetric and anesthesia leadership daily allowing for early notification of events.

University of Michigan

Reported events are filtered by quality improvement staff and directed to the proper channels for review. Sentinel and safety events will receive a formal root cause analysis coordinated by the hospital's Office of Clinical Safety. Most complications will be included in the anesthesia department reported statistics at weekly Morbidity and Mortality conferences; however complex safety issues are reviewed by an obstetric anesthesiologist who will investigate the event and recommend further action to address the incident. These complex safety issues are brought forth for discussion at quarterly meetings with a multidisciplinary quality safety committee comprised of obstetricians, anesthesiologists and nurses.

Successful changes as a result of QA/QI reports

Mayo Clinic

We have developed benchmark goals for each of our metrics and have been able to institute change when goals are not met. For example, we were able to get a dedicated video laryngoscope in our emergency CD OR when it was noted that the difficult intubation metric was above the benchmark. Last year we also noted a trend of higher GA rates for cesarean delivery in patients with preexisting neuraxial anesthetics. This prompted

an multidisciplinary education initiative that was implemented for anesthesiologists, obstetricians, and nurses; and led to a reduction in GA rates in patients with preexisting neuraxial anesthesia.

Stony Brook Medicine

There have been several process changes implemented by our QA/QI program. Most have occurred after an event on L&D. For intrathecal medications, we currently have a two-person confirmation when drawing up spinal anesthetic medications to prevent a medication error. After an incident of PPH from uterine artery laceration with delayed recognition in the recovery room, we instituted a "debriefing" practice at the end of CD to review the intraoperative course and discuss any postoperative concerns. All latex gloves have been removed from the unit following an incident when a patient's latex allergy was not recognized during a STAT CD. For trial of labor after cesarean (TOLAC) patients, a small sign is now hung outside the door as a reminder to L&D staff. Ideally process changes in the future can be made on a more proactive basis.

Conclusion

As you see, the exact obstetric anesthesia quality metrics recorded and the process for QI/QA varies across institutions. However, there are several commonalities identified including: collection via direct EMR data extraction, provider reporting of events/ issues and use of information to help drive change. Regardless of the differences in process, continued vigilance in assessing quality outcomes is key to helping shape our practice with the goal of providing the best possible care for our patients. As MQIP development continues and implementation begins, perhaps we will finally have the opportunity for a wide-scale approach to obstetric anesthesia quality assurance.

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Education Committee: SOAP 2017 Teachers of the Year

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Congratulations to Dr. Philip Hess for being named the 2017 SOAP Teacher of the Year with greater than 10 years of experience!

Dr. Hess was an outstanding and deserving candidate for this year's award. He was identified as a gifted teacher by numerous residents and fellows and won multiple departmental teaching awards. Dr. Hess has taught and directed courses in obstetric anesthesiology at national and international meetings and CME programs. He served as a senior investigator on the development of a novel tool for teaching and learning epidural catheter placement and written several book chapters. Dr. Hess is the Chief and Fellowship Director of Obstetric Anesthesia at Beth Israel Deaconess Medical Center where he has created an obstetric anesthesia resident curriculum for resident learning and has helped junior faculty develop their teaching skills.

Congratulations to Dr. Heather Nixon for being named the 2017 SOAP Teacher of the Year with less than 10 years of experience!

Dr. Nixon has been identified as an outstanding and talented educator in obstetric anesthesiology. She has received several departmental teaching awards and the 2016 SOAP Research in Education Award. Dr. Nixon has a strong commitment to mentoring and educating others in the practice of obstetric anesthesia and is pursuing a Master's Degree in Health Professionals Education.

Serving as the Residency Program Director and Associate Head of Education at the University of Illinois at Chicago Medical Center (UIC), Dr. Nixon has created many innovative educational initiatives to enhance resident education and has co-authored several book chapters and web-based educational materials. In addition, Dr. Nixon provides courses to both the Maternal Fetal Medicine Fellows and the OB/Gyn residents at her home institution. Previously, Dr. Nixon also served as the Fellowship Director of Obstetric Anesthesia at UIC.

Congratulations and *thank you* to both Drs. Hess and Nixon for their extensive contributions to obstetric anesthesia education!

Neuraxial Anesthesia Versus General Anesthesia for Cesarean Hysterectomy for Morbidly Adherent Placenta

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The incidence of morbidly adherent placenta (accreta, increta, percreta) has increased dramatically in the past three decades, with most recent rates reported as 1:272 deliveries in the United States[1]. It is associated with severe antepartum and postpartum hemorrhage, massive blood transfusion, and maternal death. The obstetric management for morbidly adherent placenta (MAP) recommended by the American College of Obstetricians and Gynecologists is elective cesarean hysterectomy at approximately 34 weeks gestation to optimize both maternal and fetal outcomes.[2] Cesarean hysterectomy for MAP has been associated with significant blood loss, need for massive transfusion, disseminated intravascular coagulation, need for vasoactive medications, cardiac arrest, and maternal death.

Controversy exists regarding what anesthetic technique is most appropriate for patients undergoing cesarean hysterectomy for MAP. Currently, there are no specific recommendations in the Practice Guidelines for Obstetric Anesthesia provided by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia or the Society for Obstetric Anesthesia and Perinatology regarding the preferred anesthetic technique for this surgery.[3] Neuraxial anesthesia (NA) and general anesthesia (GA) techniques have been used, with favorable maternal and fetal outcomes reported for both4. This article will discuss both techniques as a debate.

PRO Neuraxial Anesthesia (NA)

Historically, when major blood loss was expected during cesarean hysterectomy for morbidly adherent placenta, GA was employed to provide a stable, steady, familiar anesthetic. However, with more recent uterine sparing surgical techniques, advances in diagnostic imaging, and multidisciplinary planning, hemorrhage risk has been reduced dramatically for many cases of MAP, thus NA for cesarean hysterectomy is increasingly being utilized.

The benefits of NA are many, most significantly allowing patients to be awake to experience the birth of their newborn while also allowing family members to be present for this momentous, yet potentially catastrophic event. The use of NA is essential for the initial skin-to-skin bonding period for mom and baby, which is known to have positive maternal and neonatal effects. NA provides patients not only with excellent intraoperative anesthesia, but postoperative analgesia options as well. The ability to provide patients with long acting neuraxial opioids along with the option to utilize an indwelling epidural catheter can effectively limit postoperative pain. It is also increasingly prudent to minimize exposure of anesthetic drugs, specifically GA agents, to pregnant women and fetuses given the recent FDA drug safety communications regarding the use of anesthetic drugs in pregnant women (FDA communication, 12/14/2017 and Update Communication, 4/27/2017). Thus there is increasing effort to avoid GA for pregnant women when possible. At our institution, a combined-spinal epidural is the preferred anesthetic technique for cases of cesarean hysterectomy due to MAP. As long as the patient is hemodynamically stable, comfortable, and blood loss is controlled, NA is used for the entire procedure. In most cases this allows for the avoidance of intubation. Conversion to GA is performed only if necessary, although it is important to always be prepared for airway management should the need arise. If conversion to GA is necessary, family members are asked to leave expeditiously by our very experienced care team.

There are a number of additional factors which may lead one to choose NA for cesarean hysterectomy, the first being the diagnosis of MAP. With the use of MRI and/or color Doppler ultrasound techniques, antenatal diagnosis is the standard and has allowed for early detection and diagnosis of patients with high potential for MAP.[6] Early diagnosis allows for multidisciplinary planning and early delivery. Although not perfect, improving diagnostic technology can help predict which cases might experience less chance for severe bleeding based on placenta location and invasiveness. Issues such as blood availability and invasive line placement, along with therapeutic options such as hypogastric artery balloon placement can be discussed and planned. The use of NA can be advantageous in these cases where there is accurate preoperative assessment of MAP. Having a thorough assessment and perioperative plan decreases the likelihood of experiencing intraoperative decompensation necessitating conversion to GA. While most cases do not need conversion to GA, it is essential to be prepared to convert expeditiously and without delay.

The capabilities of individual institutions are another important factor influencing the anesthetic technique. Once the diagnosis is made, the next step would be preparation for major hemorrhage, which includes the ability to provide large volume resuscitation, the presence of a blood bank with adequate availability of blood products, massive transfusion capabilities, the capacity to carry out point-of-care testing such as TEG or Rotem analysis, and the ability for additional procedures such as internal iliac (hypogastric) artery balloon placement or uterine artery embolization. A recent article looked at one tertiary care referral center over 4 years aimed at reducing maternal morbidity by creating multidisciplinary teams as soon as a diagnosis of abnormal placentation was made. They utilized NA in 70% of cases, and found that women whose pregnancies had the greatest number of multidisciplinary components in place had a significant reduction in the risk of developing serious maternal morbidities.[7] Outcomes are further improved if delivery of the morbidly adherent placenta is performed in a center of excellence for placenta accreta with a multidisciplinary team with expertise and experience in the management of accreta, regardless of anesthetic technique.[8] Interestingly, some centers consistently use NA while others prefer GA. Many of these centers use checklists, which have been proposed to help manage difficult cases and allow for consistency within institutions and also helps to streamline their process.[9] It has also been shown that there is a reduction in maternal morbidity and mortality if patients with morbidly adherent placentas deliver at regional tertiary care centers rather than smaller community hospitals.[10] Once hospitals can prepare effectively for these patients, it may be easier to implement NA into the patient's perioperative anesthetic plan and reduce the rates of conversion to GA.

In addition to facilitating excellent postoperative analgesia, allowing for early family bonding, reducing the need for airway instrumentation, and decreasing anesthetic exposure to the fetus, the use of NA can mitigate uterine atony by avoiding the use of volatile anesthetics. Additionally, NA provides excellent anesthesia for the placement of preoperative balloon catheters with easy transition to surgical anesthesia for cesarean hysterectomy. The use of internal iliac (hypogastric) artery balloon catheters for occlusion of bleeding vessels is a widely practiced technique that requires appropriate facilities, personnel and planning. Although catheter placement can be accomplished under local anesthesia, in cases where IR techniques are going to be used, it may be preferable to utilize NA.

PRO General Anesthesia

Although cesarean hysterectomy for MAP has been performed successfully under NA, elective GA is a better option for these patients. These procedures have certainly been done without any blood transfusions,[12,13] but the greatest concern is the potential for maternal hemorrhage. Conversion rates from NA to GA during cesarean hysterectomy for MAP due to hemodynamic instability have been reported as 24%[5] and 35%.[12] Patients who already have a sympathectomy from NA and actively bleeding may experience significant hypotension with induction of GA in an urgent situation.

Thus, elective GA is often chosen when the anticipated blood loss and need for transfusion is high. Although this conservative approach may not be needed in all cases, it is difficult to predict how much bleeding will be encountered in an individual case. The degree of placental invasion has not been associated with blood loss volumes and transfusion volumes.[14-16] Therefore, less invasive placentation does not reliably predict significantly less blood loss requiring lower transfusion volumes. Accordingly, the risk:benefit ratios for NA and GA is influenced by the likelihood that the patient may hemorrhage. Although NA may be used to facilitate preoperative placement of balloons, local anesthetic for placement followed by GA has been used successfully in cases of IR assistance. Because we still do not reliably know which patients will hemorrhage, GA may be prudent in most cases.

Concerns with the use of GA for CD include airway complications. Even with the availability of video laryngoscopy and the use of difficult airway algorithms, the risk of failed intubation during CD in the last 10 years is 1:533-1:224 general anesthetics.[21] When GA is elected preoperatively, however, this risk is managed in a controlled setting with appropriate pre-oxygenation, space, and personnel. Avoiding a difficult airway initially with NA may lead to the much less desirable emergent management of that airway intraoperatively under less optimal circumstances (e.g. hemorrhage). When nearly every third case needs an intraoperative conversion to GA, would it not be advised to start with GA in the first place? Elective GA also allows for awake fiberoptic intubation if that option is preferred to an asleep intubation.

Although there is concern about exposing the fetus to GA, strategies may be utilized to minimize fetal exposure to volatile anesthetics. Peripheral intravenous catheters, rapid infusion catheters, central venous lines, and arterial lines may be placed prior to induction of GA. Dexmedetomidine 0.4 and 0.6 mcg/kg/h has been reported to reduce the minimal alveolar concentration of sevoflurane during GA for cesarean delivery without significant differences in Apgar scores at 1 and 5 minutes, Neurologic and Adaptive Capacity Scores, umbilical vein pH or base excess compared to placebo.[22] Additionally, remifentanil is an ultra-short acting opioid that can be used for maternal analgesia intraoperatively. It has been shown to decrease minimum alveolar concentration for non-obstetric patients during general anesthesia.[23] It has a rapid onset, short half-life, low context sensitive half time and is metabolized rapidly in the fetus.[24] In an observational study, it was used an adjunct to volatile anesthesia for women having cesarean hysterectomy for MAP with no differences in Apgar scores at 1 and 5 minutes, umbilical vein pH and base excess, oxygen administered, mask ventilation, or intubation immediately postpartum for doses 0.06-0.46 mcg/kg/min compared to no opioid prior to delivery.[25] The use of a Bispectral Index monitor may be prudent when using reduced doses of volatile anesthetics to monitor for intraoperative awareness. Women undergoing GA for cesarean hysterectomy have many options for postoperative pain control. Preoperative intrathecal opioids, preoperative

epidural catheter placement, and postoperative transversus abdominis plane blocks are all effective and reasonable options for these patients.

Cesarean delivery is a unique surgery in which family members may be present intraoperatively to experience the birth and provide support for the awake mother. The beneficial effects of initial skin-to-skin bonding of mother and baby are many, as mentioned previously. However, the operative times of cesarean hysterectomy for MAP are considerably longer than those of routine cesarean delivery. Even when surgery proceeds smoothly it may be difficult for patients to remain comfortable for the entire procedure, despite a working NA block. Contrariwise, if acute decompensation does occur intraoperatively, consideration must be made to the possibility of a mother experiencing fear intraoperatively, as well as she and her family member remembering the event negatively.[26] In addition, minor transfusion reactions and breathing difficulties that can occur with blood product administration and volume expansion may not be well-tolerated by an awake patient. The previously mentioned high conversion rate from NA to GA and potential for massive hemorrhage, coupled with these other important factors, are reasons why it may be prudent to use elective GA for cesarean hysterectomy for MAP.

Summary:

Regardless of the anesthetic technique chosen and the level of resources present to manage MAP, the use of a multidisciplinary care team model and appropriate perioperative planning have been shown to be effective in reducing maternal morbidity and mortality. When choosing an anesthetic technique, it is important to consider many factors, including the individual patient, the preoperative diagnosis and assessment, the resources of your institution, the planned surgical technique, and the experience of the surgeons. In advocating one anesthetic technique versus another, it should be realized that the optimal technique may vary from patient to patient and institution to institution.

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