Continuing Medical Education

Challenges in obstetric anesthesia and analgesia

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THE new challenges facing those practicing obstetric anesthesia are reflective of changes in the demographics of the Canadian parturient. The average age of the pregnant woman is rising, from 23.7 years in 1969 to 29 years in 1999, with 45% of first babies occurring in women older than 30 years.¹ There are specific adverse pregnancy outcomes associated with parturients older than 35 years, such as stillbirth, premature labour and Cesarean delivery, all of which affect anesthesia workload.² Modern medicine is saving lives of children with various congenital diseases and extending the lives of young adults with serious systemic disease; and their desire to have their own children is often very high. Assisted reproductive technologies have advanced considerably, allowing older women and women with chronic disease to conceive, as well as increasing the number of pregnancies with multiple fetuses.

With increasing maternal age comes increasing numbers of women with co-existing diseases such as hypertension and coronary artery disease; in fact, the latest Confidential Enquiries in Maternal and Child Health (CEMACH) identify cardiac disease as the number one cause for maternal mortality in the United Kingdom in the 2003–2005 triennium, responsible for 15% of maternal deaths.³ This is the first time that thromboembolism has been surpassed as the number one cause of maternal mortality. Although absolute maternal mortality from cardiac disease is low, serious morbidity from heart failure, stroke and arrhythmias does occur; a common error is to attribute cardio-respiratory symptoms to the physiologic changes of pregnancy. Coronary artery disease manifesting in pregnancy is no longer a rarity - the majority of maternal deaths in the United Kingdom from cardiac causes were secondary to myocardial infarction and/or ischemia.³ The diagnosis must be high on our list of differentials for chest pain in pregnancy, and the obstetrical team should not hesitate to apply principles

of care for cardiac ischemia including consulting cardiology early for the possibility of thrombolysis and/or stenting.³ Arrhythmias in pregnancy associated with structural disease have a relative risk of an adverse maternal cardiac event of 3.4, as well as increasing the risk of premature delivery.⁴ Management of arrhythmias in pregnancy challenges the obstetrical team: the unfamiliarity of dealing with women with pacemakers or implantable defibrillators, and the uncertainty about which drugs are considered to be acceptable to use in pregnancy.^{5,6}

The second challenge is the rising incidence of obesity in the pregnant population. Morbid obesity has been identified in the last two CEMACH reports as an independent risk factor for maternal mortality with more than half of the women who died being overweight or obese.³ There is considerable recent evidence indicating that obesity in pregnancy is an independent risk factor for adverse pregnancy outcomes, including hypertension, diabetes, intrapartum fetal distress and Cesarean delivery.⁷ For anesthesiologists, the morbidly obese parturient presents an increased risk of failed regional and a difficult/failed airway.⁸ Advanced consultation, early provision of regional labour analgesia, obsessive attention to details such as positioning (for both regional and general anesthesia),⁹ and preparation for the worst case scenario are necessary.¹⁰ Changes in our usual technique may be necessary - from the anesthetic doses we use¹¹ to the use of ultrasound to assist epidural placement.^{12–14} Ultrasound will likely improve our ability to provide effective anesthesia in the obese parturient, although unfortunately unlikely to help us predict spinal anesthesia dosing in these women who fall outside the average range for height and weight.¹⁴ Obese women have a much higher risk for urgent/emergent Cesarean delivery;^{7,10} from an anesthetic perspective having a flexible regional technique is optimal, as we wish to avoid general anesthesia, and single-shot spinal techniques are risky from the perspectives of

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choosing an appropriate dose and the unpredictable duration of surgery.

The recent literature has also challenged us to change some traditional obstetric anesthesia practices: for instance phenylephrine has proven to be a superior vasopressor than ephedrine for the fetus/neonate;¹⁵ and, that despite the generally young and healthy status of the pregnant population, normotension at Cesarean delivery should be our goal as even modest degrees of hypotension may be detrimental to the fetus/neonate.¹⁶ Anesthesiologists are investigating many aspects of anesthetic technique for Cesarean delivery in order to reduce the high incidence of hypotension with spinal anesthesia at Cesarean delivery. Practices that have been investigated include: using low dose spinal bupivacaine with relatively high dose fentanyl¹⁷ or a combined spinal-epidural technique;¹⁸ varying the speed of injection;¹⁹ administering vasopressors prophylactically,^{15,20,21} and providing fluid loading.²¹ More sophisticated models have been proposed, such as using baseline heart rate²² or heart rate variability²³ to anticipate hypotension, or dural sac dimensions to predict spread of local anesthetic.²⁴ These models have limited usefulness. The popularity of regional anesthesia for Cesarean delivery does not totally eliminate the need to be ready to administer a general anesthetic.²⁵ Recently, how we provide a rapid sequence induction in this typically high-risk population is being challenged: how to pre-oxygenate, the efficacy of cricoid pressure, and the value of maintenance of apnea prior to intubation, in a review by one of the Canadian experts in airway management.²⁶ In addition, the laryngeal mask airway has established a place in the management of the difficult obstetrical airway.²⁷

We are now regularly confronted with pregnant women with a variety of diseases, with little in the literature other than case reports to guide us in their anesthetic management. So, what are some of the general principles we should apply in order to provide women who have complex conditions with safe labour analgesia and anesthesia for delivery?

- 1) Understand the physiologic changes of pregnancy and how these interact with maternal disease. The cardiac physiologic changes of pregnancy stress the abnormal heart; those at risk for cardiac events should have particular attention paid to them starting at 28 weeks when peak cardiac output and blood volume occurs (outside of labour). An excellent summation of the cardiac and respiratory changes of pregnancy are found in Saravanakumar's review on anesthetic management of the obese parturient.¹⁰
- 2) Ensure that access to antepartum anesthesia consultation is easy and offer our obstetric colleagues a list of "reasons" for consultation as this enhances the safety of anesthetic care. Communication failure has been identified regularly in CEMACH and other expert reviews as an important contributor to adverse outcome in obstetrics.³ Obstetrical care providers are not all necessarily aware of anesthesia concerns for various medical problems even as simple as morbid obesity. Therefore it is our responsibility to provide not only the consultation service but also advice on who we wish to see antenatally.
- 3) Do appropriate testing to ensure pregnant women have been adequately assessed, and use the advances in technology at our disposal including the use of ultrasound to guide regional techniques and of echocardiography intrapartum to guide care of women with cardiac disease.^{12,28}
- 4) Consider inserting an epidural catheter sited early in labour, as it:
 - a. Controls sympathetic responses to second stage labour and allows for reduction in need for repeated Valsalva maneuvers both of which are significant cardio-respiratory stressors.
 - b. Provides us with the ability to provide, in most cases, rapid anesthesia for Cesarean delivery.
- 5) Be aware that anticoagulation in pregnancy is being used with increasing frequency, for women with cardiac disease and for the increasing numbers of women diagnosed with thrombophilias. While plans may be in place for switching to unfractionated heparin at term, these women often present in premature labour having received a recent dose of low molecular weight heparin. Anesthesiologists need to develop consistent guidelines for use of regional anesthesia/analgesia in anticoagulated parturients and understand the risks of epidural hematoma.²⁹ The incidence of major complications following regional anesthesia in obstetrics has been reviewed systematically by Ruppen *et al.*³⁰
- 6) Whenever in doubt, use a titratable regional technique rather than single-shot spinal; it provides flexibility and better hemodynamic control.
- 7) Manage hypotension aggressively during a regional. Traditionally, fluid loading was considered the main strategy to avoid decreases in blood pressure, with ephedrine being the vasopressor of choice. Recent studies support the notion that infusion of large fluid volumes is not necessary, that phenylephrine is the preferred vasopressor, and that its prophylactic use may be a good idea.^{15,21}
- 8) Provide sedation judiciously, as anxiety during

Cesarean delivery is frequent, and its treatment may be safe and appreciated by the parturient.³¹

- 9) Be prepared for a general anesthetic in case of sudden fetal distress. Although rapid sequence induction with tracheal intubation remains the standard technique, persistent attempts to intubate increases maternal risk,²⁶ and the laryngeal mask airway has become an acceptable early airway rescue device.²⁷

Objectives of this continuing medical education module:

- 1) To address how to best manage the various considerations of a complex obstetric case, as it evolves from early labour to delivery.
- 2) To understand the issues of arrhythmias in pregnancy.
- 3) To appreciate the anesthetic problems of obesity in pregnancy.
- 4) To apply the latest guidelines on regional anesthesia in the anticoagulated patient.
- 5) To predict and prevent hypotension at Cesarean delivery.

The objectives of this module are covered in the recommended highlighted articles below. Further information is contained in the other references. After reading the material, you are invited to answer questions about the following case:

You are in the Anesthesia Consult clinic, your next patient is a 39-yr-old G3P0 at 31 weeks gestation who has Factor V Leiden deficiency and long QT syndrome. She is 5 feet tall and weighs 205 lbs.

- 1) How are arrhythmias managed in pregnancy?
- 2) Which adverse pregnancy outcomes are associated with obesity?

This woman presents in labour at 36 weeks gestation and is requesting labour analgesia. Her last dose of dalteparin (Fragmin) 10,000 U daily was eight hours ago.

- 1) What will you offer her for labour analgesia?
It is 15 hr since her last dose of Fragmin and she is 5 cm dilated.
- 2) How would you initiate her labour epidural?

A Cesarean delivery is planned. On the way to the operating room her epidural catheter is accidentally pulled out. Airway examination reveals a Mallampati class I view with short neck, normal thyromental distance and mouth opening.

- 3) How will you provide anesthesia for Cesarean delivery?
- 4) If the catheter had not been pulled out, how confident would you be that the procedure could be done under epidural anesthesia?

The uterus is being approached when suddenly the woman goes into a wide complex tachycardia at 180 beats·min⁻¹ and her blood pressure falls to 85/50.

- 5) What is your first treatment option?
There is a fetal bradycardia to 70 beats·min⁻¹ that does not recover. A STAT Cesarean is requested by the obstetrician.
- 6) How would you induce general anesthesia?
Two years later, this woman is pregnant again and she is booked for an elective Cesarean delivery at 39 weeks for breech position.
- 7) How can you reduce the likelihood of hypotension from regional anesthesia?
- 8) She is extremely anxious and fearful of the needle in her back. What will you offer her?

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