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What's New in Obstetric Anaesthesia?

Dr Matthew Drake

Specialist Obstetric Anaesthetist, National Women's Health.

This session will briefly cover some of the new ideas, variations on existing themes and a paper that challenges one of the fundamental doctrines of obstetric anaesthesia. In addition, some recent reports, publications and guidelines relevant to the obstetric anaesthetist will be reviewed. I have hand-searched the major journals for publications relevant to obstetric anaesthesia from the last two years or so and will present, what I think, are the most interesting, important and thought-provoking of these from the topics that will not be covered elsewhere at OASIS.

There is insufficient time today to present more than the main findings of studies and some useful take-home messages, however the presentation will follow the sequence of the references listed below so you can review the evidence in more detail at your leisure.

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Labour epidurals

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Blood pressure too high

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Enhancing Recovery after Caesarean Section

Dr Sharon Rhodes Specialist

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Although well established in other surgical specialties with published evidence of improved patient satisfaction and reduced length of hospital stay in the United Kingdom, Enhanced Recovery is a relatively new concept in obstetrics[1]. We wished to enable mothers to make the transition from being a patient having undergone surgery to a mother able to bond and care for her baby much earlier in her postoperative recovery, but without detriment to satisfaction or safety. We felt this could be achieved through adaptation of the established principles of enhanced recovery in other surgical disciplines to Obstetrics, by redesigning our current care pathway to facilitate patients' ability to overcome the physiological and psychological stresses of surgery more quickly than existing postoperative care.

A multidisciplinary group of obstetricians, midwives, anaesthetists, pain team and patient representative was formed in 2013 to begin developing EROS. The results of an anonymous patient questionnaire and retrospective notes audit were central to the development of a detailed EROS pathway. Responses had shown patients felt the presence of the urinary catheter, analgesia pumps and intravenous access hindered mobility and ability to care for their baby. The EROS pathway therefore encouraged early mobilisation at 6 hours; removal of the urinary catheter 8 - 12 hours postoperatively; early drinking and eating post- surgery; and comprehensive guidelines for earlier transition to oral analgesia with discontinuation of analgesia pumps. A patient information booklet was revised and updated to include details of enhanced recovery with expected goals for recovery on days 0, 1 and 2 of their hospital stay, and a pictorial medicines chart to aid their understanding of, and ability to ask for, analgesia. We staggered report times for CS lists and encouraged patients to drink until 2 hours prior to their surgery to limit dehydration, including a carbohydrate drink (unless diabetic).

Enhanced Recovery after Obstetric Surgery (EROS) was introduced in August 2014 for all women following planned Caesarean Section (CS) at National Women's, Auckland City Hospital. We repeated the anonymous patient questionnaire and notes audit in November 2014[2].
With the multitude of private and public lead maternity carers working at our institution, introduction of a standardised care pathway for a surgical speciality that was not familiar with the principles of enhanced recovery was extremely challenging, and required multiple meetings with various stakeholders. A healthy dose of scepticism was encountered before its introduction from all members of the multidisciplinary team. However, having seen first-hand the more rapid return of patients to being self-caring and able to care for their newborns, many staff have become "EROS enthusiasts". We still have room for further improvement to maximise the possible benefits of EROS, and intend to repeat our audit and patient questionnaire after a further period of

intensive education. Because elective and emergency patients are cared for on the same postnatal wards, some of the principles of EROS for elective surgery have started to be applied to emergency obstetric surgery. Once EROS has truly become the norm for elective patients, we intend to formally apply appropriate parts of the enhanced recovery pathway to emergency patients, so that they too can realise the maternal and neonatal benefits of more rapid recovery after surgery. Overall our experience of enhanced recovery has been positive, and we would encourage other units to examine whether the common sense fundamentals of enhanced recovery can be adapted for their obstetric patients' pathway.

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Blood Conservation Strategies in Obstetric Surgery

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Cell salvage (IOCS) in obstetric surgery is a technique that is endorsed by CEMACH, NICE, The UK Cell Salvage Group, AABGI, OAA and the National Blood Authority of Australia (NBA).
Reducing the loss of total red cell mass intra-operatively is the second pillar of perioperative Patient Blood Management as described by the NBA. IOCS is one technique that can support this clinical goal. It is also often the only mechanism for return of red blood cells (RBC) that may be acceptable to Jehovah's Witnesses.

Post-partum haemorrhage remains one of the leading causes of maternal morbidity and mortality both locally and internationally. Each unit of allogeneic RBC transfused increases perioperative risk to patients. Theoretical risks of amniotic fluid embolus with obstetric IOCS exist but have not been reported in the literature.

This talk will outline the experiences at Auckland City Hospital since the formal introduction of obstetric IOCS including patient selection and standard operating practice in our theatre suite. Intravenous iron is a therapy used to optimise red blood cell mass preoperatively. Parenteral iron has also been shown to be efficacious in the antenatal setting. Anaemia is the most common nutritional deficiency internationally and is a public health issue. After 28 weeks the demands of the fetus for iron from the mother increase markedly. This can cause iron deficiency (ID) and iron deficiency anaemia (IDA) leaving the woman more vulnerable to the risks of post-partum haemorrhage (PPH) and associated transfusion at delivery.
The use of parenteral iron is recommended by the NBA when rapid restoration of Hb and iron stores is required in pregnancy. This talk will outline the implementation of a clinical pathway for investigation and management of antenatal ID and IDA at Auckland City Hospital. This pathway includes both oral and iron therapies according to a flow chart. More recently we have used parenteral iron in the postnatal period after PPH or with pre-existing IDA. I will outline when it may be appropriate to use as an "alternative" to red cell transfusion with a review of the current literature.

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Management of PPH from a Haematological Perspective

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Postpartum haemorrhage (PPH) is a major global cause of maternal mortality and morbidity. Attempts to minimize the clinical impact of PPH include primary prevention with measures to increase the awareness of women who are at risk from PPH, but most women with major PPH do not have identifiable risk factors. Minimising adverse outcomes includes ensuring a rapid recognition and response to postpartum bleeding with education emphasizing the importance of early transfer and escalation of care to secondary or tertiary centres for women who do not respond to initial measures. A coordinated response for women with uncontrolled bleeding includes the use of effective uterotonic agents, transfusion with blood and plasma products to maintain circulating blood volume and tissue oxygenation and correct coagulopathy; obstetric assessment for problems such as retained placenta, genital tract trauma and interventions such as balloon tamponade, uterine artery embolization and hysterectomy.

A critical feature of obstetric haemorrhage is development of coagulopathy, particularly early-onset coagulopathy that develops even before massive transfusion causes haemodilution. Early consumption of fibrinogen followed by hyperfibrinolysis is a feature of obstetric complications such as placental abruption, amniotic fluid embolism and retained foetus after intrauterine demise but even in PPH not due to these conditions early consumption of fibrinogen is described. Studies have shown that when PPH is diagnosed, women with lower mean levels of fibrinogen go onto develop more severe haemorrhage. These hypothesis-generating observational studies support the association of a low fibrinogen concentration with development of more severe haemorrhage. They do not answer the important question as to whether early replacement of fibrinogen will modify the risk of severe haemorrhage developing subsequently. A recently published study by the Danish group: FibPPH (Pre-emptive treatment with fibrinogen concentrate for postpartum haemorrhage: randomized controlled trial) by Wikkelso et al demonstrated no benefit in terms of the reduction of transfusion of red blood cells in women who have a normal fibrinogen at the time of bleeding. The mean fibrinogen concentration at time of enrolment was 4.5g/L with a range of 3.2 – 5.8 g/L; none of the women in the study had a fibrinogen under 3g/L. We know from other studies that fibrinogen less than 3.2g/L is a predictor of the severity of PPH and in trauma and cardiothoracic surgery low fibrinogen of less than 2g/L is associated with more severe bleeding. The approach to management of obstetric haemorrhage involves immediate resuscitation with fluid to maintain circulating blood volume, with rapid recourse to transfusion of red blood cells to maintain tissue oxygenation. At the same time an obstetric survey is required to identify and treat the cause of bleeding, which in the majority of cases will be due to uterine atony, with retained placenta and genital tract trauma remaining important causes. Coagulopathy frequently occurs

early in the setting of PPH and urgent bloods should be taken for standard coagulation studies, which are increasingly being supplemented by point-of-care testing using thromboelastography or ROTEM.

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Obstetric Difficult and Failed Intubation – Are the New Guidelines a Panacea or Perplexity?

Dr Mark Moll,

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Difficult and failed intubation (FI) in obstetric general anaesthesia (GA) is well known to be much more common than in anaesthesia for the general population. A recent large prospective case control study found FI occurs in 1 in 224 GA for caesarean section (CS)[1]. The incidence has remained largely unchanged over the last four decades[2], despite huge advances in equipment to manage airways. Postulated reasons for the ongoing high incidence of obstetric FI are a decline in the number of cases of GA for CS, reduced experience for anaesthetists in training and an increasingly complex maternal population.

It is widely recognised that several maternal, fetal, surgical and situational factors are in play when managing anaesthesia for CS. Previously published non-obstetric intubation guidance does not take into account these factors, in particular the fact that surgery is often being performed with extreme urgency to ensure the wellbeing of the fetus as well as the mother.

To address this, the Obstetric Anaesthetists' Association (OAA) and Difficult Airway Society (DAS) in the United Kingdom have developed the first stand-alone guidelines for the safe management of DI and FI during obstetric GA[3].

This talk will take a critical look at the OAA/DAS guidelines and present the process and evidence base behind their development. Particular areas I will cover include a framework for ensuring safe GA in the obstetric patient, recommended management after obstetric FI, management of the 'can't intubate can't oxygenate' (CICO) scenario, factors to consider when making a decision on whether to awaken or proceed with GA should intubation fail and practical considerations of how to awaken or proceed with surgery.

I will also touch on obstetric airway cases from morbidity reviews, the role of the supraglottic airway device in anaesthesia for CS, evidence for use of video laryngoscopy in obstetric anaesthesia and safe extubation of the maternal airway.

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Anaesthetics and the developing Brain – another reason to avoid General Anaesthesia in Obstetrics?

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Human central nervous system development involves a number of processes starting in the foetus and continuing beyond infancy. These processes include neurogenesis, apoptosis, migration, synaptogenesis and myelination. Synaptogenesis and apoptosis occur from the mid trimester with peak activity occurring around birth. Some areas of the brain lose up to half of the original neurons during normal development due to physiological apoptosis; a complex process, in part involving NMDA and GABA receptors.

Initial work in rats demonstrated that exposure of the developing brain during the period of synaptogenesis to ethanol, (which has both NMDA antagonist and GABA mimetic properties) triggered widespread apoptotic neurodegeneration. Since then studies of anaesthetic agents in both the rat model and more recently in monkeys has shown that anaesthetic agents acting predominantly as NMDA antagonists (Ketamine, N_2O) or GABA mimetic agents (inhalational agents, propofol, etomidate, benzodiazepines) trigger widespread apoptotic neurodegeneration. Furthermore some of these studies have demonstrated learning and cognitive defects in the animals studied. These detrimental effects appear to be age dependent with maximal effects seen at the peak of synaptogenesis.

The relevance of these animal models to human neonates and infants is contentious as our development is more prolonged and neurocognitive development performance more complicated. It may be that the effects seen in the 7-day old rodent model often used, represents effects likely to be equivalent to a mid-term human foetus rather than pre-term or term neonate as originally thought.

Clinical studies have started to appear following cohorts of healthy children undergoing anaesthesia for a variety of procedures, and examining a variety of neurobehavioral outcomes, including learning disabilities, developmental abnormalities, behaviour disorders and academic performance. Clinical studies have their limitations but a review of the published human studies to date suggests little or no association with single brief exposures but some association between repeated exposure, with poor performance on a variety of nonspecific tests of cognition and behaviour. The hazard ratio in almost all of these studies is lower than 2, implying that bias or confounding factors could easily account for the association[1].

Limited information is available for the developing foetus. Exposure of foetal mice to sevoflurane has been shown to show changes suggestive of neurotoxicity with cognitive impairment at postnatal day 31[2]. A clinical study examining learning disabilities (LD) in children following Caesarean section under GA showed they were no more likely to develop LD compared to children

delivered vaginally, suggesting that brief perinatal exposure to anaesthetic drugs did not adversely affect long-term neurodevelopmental outcome[3].

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