Anaesthesia for the changing obstetric population: challenges and solutions

This article outlines the main challenges facing the obstetric anaesthetist as a result of the changing obstetric population and identifies some solutions which may help overcome such challenges in the future.

Obstetric anaesthetists are devoted to the comprehensive anaesthetic management, perioperative care and pain management of women during pregnancy and the puerperium. They continue to strive to improve satisfaction and safety as the speciality develops as well as contribute towards efficiency savings for the NHS. To achieve these goals obstetric anaesthetists must respond to the ever-evolving challenges that the speciality presents. This article focuses on the challenges faced as a result of a changing population which come at a time when the birth rate is already rising, and attempts to address some of the solutions that may help to overcome such challenges in the future.

Changes in the obstetric population

The obstetric population is changing rapidly as a result of increases in the prevalence of obesity, advanced maternal age, the prior existence of comorbid disease and advances in infertility treatment leading to higher-order multiple gestation.

Obesity

The Centre for Maternal and Child Enquiries (2010) argues that obesity is the biggest challenge facing maternity services today, reporting that almost one in five pregnant women in the UK is obese. The major maternal complications reported by Castro and Arina (2002) to be associated with obesity during pregnancy include hypertensive disease (chronic hypertension and pre-eclampsia), diabetes mellitus (pre-gestational and gestational), respiratory disorders (asthma and sleep apnoea), thromboembolic disease and infections (primarily urinary tract infections, wound infections and endometritis).

Physiological changes associated with pregnancy are significant enough to have serious anaesthetic implications. When these are compounded by obesity, the anaesthetist may have to deal with a patient with seriously limited physiological reserve. These patients can pose great challenges to the obstetric anaesthetist, in particular an increased incidence of difficult or failed intubation as well as increased difficulty in maintaining adequate mask ventilation. Difficulties with regional anaesthesia reported by Leykin and Pellis (2009) include technical difficulties in performing a regional technique, achieving adequate positioning for a block, identifying appropriate landmarks, choosing a needle of appropriate length and choosing appropriate drug doses of local anaesthetic.

The 2011 Centre for Maternal and Child Enquiries' report on maternal deaths reported that a disproportional number of maternal deaths occurred in women who were either overweight or obese (49%) compared to those with a normal body mass index. This figure remained the same in the most recent MBRRACE-UK (Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK) report (2014). The Centre for Maternal and Child Enquiries (2010) noted that compared to the caesarean section rate of 25% in the general population, the rate for women with a body mass index of >35 kg/m^2 is 37%. The general anaesthetic rate is 7.7% compared to 5.5% in the general obstetric population. They also point out that the potential complications from obesity pose particular challenges to maternity services with increased need for appropriate facilities and greater demands on midwives, obstetricians and anaesthetists who manage the complications. The cost of this places an increased burden on the limited resources for maternity services. In the latest MBRRACE-UK report (2014) thromboembolic events superseded sepsis as the leading cause of pregnancy-related mortality. MBBRACE-UK points out that it is perhaps unsurprising that maternal deaths from thrombosis and thromboembolism remain a major cause of direct maternal deaths, given the known association with maternal obesity.

Since pregnant women with obesity are at higher risk of anaesthesia-related complications than women with a normal body mass index, the Centre for Maternal and Child Enquiries recommended that in the future, pregnant women with a booking body mass index ≥40 kg/m^2 should have an antenatal anaesthetic consultation with an obstetric anaesthetist. However, as pointed out by the Obstetric Anaesthetists' Association (2011), this would have significant workload implications, especial-

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ly in regions where there is a higher prevalence of obesity. The Obstetric Anaesthetists' Association (2011) suggests alternative options that might be explored in those units that cannot comply with the recommendation to see all women with body mass index >40 kg/m^2, such as screening for low risk women in whom a consultation is not required, e.g. those with previous uncomplicated vaginal deliveries with no anaesthetic intervention.

The Centre for Maternal and Child Enquiries also suggests that the overall solution to obesity lies more in the public health arena as the critical time to influence the growing burden of obesity is before pregnancy. Thus the challenge of obesity should be high on our public health agenda in the UK, where reducing rates of obesity in the population will have a significant impact on health in general and pregnancy in particular.

From a technical point of view, a meta-analysis by Shaikh et al (2013) showed that ultrasound imaging can be a useful adjunct for performing spinal blocks and epidurals, which may be more widely used in the future. There has also been increasing interest in the use of continuous spinal anaesthesia during labour in the morbidly obese patient. With the relatively high failure rate of epidural catheters in this population, spinal catheters can be readily converted to surgical anaesthesia if necessary. Arkoosh et al (2008) note that previous catheters have been too big (risk of dural puncture) or too small (risk of neurological injury). Novel devices for continuous spinal anaesthesia have been explored, including the Wiley spinal device (an over-the-needle system using a small-bore pencil-point needle for the dural puncture) and may be a promising alternative for the future.

From a training point of view there are currently no specific competencies for the management of obese pregnant women. Certainly at a junior level trainees should be aware of the increased risks posed by obese parturients, the anaesthetic challenges they present and how to manage these. At a more senior level trainees could attend obstetric anaesthetic clinics to gain experience in assessing obese patients and formulating a management plan. Workplace-based assessments and a review of anaesthetic logbooks should ensure that trainees have received appropriate training and experience in managing the obese parturient.

Maternal age

There is a steady worldwide trend in delaying childbearing, especially in developed countries. Braveman (2006) states that increased maternal age is positively correlated with maternal morbidity, including gestational diabetes, pre-eclampsia, placental abruption and caesarean delivery. Advanced age is also associated with a higher incidence of pre-existing medical conditions such as hypertension, ischaemic heart disease, obesity and diabetes. Maternal deaths from acute coronary syndromes, as reported by the Confidential Enquiry into Maternal and Child Health (Lewis, 2007), had risen fourfold in the triennium from 2000–2 to 2003–5. As such, the case of the older parturient is the case of the high-risk pregnancy.

Comorbid disease

Hawkins (2003) states that advances in medical care have resulted in an increasing number of women with concomitant diseases becoming pregnant, with diseases such as hypertension, diabetes and autoimmune disease to name a few becoming more prevalent in the obstetric population. The increase in the incidence of obesity and the age of our gravidas has further increased the incidence of comorbid disease in the obstetric population. These factors can in turn lead to an increase in intensive therapy unit admissions secondary to obstetric complications. In the 2014 MBRRACE-UK report almost three-quarters (74%) of maternal deaths between 2009 and 2011 involved patients with pre-existing medical complications. Cardiac disease remains the largest single cause of indirect maternal death.

Higher-order multiple gestation

The National Institute for Health and Care Excellence (2011) stated that the incidence of multiple births has risen in the last 30 years. This rising multiple birth rate is mainly the result of increasing use of assisted reproduction techniques, including in-vitro fertilization. Multiple gestations are high-risk pregnancies which, as reported by Crosignani (2000), may be complicated by prematurity, low birth weight, pre-eclampsia, anaemia, postpartum haemorrhage, intrauterine growth restriction, neonatal morbidity, and high neonatal and infant mortality.

Patient optimization

Obstetric anaesthetists are increasingly challenged to stay engaged and to spend more time in the antenatal clinics and on postoperative care to optimize outcomes for these groups of patients. A named obstetric anaesthetist should be responsible for setting up antenatal anaesthetic clinics to see all high-risk pregnant women in order to identify potential problems before the patient arrives on the labour ward. An anaesthetic management plan for labour and delivery needs to be discussed and documented in the notes as well as consideration for referral to other specialities. If an obese or high-risk parturient presents in labour there should be a system in place to alert the on-call obstetrician, obstetric anaesthetists and theatre team of their presence at the earliest opportunity. Anaesthetic plans for these patients should be reviewed.

Handovers between midwives, obstetricians and anaesthetists together should occur at the end of each shift and should be meticulous to avoid any gaps or miscommunication of patient information. The Obstetric Anaesthetists' Association/Association of Anaesthetists of Great Britain and Ireland (2013)

Guidelines for Obstetric Anaesthetic Services recommend in the future that relationships between the maternity team and other specialities in the hospital setting should be developed, such as maternity units receiving support from a named cardiologist for example. MBRRACE-UK (2014) recommend that pregnant women with medical conditions require an individualized care plan made together by members of the multidisciplinary team including an obstetrician, obstetric anaesthetist, obstetric or specialty physician, surgeon and members of the allied health professions as appropriate.

The increase in workload

All of the above discussed population changes result in a greatly increased workload for the obstetric anaesthetist. In the Obstetric Anaesthetists' Association/Association of Anaesthetists of Great Britain and Ireland (2011) joint workload survey not only was an increase in caesarean section rate noted in the UK but also increased delivery rates, and increased number of epidurals and instrumental deliveries, all leading to an increase in 'follow ups' and further impacting on daytime workload.

The Obstetric Anaesthetists' Association/Association of Anaesthetists of Great Britain and Ireland in their 2013 guidelines now advise as a basic minimum that there must be 12 consultant sessions per week to cover emergency work on the delivery suite. The guidelines recommend that scheduled obstetric anaesthetic activities (e.g. elective caesarean section lists, clinic) require additional consultant sessions over and above the 12 needed for emergency cover. The objective is to deliver a quality service that improves patient care but also contributes towards training and development of staff, setting a standard expected for departmental accreditation but also helping obstetric units provide a business case for additional funding.

The Obstetric Anaesthetists' Association/Association of Anaesthetists of Great Britain and Ireland also state in their 2013 report that 'it is the unanimous opinion of this working party that a move towards obstetric anaesthetic services being fully consultant delivered is both desirable and inevitable'. Having a consultant anaesthetist working overnight has advantages for patient safety but also has a huge impact on costs, provision of daytime service and training. It has been suggested that consideration should be given to amalgamating units that are too small to support the costs of providing these services. However, this may reduce patient choice and increase the distance to where patients would like their babies to be delivered. One proposal for reducing the cost of providing 24-hour consultant cover could be to have a two-tier fee system overnight. A trainee anaesthetist could be on site managing the majority of the workload with a consultant providing near supervision. If the consultant anaesthetist was allocated a reduced professional activity (PA) for the hours he/she was resident overnight he/she could be 'paid by results' similar to the private sector if he/she directly undertook clinical work. In this way trainees continue to gain valuable experience while on call.

Other concerns raised by obstetric anaesthetists in the workload survey include reduced trainee numbers, with the widespread perception that trainees require more supervision than in the past. Other causes of an increased workload included trainee paperwork and increased requirement for training of midwives as part of multidisciplinary training. The Royal College of Anaesthetists and the Royal College of Surgeons of England (2009), in their report *WTD - Implications and Practical Suggestions to Achieve Compliance*, pointed out that there needs to be a realistic appraisal of consultant responsibilities and job plans. Both consultants and senior trainees consistently commented that those in senior positions were required to perform procedures traditionally allocated to more junior doctors because these doctors were relatively inexperienced or simply not available during normal working hours. This model of substitution of consultants for trainees is not sustainable unless consultant expansion is planned, which will inevitably require additional investment. Another solution may be an increase in the number of staff grade doctors working on the labour ward.

The effect on training

With reduced training hours anaesthetic trainees are gaining less experience in obstetrics. This also means new consultants may be less experienced. Ideally, trainees should be exposed to a combination of high- and low-risk pregnancies, elective and emergency work. Simulation training involving the whole multidisciplinary team, including midwives and obstetricians, should be incorporated into training. Trainees should participate in antenatal clinics to develop their skills in managing the increase in high-risk pregnancies.

The critically ill obstetric patient

An increase in high-risk pregnancies as a result of the changing population also means an increase in the incidence of critically ill obstetric patients. Early detection of severe illness in the obstetric patient remains a challenge for all clinicians involved in their care. During the 2006–8 triennium, sepsis was the leading cause of maternal death in the UK and the use of the Modified Early Obstetric Warning System (MEOWS) in the absence of an alternative validated chart was strongly recommended. A UK-wide obstetric anaesthetist survey by Swanton et al (2009) revealed the consensus of opinion of the need for a nationally agreed early warning tool for obstetrics, and this remains a challenge for the future. Currently there is no direct evidence that early warning systems improve actual outcome, although Singh et al (2012) and Isaacs et al (2014) have attempted to investigate their usefulness and applicability. While accepting that the amount of high-level evidence supporting the use of obstetric early

warning systems is limited, the reviewers agreed that it is important to ensure that women are appropriately monitored and their observations are recorded, and that having an early warning system in place does at least require women to be monitored clinically.

The Royal College of Obstetricians and Gynaecologists produced a national guideline in April 2012 to try and reduce morbidity and mortality from bacterial sepsis in pregnancy. Possibly as a result of these guidelines, the mortality rate from genital tract sepsis more than halved between 2006–8 and 2010–12 as described in the latest MBRRACE-UK (2014) report. National anaesthetic guidance is in evolution. Obstetric anaesthetists should be involved in agreeing appropriate triggers for escalation of care, auditing the use of early warning scores and ensuring that referrals to critical care are acted upon appropriately and in a timely manner. Outreach teams could be involved in the assessment of pregnant women to reduce anaesthetic workload but would require appropriate and additional training to include awareness of physiological adaptations to pregnancy.

Major haemorrhage remains the leading cause of pregnancy-related admission to critical care. In a series of 128 women, Charbit et al (2007) showed that an early reduction in the fibrinogen level during postpartum haemorrhage was the best early biological marker for predicting the risk of severity. Bedside tests of thromboelastometry allow rapid measurement, and even nearly continuous monitoring, of the fibrinogen level. No study has currently assessed the benefits of an early fibrinogen transfusion during postpartum haemorrhage, but according to Cortet et al (2012) teams increasingly report using it routinely in postpartum haemorrhage because fibrinogen is rapidly available while waiting for fresh frozen plasma to thaw. This needs to be investigated in the future.

Changes in intensive care training mean that future obstetric anaesthetists may have limited experience in managing critical care patients unless they become dual accredited. Plaat and Naik (2011) point out that it will be vital in the future to share experience between critical care, obstetricians, anaesthetists, midwives and nurses in order to optimize the care that seriously ill pregnant women receive. Anaesthetic training should incorporate more competencies in the management of critical illness in obstetrics.

KEY POINTS

- The obstetric population is changing, leading to an increase in the number of high-risk obstetric patients.
- The resulting increase in workload has implications for both anaesthetic service provision and training.
- A move towards obstetric anaesthetic services becoming fully consultant-led may be problematic but inevitable.

Funding

As the more challenging obstetric population grows, an increase in funding does not necessarily match it. As well as possibly amalgamating units and running a two-tiered system at night we need to find areas where money can be saved. One possible concept that may reduce the workload on maternity services in future is that of enhanced recovery. There are potential financial advantages largely as a result of earlier discharge from hospital. However, cost savings in hospitals from shorter inpatient stays will need to be balanced by the provision of adequate community care for both the mother and the neonate.

Conclusions

The changing population presents real challenges to the obstetric anaesthetist in the future. The increase in workload has implications for the work patterns for obstetric anaesthetists, as well as organizational implications. Obstetric anaesthetists will continue to be required to take on the role of peripartum physicians as the obstetric population becomes more challenging. Apart from playing a key role in management of high-risk pregnancies, anaesthetists must also be members of the multidisciplinary team that is required to care for the critically ill parturient, educate and train the obstetric care providers in MEOWS, resuscitation training, and running 'skill drills' for emergency simulations. The future is likely to involve the amalgamation of smaller maternity units to provide large centralized obstetric centres. **BJHM**

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