Anaesthesia for the obese parturient

A/Prof Steven Katz
Director
Department of Anaesthetics
Royal Hospital for Women
Sydney

The prevalence of obesity continues to increase both in the community and in the labour ward. Overweight and obesity have been recognised as important public health problems in Australia. 35 per cent of Australian women aged 25 to 35 are overweight or obese.[1] See Table 1.

Pregnancy risks associated with obesity

Antenatal
- Gestational diabetes
- Hypertension, pre-eclampsia
- Abnormal fetal growth: either macrosomia or intrauterine growth restriction
- Sleep apnoea
- Undiagnosed fetal anomaly.

Intrapartum
- Failure to progress in labour
- Shoulder dystocia
- Difficulties monitoring fetal heart
- Inadequate analgesia
- Unsuccessful vaginal birth after caesarean section
- Emergency caesarean section
- Technically difficult caesarean section, with associated increase in morbidity and mortality.

Postpartum
- Wound infections postoperative delivery
- Thrombo-embolic events
- Postnatal depression.

See Tables 2 and 3.

Occupational health and safety

Issues such as positioning and moving of the patient and the safe use of equipment, such as lithotomy stirrups and operating tables need to be considered and planned for antenatally.

Table 1.
World Health Organisation classification of obesity

Classification	BMI (kg/m²)	Risk of obstetric/ anaesthetic complications
Normal	18.5 – 24.9	No increased anaesthetic or maternal risk
Overweight or pre-obese	25 – 29.9	No increased anaesthetic or maternal risk
Obese class 1	30 – 34.9	Moderately increased risk
Obese class 2	35 – 39.9	Severely increased risk
Obese class 3	≥40	Significantly increased risk

BMI = body mass index
Note: Obese class 3 is formerly known as 'morbidly obese'.

In a UK report by Cooper and colleagues, *Why Mothers Die, 2000 -2002*, 35 per cent of all women who died were obese, 50 per cent more than in the general population.[3]

Obesity is also associated with an increase in caesarean section rate and thus, also the need for anaesthesia. Obesity is an intrinsic factor for both increased operative blood loss and postpartum haemorrhage.

'Obesity is a risk factor for anaesthesia-related maternal mortality.'

In addition to the associated medical problems, the anaesthetist is challenged by these patients with technical difficulties of airway management and insertion of regional blocks. No anaesthetic technique is without special hazards in grossly obese patients.

The above factors all increase the risks involved in providing both regional and general anaesthesia to obese women.

Specific anaesthetic and medical implications of obesity

Airway
Optimal assessment and management of the airway cannot be overemphasised in the obese parturient.

The incidence of failed tracheal intubation in the general surgical population is one in 2230. This incidence increases to one in 280 in the obstetric population. The incidence of difficult intubation in the obese population is as high as 15.5 per cent, rising to as high as 33 per cent in the morbidly obese parturient.[4]

Respiratory system
The likelihood of obstructive sleep apnoea (OSA) is often underdiagnosed in women of childbearing age. Obesity increases the risk of OSA significantly. OSA has been associated with increased systemic hypertension and pulmonary hypertension. These patients are also at increased risk for arrythmias, coronary artery disease and stroke. Continuous positive airway pressure (CPAP) is a safe and effective treatment.

Cardiovascular system
Cardiovascular co-morbidities such as hypertension, ischaemic heart disease and heart failure dominate the clinical picture in the obese patient and these can co-exist in obese parturients. During the second half of pregnancy, aortocaval compression by the uterus in the supine position can severely reduce cardiac output

and placental perfusion. This problem is worsened in the obese parturient, when the large fat panniculus may further compress the great vessels.

Gastrointestinal system
Both obesity and pregnancy have been associated with an increased risk for aspiration and Mendelson's syndrome. Obese patients have a higher incidence of hiatus hernia and elevated intra-gastric pressures. This further increases the risk of pulmonary aspiration.

Practical considerations
Obese parturients share a range of technical difficulties. Blood pressure measurement will require an appropriate-sized cuff, otherwise both systolic and diastolic readings will be overestimated. There is a strong argument in favour of invasive blood pressure monitoring peri-operatively. Venous access may also be difficult and central venous cannulation may be required.

'The anatomical and physiological changes caused by both obesity and pregnancy may result in an increased incidence of difficult intubation and rapid desaturation.'

The weight bearing capacity of delivery beds and operating tables should be adequate to accommodate morbidly obese parturients. Mechanical devices for thromboprophylaxis, such as stockings of appropriate size and sequential compression devices, are other important considerations for these patients.

Table 2.

Comparison of maternal, peripartum and neonatal characteristics and outcomes according to BMI category (*n*=11252)*					
	BMI category (kg/m²)				
Maternal outcomes	Normal (20.01-25) (*n*=6443)	Overweight (25.01-30) (*n*=2882)	Obese (30.01-40) (*n*=1679)	Morbidly obese (>40) (*n*=248)	*P*
Hypertensive disorders of pregnancy (%)	2.4	5.6	9.1	14.5	<0.001
Gestational diabetes (%)	1.2	2.0	3.3	8.9	<0.001
Type 2 diabetes mellitus (%)	0	0.6	1.4	2.8	<0.001
Chronic hypertension (%)	0.5	1.2	3.0	6.9	<0.001
Mean length of stay, in days (SD)	2.9 (3.8)	3.1 (5.6)	3.1 (2.8)	3.9 (3.6)	<0.001
Peripartum outcomes					
Spontaneous vaginal delivery (%)	68.6	63.7	59.0	53.2	<0.001
Assisted vaginal delivery (%)	9.1	6.8	5.8	4.0	<0.001
Caesarean section (%)	22.3	29.5	35.2	42.7	<0.001

Callaway LK, *et al.* The prevalence and impact of overweight and obesity in an Australian obstetric population. *MJA* 2006;184(2):56-59. © Copyright 2006. *The Medical Journal of Australia* – reproduced with permission.[2]

Key messages

- Effective communication and good teamwork between an anaesthetist and an obstetrician are essential for the care of obese parturients.
- Anaesthesia for both elective and emergency scenarios should be planned in advance.
- Obesity is a risk factor for anaesthesia-related maternal mortality.

Anaesthetic management

Anaesthetic principles
- Regional anaesthesia unless contraindicated
- Care provided by experienced medical personnel (both anaesthetist and obstetrician)
- Anticipation of problems and effective preparation in terms of equipment, monitoring and personnel
- General anaesthesia, if required should be delivered with tracheal intubation and controlled ventilation
- Postoperative care that includes close monitoring, early mobilisation and physiotherapy; a high dependency setting may achieve this most appropriately
- Judicious use of neuraxial, oral and intravenous opioids for postoperative pain relief.

Analgesia for labour
Analgesia using neuraxial blockade has been shown to be the most effective form of pain relief in labour. Placing a functional epidural catheter has an added advantage in the event of any operative intervention being required, particularly as obesity increases the risk of emergency caeserean section.

The challenges for the anaesthetist should not be underestimated. Technical difficulties include positioning the patient correctly, identification of the midline, identification of the epidural space and the dislodgement of catheters.

The initial failure rate for epidural catheters in obese parturients can be extremely high and multiple attempts of catheter placement are common.

The incidence of accidental dural puncture is also significantly increased in morbidly obese parturients (as high as four per cent

Table 3.

Adjusted odds ratios (95% CIs) for maternal, peripartum and neonatal outcomes, according to BMI category (*n*=11252)*				
	BMI category (kg/m²)			
Maternal outcomes	Normal (20.01-25) (*n*=6443)	Overweight (25.01-30) (*n*=2882)	Obese (30.01-40) (*n*=1679)	Morbidly obese (>40) (*n*=248)
Hypertensive disorders of pregnancy	1.0	1.74 (1.45-2.15)	3.00 (2.40-3.74)	4.87 (3.27-7.24)
Gestational diabetes	1.0	1.78 (1.25-2.52)	2.95 (2.05-4.25)	7.44 (4.42-12.54)
Length of stay > 5 days	1.0	1.36 (1.13-1.63)	1.49 (1.21-1.86)	3.18 (2.19-4.61)
Peripartum outcomes				
Caesarean section	1.0	1.50 (1.36-1.66)	2.02 (1.79-2.28)	2.54 (1.94-3.32)

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compared with 0.5 per cent to 2.5 per cent in non-obese patients).[5] Ultrasound is a new modality that is being used to identify the epidural space.

The influence of obesity is not limited to caesarean delivery but extends to complications during labour such as intrapartum fetal distress; meconium aspiration; failure to progress; abnormal presentation; shoulder dystocia; and an increased likelihood of requiring instrumental delivery. Hence, regional blocks administered early in labour are advantageous.

Anaesthesia for caesarean section

Obesity and caesarean section have been identified as independent risk factors for maternal morbidity and mortality. There are increased operative complications in obese parturients undergoing surgery, including increased operative time; increased blood loss; increased post-operative wound infection; and endometritis. Obesity is an intrinsic risk factor for both increased blood loss and postpartum haemorrhage.

'Effective communication and good teamwork between an anaesthetist and an obstetrician are essential for the care of obese parturients. Anaesthesia for both elective and emergency scenarios should be planned in advance.'

Good communication between anaesthetists, obstetricians and nursing staff is mandatory on every delivery ward, but even more so when dealing with the obese parturient. Antepartum anaesthetic consultation is essential as well as multidisciplinary meetings with obstetricians, anaesthetists, midwifes and theatre staff.
Key factors to discuss beforehand include the availability of a suitable bed and operating table; surgical technique and panniculus retraction; thromboembolism prophylaxis; blood cross match; post-operative care; and overnight monitoring in a high dependency unit.

Regional anaesthesia

Spinal anaesthesia is widely used for elective caesarean delivery. However, in the morbidly obese parturient, this technique may have additional risks. Obesity may result in an unpredictable exaggerated spread of local anaesthetics and may therefore increase the risk of a high spinal block. Duration of surgery may extend beyond the duration of single-shot spinal anaesthesia, leading to intra-operative induction of general anaesthesia, which is undesirable and potentially hazardous.

Epidural anaesthesia offers several advantages, including an easily titratable local anaesthetic dose and level of anaesthesia; ability to extend the block for prolonged surgery; slower and more easily controllable haemodynamic changes; a decreased potential for high block; and utilisation for post-operative analgesia.

A combined spinal-epidural technique represents an attractive alternative, combining the advantages of rapid onset and dense block with the ability to prolong the block.

Regardless of the regional technique used, a thorough assessment of the block prior to surgical incision is essential in the obese parturient, as inadequate block and the need to convert to general anaesthesia during surgery may have catastrophic consequences.

General anaesthesia

The anatomical and physiological changes caused by both obesity and pregnancy may result in an increased incidence of difficult intubation and rapid desaturation.

The potential for a difficult airway emphasises the need for an additional pair of experienced hands when performing general anaesthesia.

Postoperative care

Early mobilisation, thromboprophylaxis, chest physiotherapy and adequate pain control are the key to the success of effective post-operative care.

Prophylactic antibiotics should be administered at the time of surgery.

Obesity is a known independent risk factor for deep venous thrombosis. Both pharmacological and mechanical strategies are used for thromboprophylaxis.

Morbidly obese patients are also at increased risk of potentially life-threatening complications such as hypoxaemia and postpartum cardiomyopathy.

Conclusion

The anaesthetic management of the morbidly obese parturient is associated with special hazards. The risk for difficult or failed intubation is extremely high. The early placement of an epidural or intrathecal catheter may overcome the need for general anesthesia. The high initial failure rate necessitates critical block assessment and catheter replacement when indicated.

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Suggested reading

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