

General anaesthesia for operative obstetrics

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Abstract

General anaesthesia in obstetrics is reducing with a reported use in only 8% of caesarean sections in 2013. Obstetric surgery is often urgent, requiring effective team communication and a rapid, focused preoperative assessment. Physiological changes of pregnancy increase the incidence of aspiration, desaturation and failed intubation. In addition, the rapidly evolving circumstances add additional stress impacting on performance. Hypotension from aortocaval compression is common and minimized by left lateral tilt or uterine displacement. Rapid sequence induction with tracheal intubation remains gold standard but supraglottic devices are advocated in the event of failed intubation. Awareness remains relatively common and adequate depth of anaesthesia should be maintained and monitored. Complications are more common in obese pregnant patients, whilst women with pre-eclampsia are at particular risk of hypertensive responses to intubation and extubation, intravenous opiates can ameliorate this. There is no difference in maternal or neonatal adverse outcomes between general and regional anaesthesia. Improved multidisciplinary communication on the delivery suite allows for pre-emptive assessment of patients at risk of requiring an operative delivery. With diminishing individual experience of general anaesthesia in obstetrics and delivery suite often being covered by junior doctors, simulation exercises can improve confidence, performance and team working.

Keywords Aspiration; awareness; general anaesthesia; obesity; obstetrics; preoxygenation; rapid sequence induction

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Indications for general anaesthesia

Surgery during pregnancy may be:

- antenatal surgery (e.g. cervical suture)
- peripartum surgery (e.g. caesarean section, ex utero intrapartum treatment (EXIT) procedure, management of antepartum or postpartum haemorrhage including laparotomy)
- postpartum surgery (e.g. perineal repair, manual removal of placenta)
- non-obstetric surgery (occurs in up to 2% of all pregnancies).¹

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Learning objectives

After reading this article, you should be able to:

- discuss the specific increased risks posed by general anaesthesia in the obstetric population
- explain the importance of preoxygenation, aspiration prophylaxis and proper positioning in obstetric patients
- list the pros and cons of cricoid pressure

The risks and benefits of surgery during pregnancy should be evaluated in all cases and non-emergency surgery is usually postponed until after delivery. During pregnancy regional techniques are preferred, but some situations where general anaesthesia (GA) is considered most appropriate are:

- contraindication to regional anaesthesia
- maternal refusal or lack of cooperation
- failure or complication of regional anaesthesia
- insufficient time to establish regional anaesthesia for urgent delivery
- nature of surgical procedure.

There is no obstetric surgical procedure for which GA is mandatory, but it is most often used for time-critical caesarean section. The incidence of this continues to fall due to better antenatal optimization of co-morbidities, advanced planning for anaesthetic management, establishing epidural analgesia early in labour in high-risk women and an increased multidisciplinary willingness to facilitate regional anaesthesia.

Preparation

The overall approach to GA in the obstetric population is outlined in [Table 1](#).

Effective communication on the delivery unit is vital so that women at risk of operative intervention or those with significant co-morbidities are identified early. This allows medical optimization and administration of appropriate acid-aspiration prophylaxis. Also, the anaesthetist can preoperatively assess patients and relevant options discussed prior to transfer to theatre.

Induction of anaesthesia

Aortocaval compression should be minimized using a 15° left lateral table tilt or manual uterine displacement. The patient's head, neck and shoulders should be optimally positioned for airway management with the neck flexed at the cervico-thoracic joint and extended at the atlanto-occipital joint. A 20–30° head up position increases functional residual capacity (FRC), reduces difficulty in laryngoscope insertion due to large breasts, improves the view at laryngoscopy and may reduce gastro-oesophageal reflux.²

Rapid sequence induction with endotracheal intubation is recommended for GA after 20 weeks' gestation. Proseal laryngeal mask airway has been successfully used for airway management in carefully selected patients undergoing elective caesarean section.³ Prior to induction of anaesthesia an airway plan should be discussed between the anaesthetist and assistant to ensure appropriate equipment is available.

Overall approach to general anaesthesia in the obstetric population

Multidisciplinary team approach	Obstetricians, anaesthetists, midwives, neonatologists and other surgical specialities
Effective communication	To include all team members, including patient
Thorough preoperative assessment	Particular attention to airway assessment and co-morbidities
Appropriately trained assistance and equipment	
Aspiration prophylaxis	H ₂ -antagonist 0.3 M sodium citrate
Use of World Health Organization surgical safety checklist	This should be modified for obstetric patients
Positioning	15° left lateral tilt or leftwards manual displacement of the uterus Ramped position for obese patients
Monitoring	As per Association of Anaesthetists of Great Britain and Ireland guidelines. Cardiotocography
Antibiotic prophylaxis	NICE recommend antibiotic administration prior to skin incision which is superior for the prevention of endometritis but without reduction in overall infectious morbidity
Preoxygenation	100% oxygen via a close-fitting mask to fractional end tidal oxygen concentration >0.9 High flow oxygen delivery through nasal cannula for apnoic oxygenation
Rapid sequence induction	Almost always with intubation of the trachea with a cuffed oral endotracheal tube Rehearsed 'airway plan B' in case of failed intubation
Induction drugs	Propofol 2.5 mg/kg, thiopentone 5–7 mg/kg Suxamethonium 1–1.5 mg/kg Rocuronium 1–1.5 mg/kg (Ensure Sugammadex available) Opiates (Alfentanil/Remifentanil). Especially if pre-eclampsia or cardiac co-morbidities
Maintenance	Adequate depth of anaesthesia Aim for normotension and normocapnia Monitor neuromuscular blockade
Extubation	Fully reversed and awake in the left lateral or semi-recumbent position
Planning for appropriate postoperative analgesia	Simple analgesics, opioids and local anaesthetic techniques, e.g. transversus abdominis plane (TAP) blocks

Table 1

Preoxygenation, to an end tidal oxygen fraction ≥ 0.9 is essential prior to induction. This should be achieved by tidal breathing through a circle system with tight-fitting facemask and a fresh gas flow rate of ≥ 10 litres/minute. Recent computer modelling indicates that 2 minutes of pre-oxygenation is sufficient in a term pregnant patient.³ In pregnancy, reduced FRC and increased oxygen requirement result in quicker onset of desaturation during apnoea with time to SaO₂ less than 90% being reduced by approximately 35%; labour, obesity and sepsis shorten this time further.⁴ Nasal Oxygenation During Efforts Securing A Tube (NODESAT) uses high flow (15 litres/minute) oxygen via nasal cannula to fill the pharynx with oxygen during apnoea and has been shown to decrease time to desaturation.⁵

The efficacy of cricoid pressure is controversial, with correct application often being more difficult than expected.⁶ An initial force of 10 N should be applied prior to induction of anaesthesia, increased to 30 N after loss of consciousness and maintained until correct placement of the endotracheal tube is confirmed. Table tilt must be appreciated when applying cricoid pressure in order to provide reliable midline oesophageal compression and not distort the laryngoscopic view. The National Institute for Health and Care Excellence (NICE) recommend the use of cricoid pressure and recent videolaryngoscopic studies have shown it is effective for oesophageal occlusion.⁶ Poorly applied cricoid

pressure can increase intubation difficulty and in this event should be gently released.

Thiopentone (5–7 mg/kg) remains the most popular induction agent in obstetrics despite a survey showing that 55% of UK anaesthetists rarely use thiopentone outside of obstetrics. NAP5 noted that thiopentone, used in 3% of anaesthetic inductions, was implicated in 23% of awareness reports. Concerns regarding propofol included its slower onset, short distribution half-life, reduced titratability and cardiovascular depression.⁷ However, evidence of increased awareness with thiopentone and increasing familiarity with propofol support its use as a standard induction agent for GA in caesarean section in non-compromised patients.⁶ A dose of 2.5 mg/kg is sufficient to prevent maternal awareness but is associated with hypotension. In a hypovolaemic patient, alternatives include co-induction with a reduced dose of propofol and an opioid or ketamine (1–2 mg/kg). The sympathomimetic effects of ketamine make it unsuitable for women with pre-eclampsia or cardiovascular disease.

Opioid analgesia has tended to be avoided until clamping of the umbilical cord due to concerns regarding reduced placental flow secondary to maternal hypotension, and respiratory depression in the neonate due to transfer of drug. However, in patients with pre-eclampsia or cardiac disease, opioids provide haemodynamic stability and protection from increases in MAP

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