PRINCIPLES OF GENERAL ANAESTHESIA FOR
CAESAREAN SECTION

Updated by Dr Mary Mushambi Consultant Anaesthetist and Dr Antony Joseph, Anaesthetic ST7. January 2010

Pre-operative visit
A normal anaesthetic history and examination should be performed with particular attention to the airway. Remember to pay special attention to patients with pre-eclampsia and the morbidly obese parturient. If you anticipate difficulty, summon help before starting. If time allows, it is essential to inform patient about the process of general anaesthetic in the pregnant woman and side effects of a general anaesthetic. Suggested topics to mention are rapid sequence induction, awake extubation, increased recovery period and failed intubation. Inform about poorer pain relief, increased blood loss, postoperative nausea and vomiting and neonatal depression compared to regional anaesthesia. The patient should receive prophylaxis against acid aspiration.

Equipment check.
It is essential to check anaesthetic equipment prior to starting an anaesthetic.
The anaesthetist on labour ward should be familiar with the difficult airway guidelines of the department and the difficult airway equipment on labour ward including contents of airway trolley, manujet and fibreoptic scope.

Preparation for General Anaesthesia

1. Skilled Assistance - ensure that the ODP has been contacted. Skilled assistance (and access to the drug cupboards) is essential and no anaesthetic should commence until assistance is available.

2. Sodium Citrate – 30ml 0.3 Molar, immediately prior to a general anaesthetic

3. IV Access - establish a free-running intravenous infusion via a 16 or 14 gauge cannula.


5. Head & Neck Position - optimise head and neck position for intubation prior to induction (sniffing the morning air – neck flexed, head extended). Ramping should be used for obese patients.

6. Establish full monitoring as per AAGBI guidelines.

7. Suction should be switched on and accessible.
Pre-oxygenation
Start 100% O₂ via close-fitting facemask, at sufficient flow to prevent re-breathing. Ensure that the gas analyser is switched on and the sampling line is connected to the filter. Confirm the presence of a CO₂ trace. Pre-oxygenate for three minutes, or until the end-tidal oxygen concentration reaches 90%. When the surgeon is ready, instruct the ODP to apply cricoid pressure (10 Newtons) prior to loss of consciousness. Ensure that cricoid pressure is being applied correctly at 90 degrees to the tilted table and that the head and neck are optimally positioned for intubation.

Induction
Thiopentone - 5 mg/kg
Succinylcholine - 1.5 mg/kg.
Opioids – Short acting opiate can be used to obtund sympathetic response to intubation in hypertensive patients and in patients with either cardiac or cerebrovascular disease. The ODP should apply full cricoid pressure (30 N) when the patient loses consciousness. It is recommended to use a size 7 or 7.5 endotracheal tube. After intubation, listen for bilateral breath sounds and check for the regular appearance of CO₂ on exhalation and check that there is no audible leak around the cuff before ordering the cricoid pressure to be removed.

Maintenance of Anaesthesia
End tidal carbon dioxide - keep ET CO₂ ~ 4.0 kPa.
Anaesthetic Agents – use a volatile agent to keep a MAC of at least one.
Oxygen - use 33 - 50% O₂ in N₂O
A non-depolarising muscle relaxant e.g. atracurium or rocuronium should be given, guided by the response to peripheral nerve stimulation following suxamethonium. At the end of surgery, reverse neuromuscular blockade with the use of a peripheral nerve stimulator to confirm full recovery. This is particularly important if magnesium sulphate has been given.

Analgesia - after the umbilical cord has been clamped, give i.v. morphine 10-15 mg.
Paracetamol 1G should be administered intravenously. Rectal diclofenac can be administered at the end of surgery if consent has been obtained and if it is not contraindicated. Transversus abdominis plane blocks can be inserted under ultrasound guidance. Other blocks such as ilioinguinal or rectus sheath blocks can be carried out as alternatives. PCA morphine should be set up for post operative analgesia.

Blood Loss – Blood loss during Caesarean section under general anaesthetic is thought to be 100-200 ml more than under regional anaesthetic and for this reason it is advisable to give oxytocin infusion at a rate of 10u/h after the initial 5u bolus. Estimation of blood loss is difficult because of mixing with liquor. Haemocue estimation of the haemoglobin concentration is useful.

Extubation
Extubation should occur when there is return of the airway reflexes and the patient extubated in the left lateral, head down position when fully awake. Supplementary oxygen should be administered until patient is fully awake and maintaining SpO₂ of 96% or more.
Recovery

All women who have undergone Caesarean Section must remain fully supervised in the recovery area for a period of at least 30 minutes or until discharge criteria have been met (see below). The anaesthetist should be immediately available during this period and should not leave the unit. Please be aware that many midwives are not experienced in recovering patients who have had a general anaesthetic. The anaesthetist should therefore remain with the patient until she is fully awake and maintaining her airway. The midwife should not have additional responsibility over caring for the mother. Another midwife or member of the team should look after the baby. Partners should not come into recovery until the woman is fully awake and stable.

Before Discharge - ensure the following:

Vital signs are stable
Patient is pain free
Drugs and fluids are prescribed – i.e. post-operative fluids, analgesia and low molecular weight heparin (LMWH).
Failed Intubation in obstetrics

Failed intubation is the failure to pass an endotracheal tube into the trachea following induction of a general anaesthetic. Failed intubation is encountered almost 10 times more often in the obstetric population (1:300 compared with 1:3000 in the non-pregnant population).

Causes of failed intubation in obstetrics

1. Increased fatty tissue
2. Increased pharyngeal and laryngeal oedema
3. Large breasts
4. Complete dentition
5. Incorrectly applied cricoid pressure
6. Obesity
7. Urgency of surgery
8. Inexperience of anaesthetist and ODP

Measures that aim to reduce the incidence of failed intubation

- Attending ward rounds: be aware of patients who may be potentially difficult to intubate so that a plan is in place such as an early working epidural
- Avoiding general anaesthesia if possible
- Attain optimum position for direct laryngoscopy before attempting intubation
- Communication with senior colleagues if airway problems are anticipated
- If giving a GA, give a correct dose of suxamethonium. Have a second syringe of suxamethonium drawn up in case contents of first syringe is accidently lost on the floor.
- Know your intubating equipment: Do not use unfamiliar equipment in a failed intubation drill
- Have a trained assistant to apply cricoid pressure. Incorrectly applied cricoid pressure is a common cause of a failed intubation
- Training in basic and advanced airway skills

Two considerations before giving a General Anaesthetic:

If you fail to intubate this patient:
1. Are you going to try and proceed with the operation?
   **OR**
2. Are you going to wake the patient up?
   *Answer depends on:*
   - Is the mother’s or baby’s life in immediate danger?
   - Will it be easy to maintain a safe airway in this patient?
   (ref: failed intubation algorithm)
   This should ideally be discussed with the obstetricians and a combined decision by obstetrician and anaesthetist should be made prior to giving a general anaesthetic.
Failed intubation guidelines

The Difficult Airway Society (DAS) published failed intubation guidelines during a rapid sequence induction in 2004 with Plan A, C and D. *(Plan B of DAS guidelines do not apply to situations requiring rapid sequence intubation.)* Although the DAS guidelines flow chart was not designed for obstetric patients, there are clearly some features of it that are common to obstetric anaesthetic practice and these will be highlighted in these guidelines.

**Plan A** is the initial intubation plan and the initial attempt to intubate the trachea if difficulty is encountered. After a failed first attempt at intubation, the anaesthetist can use airway adjuncts such as bougies or different laryngoscopes such as McCoy or videolaryngoscopes, reposition the head and neck and cricoid pressure and external manipulation of the larynx. Cricoid pressure must be maintained. If intubation fails despite all these attempts, the anaesthetist will proceed to Plan C.

**Plan C** is oxygenation following a failed intubation. It will start with the use of simple airway adjuncts such as oral airway, followed by two person mask ventilation technique and reduction of cricoid pressure. If this fails, then use of a supraglottic airway such as LMA, Proseal or ILMA. It may be necessary to reduce cricoid pressure during insertion of the supraglottic device. If ventilation and oxygenation fails despite these, consider release of cricoid pressure at this stage to see if oxygenation is possible. If this fails the anaesthetist should proceed to Plan D.

**Plan D** is a rescue technique when there is increasing hypoxia and inability to ventilate i.e. during a ‘can’t intubate and can’t ventilate situation. Three options are available: (i) Narrow bore cannula (eg Ravussin cannula or a 14G cannula), and high pressure ventilating system (Manujet or Sanders injector), (ii) large bore cannula such as Melkar or quicktrach and (iii) surgical cricothyrodotomy.

**COMBINED OBSTETRICIAN AND ANESTHETIC PLAN** is for the decision to proceed with surgery or to abandon surgery after failed intubation. Proceeding with surgery after failed intubation should only be in circumstances where the mother’s life is at risk for example cardiac arrest or major haemorrhage. In situations, where fetal bradycardia was the indication for a general anaesthetic, the decision may depend on the ability to ventilate and oxygenate the mother. Maternal oxygenation is more important in this situation.
References:
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