Failed intubation in obstetrics

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Abstract
Failed intubation in obstetrics is rare. However, if the situation is not managed appropriately the consequences for the mother and newborn may be catastrophic. The skill of managing the airway seems to be decreasing, primarily because the skills are not being practised in general or obstetric anaesthesia. Solutions for this decrease in skills may include improved training and the use of manikins, both for role play and for practising skills. The priority of airway management is to provide oxygen to the mother and to call for assistance. Oxygen can be provided using basic airway, intubation, and, if necessary, surgical airway skills. Such skills need to be practised on manikins and non-obstetric patients. The decreasing incidence of general anaesthetics means that planning and preparation should be meticulous before and during caesarean section. Ideally, the first intubation attempt should be the best. If a failed intubation occurs, initially techniques such as the use of a bougie, McCoy blade or the left molar approach may be considered, provided hypoxia is avoided. If intubation is unsuccessful the mother should be woken and a regional technique or awake fibreoptic intubation from a suitably experienced practitioner should be considered. A simple protocol shown in this article can be used as a training tool to assess skills, decision-making and teamwork in the event of a failed intubation. Extubation after a difficult intubation should be done with care, and the patient warned of the difficulty in case of further anaesthetics.

Keywords Airway; basic skills; caesarean section; extubation; obstetrics

Experience and training in airway management skills is an essential part of an anaesthetist’s education. The European Working Time Directive has impacted on trainee working hours and the introduction of specialist training is a further threat to available training time.

The incidence of failed intubation in the obstetric population in the UK is approximately one in 300 compared with an incidence of one in 1000 in the general surgical population. By contrast, an incidence as low as one in 750 has been quoted in a South African delivery unit, where general anaesthesia and intubation are regularly practised.

Airway management skills are diminishing, and this may partly explain the three most recent obstetric deaths caused by failed intubation in the Confidential Enquiry into Maternal and Child Health (CEMACH) report. This decrease in airway skills is probably associated both with an increase in regional techniques in the management of caesarean section, and a reduction in the experience of trainees regularly intubating patients in obstetric and non-obstetric practice. The increase in the use of the laryngeal mask airway (LMA) for most general anaesthetics also contributes to reduced experience, in both bag valve mask skills and intubation.

Many detailed airway algorithms have been published that deal with every potential complication. Although comprehensive in content, the excessive detail contained within many of these algorithms may lead to confusion, particularly in inexperienced doctors who may encounter such emergency situations for the first time. To minimize any such confusion, the use of a simple protocol would be preferable, in which the only requirement is the use of a small number of airway adjuncts. Such a protocol (Figure 1) can be used for training and assessment purposes, potentially decreasing cognitive load and optimizing performance.

Airway training is the responsibility of trainers and trainees. It is important to recognize that any skill has a cognitive component; inexperience and unfamiliarity may result in cognitive overload impacting on performance. Reducing cognitive load can improve performance by allowing focus on the skill at hand. Ideally, all trainees should practise airway scenarios and skills on a manikin together with the theatre team, as part of their competency-based training, preferably while being assessed by a senior trainer. This also allows assessment of relationships with the team.

The techniques listed in Figure 1 can be practised on manikins and non-emergency patients in a controlled fashion. The theoretical knowledge, training and previous experience gained in such scenario practice provide the cornerstones of successful management of an airway crisis. This training can then be extended to supervising general anaesthesia on patients. It is important that trainers are on the delivery suite as much as possible to provide such supervision and structured feedback. Development of checklists similar to those used in aviation training may allow structured skills training with appropriate

Learning objectives
After reading this article you should be able to:
• know a practical approach to managing failed intubation in obstetrics
• develop and optimize a teaching strategy to deal with potential complications of airway management in obstetrics
• understand the importance of cognitive management in dealing with stressful scenarios.
opportunities for focused feedback. The airway algorithm (Figure 1) is combined with the checklist in Table 1, and used for teaching, assessment and structured feedback.

**Pre-assessment**

The anaesthetist should be warned at the earliest opportunity of the likelihood of a general anaesthetic caesarean section and the reason for it. An airway assessment should look for potential difficulties. This assessment is unlikely to give useful information in terms of a difficult intubation, but it does allow an appropriate management plan to be instituted. The lack of any abnormality in the airway assessment does not exclude an airway problem subsequently. If the patient is thought to be a difficult intubation, help from a senior anaesthetist should be sought at the earliest opportunity. Once the anaesthetic decision is made, the plan to follow should be simple. Although a catastrophic event may be very rare, there is no room for complacency, and appropriate strategies must be taught and practised. Not every problem is
predictable, but proper preparation and careful practice will reduce the likelihood of such happening. In our unit the trainees are taught to consider the likely ‘what ifs’ in order to ensure appropriate preparation for likely problems (e.g. what if you cannot intubate/ventilate? where is the appropriate help, can I use the relevant equipment?). Whilst there is a need for perfect practice in such a situation, there is still scope for teaching skills and technique in the setting of caesarean section under general anaesthesia.

**Preparation**

**Equipment**

Appropriate drugs for induction of anaesthesia and muscle relaxation should be available at all times in the obstetric unit. A second ampoule of suxamethonium is kept in case the first drops on the floor and not to aid further attempts at intubation in the failed-intubation situation. The choice of volatile anaesthetic is debatable, but the non-irritant nature of sevoflurane may have some advantages if airway problems arise. In view of the rarity of general anaesthetics for caesarean sections, an equipment check such as that recommended by Hart and Owen is worth practising on a daily basis. The importance of the team approach and communication cannot be emphasized enough. An appropriately trained assistant who has been briefed on the potential problems and specific requirements of the task at hand is essential.

**Equipment**

Essential equipment comprises:

- masks of various sizes
- oropharyngeal Airways
- LMA sizes 3 and 4, *Proseal LMA* (*pLMA*) sizes 3 and 4
- McCoy and Macintosh laryngoscopes
- gum elastic bougie (GEB),
- *Quicktrach* surgical airway or jet ventilation catheter, and *Manujet* ventilator (available from VBM Medizintechnik GmbH).

**Patient**

The patient should be informed of the sequence of events, and premedicated with 30 ml of 0.3 M sodium citrate.

**Position, preoxygenation, paralysis**

Before induction of anaesthesia, the patient should first be positioned appropriately on the operating table in theatre in the left lateral tilt position. To aid airway manipulation, the head should be in the position described as ‘sniffing the morning air’ (neck flexed, head extended), ensuring that the mouth can be maximally opened. Braided hair or knotted scarves may prevent head extension and should be undone or removed so that the head can be optimally positioned. The ‘ramped’ position may be of benefit in obese patients. The patient is asked to take eight slow, deep breaths (aiming for an end-tidal oxygen greater than 90%) to ensure optimal preoxygenation.

The first intubation should be the most accurate attempt. To ensure this, an adequate dose of induction agent such as thiopentone (4–7 mg/kg) is given, followed by 100 mg of suxamethonium (more may be required if the patient is very obese (1 mg/kg)). After 30 seconds (not before) the laryngoscope is inserted and the trachea intubated with a size 7 endotracheal tube railroaded over a GEB. The inexperienced anaesthetist, in their haste to secure the airway, may attempt intubation too early and insert the tube too far, leading to further iatrogenic problems. Successful intubation is confirmed by capnography and stethoscopy. If necessary, the McCoy blade can be used for the first intubation. This will allow experience and expertise to be gained with this piece of equipment before having to use it in difficult circumstances.

**Failed intubation**

If laryngoscopy fails, the priorities are to oxygenate the patient and to call a senior anaesthetist for help. This should be instituted earlier rather than later (most senior anaesthetists would rather be called sooner rather than later, when it may be too late). Oxygenation is likely to be successful if a four-hand ventilation technique is used with an oropharyngeal airway (Figure 2). It is important to ensure that the jaw thrust is applied to the posterior border of the ramus of the mandible, with the thrust being applied towards the ceiling. This will ensure that three primary areas of airway obstruction (tongue, epiglottis, soft palate) are bypassed. With adequate jaw thrust and a proper mask seal, oxygenation should be possible in most cases, but cricoid pressure may need to be removed or adjusted to improve the airway.

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**Checklist for general anaesthesia caesarean section**

**Before event**

*What can you prepare?*

**Equipment**

- What may you need?
- Do you know where everything is?
- Do you know how to use it?

**Drugs**

- What may you need?
- Has it been checked?

**Machine**

- Checked?

**You**

- What if’s? (prepared)
- What is happening on ward? (no surprises)

**Patient arrives**

- Open mouth
- Check neck
- Past medical history
- Medications
- Allergies

**During**

- Prepare (equipment)
- Patient (knowledge)
- Perfect position

- Preoxygenation \((\text{ET}O_2 > 0.9)\)

- Paralyse

- Thiopentone 4–7 mg/kg

- Suxamethonium 100 mg

- Wait 30 seconds

**Extubate**

- Awake
- Left lateral
- Upright

**Table 1**
A recent editorial suggests that cricoid pressure can cause problems with laryngoscopy view in 14–45% of patients and may also be a factor making LMA insertion more difficult. However, based on recent randomized control trial data, ‘cricoid pressure should not be avoided for fear of increasing difficulty of intubation’. Current recommendation is to use a force of 30 N (equivalent to a force of 3 kg on a weighing scale). 20 N of force with 20° head up has been shown to cause less distortion of the airway, potentially improving the view without increasing the risk of regurgitation. Basic airway maintenance is an acquired skill and needs to be practised on elective non-obstetric cases.

Second attempt

If a second attempt at intubation is considered, a left molar approach may be successful where conventional laryngoscopy is not. This approach is described as inserting the laryngoscope directly down the left side of the mouth to access the larynx. It is thought to improve the view of the larynx because the tongue does not need to be compressed. This particular technique can and should be practised on an intubation dummy and on elective cases before being used in the obstetric situation.

The laryngeal mask airway

If the second attempt at laryngoscopy is unsuccessful and oxygenation is still difficult, the insertion of a classic laryngeal mask airway (cLMA) is the next step. It may be necessary to ease the degree of the applied cricoid pressure to allow proper positioning of the LMA. If the LMA insertion is successful and oxygenation is possible, the safest decision is to wake up the mother. A senior anaesthetist can then provide anaesthesia for the caesarean section, with a regional technique or awake fibreoptic intubation.

If the anaesthetic has to proceed at this point (e.g. the mother has to be resuscitated) continue with the LMA to provide your airway and re-apply cricoid pressure. It is important to make this decision before the induction of anaesthesia, and not when failed intubation and ventilation occurs.

In practice, there are only two absolute indications to continue with surgery: maternal cardiac arrest and life-threatening haemorrhage. In a maternal cardiac arrest the uterus must be evacuated in order for cardiopulmonary resuscitation to have any chance of success.

The Difficult Airway Society has recommended the intubating LMA or pLMA as alternatives for failed intubation. But these devices are larger than the cLMA, and trainees (and consultants) are less likely to have experience of them. Findings from obstetric case reports suggest that the pLMA may offer increased safety (with protection against aspiration of stomach contents) compared with the cLMA, but also advise against use of the pLMA by inexperienced anaesthetists in failed intubation. The recent introduction of a variety of supraglottic airways (which all function differently and have different learning curves) has made it difficult to decide which one of the disposable LMAs to keep on the difficult airway trolley.

Failed intubation, failed oxygenation

If, despite all efforts you have failed to oxygenate the patient and she is developing marked deoxygenation, a surgical airway must be secured. The difficulty of managing such a situation is compounded by the difficulty of making the decision. Some of these cognitive issues can be aided by rehearsing the strategies to deal with different ‘what ifs’, rehearsing and familiarizing oneself with appropriate equipment and its location before the event occurs.
At the University Hospital of Wales, Quicktrach or jet ventilation catheter, with a Manujet ventilator, is used (Figure 3). Trainees are assessed on their ability to put the equipment together and to jet-ventilate a dummy before they are faced with a general anaesthetic caesarean section on a patient. In particular, trainees need to know where to plug in the Manujet. The Melker’s and Quicktrach sets have been shown to be technically reliable in manikin studies. Familiarity with such equipment can also be gained and the skill practised on manikins.

Extubation

If the patient was difficult to intubate, extreme care should be taken at extubation. There is debate as to whether extubation should be done in the left lateral position or the upright position. The left lateral position is used by radiologists to encourage reflux, whereas sitting upright allows freer excursion of the diaphragm and decreases the risk of reflux. With an increasingly obese population the upright position tends to be favoured.

Once the patient has fully recovered she must be informed of the failed intubation and the relevance for further anaesthetics. Patients are given a letter to keep, clearly describing the problem and subsequent management, a copy of which is kept in the notes.

REFERENCES


FURTHER READING