



Difficult and failed intubation in 3430 obstetric general anaesthetics★

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Summary

A retrospective audit was performed of all obstetric general anaesthetics in our hospital over an 8 year period to determine the incidence of difficult and failed intubation. Data was collected from a number of sources to ensure accuracy. A total of 3430 rapid sequence anaesthetics were given. None of the patients had a failed or oesophageal intubation (95% CI, 0–1:1143). There were 23 difficult intubations (95% CI, 1:238–1:100). This was anticipated in nine cases, requiring awake fiberoptic intubation in three cases. Consultants or specialist registrars were involved in the management of all cases. We attribute the low incidence of airway complications to the above average rate of general anaesthesia in our hospital, senior cover and specialised anaesthetic operating department assistants.

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Difficult and failed maternal intubation remains a highly topical issue. Failed maternal intubation is the most frequent cause of death directly attributed to anaesthesia, accounting for 50 out of 103 deaths reported in Confidential Enquiries from 1976 to 2005 [1–10]. While the numbers remain small, the impact of maternal death due to failed intubation is enormous in terms of its impact upon the patient's family, and each case is invariably accompanied by coverage in the national press [11].

The risk associated with obstetric general anaesthesia has led to regional techniques being used wherever possible. NHS maternity statistics show that the number of obstetric general anaesthetics administered in the UK has fallen in the past 25 years from 50% of Caesarean sections down to 5% [12]. Johnson et al. [13] similarly found a marked fall from 79% to under 10% over the same period. General anaesthesia is now used mainly for true emergency cases where there is insufficient time for a regional technique [14, 15]. Such circumstances may also lead to an inadequate airway assessment, which can contribute to the risk of difficult or failed intubation [10, 16].

The trend away from obstetric general anaesthesia has been accompanied by a rise in the rate of failed intubation from 1:300 to 1:250 [17–19]. Most obstetric general

anaesthetics in the UK are given by trainee anaesthetists [20, 21]. Concerns have been raised about the problems of providing suitable experience in obstetric general anaesthesia, when such training opportunities are now few and far between [13, 21].

Trainees are now not only unfamiliar with obstetric general anaesthesia but also with the drugs and equipment used. Thiopental has been relegated from induction agent of choice to exclusive use in obstetrics. Furthermore, an invaluable intubation aid, the re-usable Eschmann gum elastic bougie, has been replaced by single-use devices that have been shown to be less effective [22, 23].

The advent of the laryngeal mask airway has also decreased trainees' exposure to laryngoscopy and intubation and has increased the time taken to acquire intubation skills [9, 17]. Compliance with the European Working Time Directive has considerably reduced the number of working hours available to acquire experience during the specialist training period [10, 24, 25].

It is pertinent that countries that have a high rate of general anaesthetic usage, such as South Africa, have a low failed intubation rate – 1:750 [26]. Similarly, those countries where obstetric anaesthesia is administered by senior anaesthetists such as the USA also have a lower failed intubation rate [27, 28]. In addition, the

characteristics of pregnant women have changed. Average maternal age, body mass index and number of co-morbidities have all risen. These factors have significantly contributed to a rising Caesarean section rate and may also affect the risk of difficult/failed intubation [29, 30].

Methods

Approval for the audit was obtained from the Hospital Clinical Audit Committee. Data were collected by writing a custom report from the Meditech electronic patient record system, containing details of all deliveries, operations, anaesthetics and associated complications from January 1st 2000 until December 31st 2007. This was supplemented by additional information obtained from the Adverse Clinical Event database, internal case reviews and the records of the Obstetric Anaesthetic Clinic. An audit proforma was used to collect information from the case notes of all patients with difficult or failed intubation.

Results

During the eight year audit period, there were 55 057 deliveries of which 12 806 occurred via Caesarean section (23.2%). A total of 3 430 obstetric general anaesthetics were administered. Of these, 86.3% were given for Caesarean section and the remainder for other procedures including removal of retained placenta, repair of third degree tear, wound exploration and laparotomy. General anaesthesia was used, on average, for 8.7% of elective and 30.4% of emergency Caesarean sections. Tracheal intubation with a rapid sequence induction using thiopental and suxamethonium was used in all cases. None of the patients in the series had a failed intubation or an oesophageal intubation.

Only 23 patients were recorded as having a difficult intubation (1:156). Of these, 15 occurred in emergency Caesarean sections (65%). Two of the patients had severe pre-eclampsia. Airway difficulties were anticipated in nine patients. Of these, three patients had an elective Caesarean section using an awake fiberoptic intubation under remifentanyl sedation. The other six patients were morbidly obese and were managed by senior trainees and consultants. Unanticipated difficulties occurred in 14 patients (61%). However, in all such cases, the preoperative airway assessment was found to be inadequate and not recorded in six cases or poorly documented in a further eight cases. Body mass index (BMI) was recorded for 17 patients, of whom seven were overweight and two had BMI > 35 kg.m⁻².

A bougie was required in 15 patients (65%) and one patient required a change to a McCoy blade. All patients were intubated with a standard 7.5-mm oral cuffed

tracheal tube but one patient required the use of a 6.5 mm tube. There were no recorded cases of difficulty in ventilating via the face mask and no patients required laryngeal mask airway rescue. Only one patient had significant desaturation during attempts at intubation and underwent bronchoscopy before extubation, with no evidence of pulmonary aspiration. Only four difficult intubations occurred outside working hours and in 15 out of 23 cases, a consultant was present. In all cases, a consultant or specialist registrar was on hand to assist the anaesthetist in difficulty.

All patients made a good recovery with no sequelae. All patients were followed up on the ward and were seen by a Consultant anaesthetist.

Discussion

We found an incidence of failed intubation of 0 in 3430 cases. The 95% confidence intervals of this proportion are 0–1:1143, which are lower than other figures previously quoted in the UK literature [17–19]. The incidence of difficult intubation was 23:3430 with 95% confidence intervals ranging from 1:238 to 1:100. The incidence of difficult obstetric intubation has been quoted in other series as being of the order of 1:30 [31–35], although it is recognised that the definition of 'difficult' is open to interpretation. [31, 32]. While there may be some under-reporting of patients with difficult intubation conditions, we have cross checked our failed intubation records across multiple data sources and are confident that no patients were missed in this series.

Our unit has a liberal policy of allowing general anaesthesia if there are reasonable obstetric or anaesthetic indications and the risk/benefit ratio appears favourable. Our general anaesthetic rates have therefore remained above the national average. The use of general anaesthesia fell gradually over the audit period from 15% of electives and 40% of emergency Caesarean sections in 2000 down to 4% of elective and 24% of emergency Caesarean sections in 2007. However, the large number of deliveries has ensured that the number of general anaesthetics administered remained sufficient to offer training opportunities, with 348 general anaesthetics given in 2007. In 1999, the nine trainees in the department gave, on average, four obstetric general anaesthetics per month. Following the transfer of maternity services from University Hospital Aintree in 2004, our trainee numbers increased to 14. With full implementation of the Working Time Directive in August 2008, we now have 16 trainees, who now give an average of two general anaesthetics per month. The size of our unit ensures that our trainees are always able to receive adequate supervision and this may partly account for our good results. There is consultant anaesthetic

presence on labour ward during the working week from 8 am to 7 pm daily, with 20 obstetric anaesthetic sessions. Out of hours, there are two trainees on call for obstetric and gynaecological emergencies, pairing junior trainees with more senior trainees under distant supervision. There are further obstetric general anaesthetic training opportunities in seven other units in our training rotation.

These figures are considerably higher than those published for trainees in the Yorkshire region whose experience of obstetric general anaesthesia per rotational attachment fell from four in 1998 down to one in 2006 [13, 17, 25]. The Yorkshire experience mirrors reports from the United States where some trainees were able to complete their residency having given fewer than six obstetric general anaesthetics [27, 28, 36]. Training that largely consists of elective regional anaesthesia is unlikely to prepare the trainee for an emergency requiring general anaesthesia [20].

We are also aware of the active role played by our Operating Department Practitioners (ODP) in keeping our difficult and failed intubation rates to a low level. Our ODPs specialise in obstetrics and gynaecology and do not rotate to scrub or recovery duties. They have been able to provide internal cover to ensure that agency staff are not required. On average, during the audit period, each ODP assisted at more than 45 obstetric general anaesthetics per year. This experience allows the ODPs actively to assist both junior and senior anaesthetists and work within the team to anticipate potential problems. They provide a stable, solid support for rotating trainees during local and distant supervision. Some of these trainees have eight-week placements in the first instance. However, this too is under threat as there is pressure for new ODP job descriptions to include scrub and recovery duties.

While the overall figures are good, there is scope for improvement in terms of documentation of pre-operative airway assessment, grade of view at laryngoscopy and a detailed annotation of any difficulty encountered. The introduction of a new electronic anaesthetic record should facilitate future audits in this area.

As the figures above demonstrate, trainees joining our department now will receive around half the clinical exposure to obstetric general anaesthesia by comparison with those at the start of the audit in 2000. We must therefore supplement this clinical experience with airway drill practice both on the delivery suite and in the high fidelity simulator to develop teamwork and situational awareness [36]. Our colleagues at Aintree University Hospital have developed a system called ADAM to optimise pre-operative airway assessment and facilitate choice of appropriate airway techniques and devices. We have been asked to contribute towards this system to suit the needs of the obstetric airway.

Our policy advocating a liberal attitude towards the use of general anaesthesia can be criticised as exposing mothers to unnecessary risk. However, our rate of general anaesthesia lies in the middle of the range quoted in the National Sentinel Caesarean Section Audit [15]. General anaesthesia will remain an important part of obstetric anaesthesia practice as there will always be situations where regional techniques fail or are contra-indicated.

The rate of difficult and failed obstetric intubation is a key performance indicator for an obstetric anaesthetic department, albeit one that needs to be measured over a long time frame. While the rates found in this audit (1:149 and 0, respectively) are satisfactory, there is no room for complacency and we must ensure that trainee anaesthetists and their assistants receive the best possible training in airway management.

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