Obstetric Airway Assessment

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Introduction

After working in obstetrics for approximately 5 years, I noticed that during emergency lower segment caesarean sections (LSCS) managed under general anaesthesia (GA); some of the patients seemed to have a more difficult airway than had been expected. Although there was never a time when we had to use equipment from the difficult intubation trolley, there have however been a number of times when the anaesthetist has been surprised at the unexpected difficulty. In retrospect there have also been several times when the anaesthetist handed over that the patient was a grade II or III and yet on laryngoscopy, they are found to be a I or II. I found this very interesting and decided to read some research on the changes in Mallampati scores and the comparison with the Cormack and Lehane score in obstetric patients. I will use a recent experience with a patient to illustrate this phenomenon and discuss the issues surrounding it, including the influence this knowledge has had on my practice.

Patient history

The patient in this case study is a 33 year old 38 week pregnant woman. She was originally booked as an acute patient for a trial of ventouse for decelerations on the cardiotocograph. On the delivery unit (DU) the patient was fully dilated but had little progression of labour. An urgent foetal lactate test result of 5.7 mmol made the Consultant Obstetrician decide she needed an emergency LSCS as the baby was severely acidotic. The anaesthetist received only a brief history that the patient was allergic to penicillin. It was fortunate that he had previously examined her in the DU. He assigned her a Mallampati III score at that time. The patient was brought to the operating room and given a general anaesthetic. The foetus was delivered within 5 minutes of arrival in the operating room. Upon laryngoscopy it was interesting that the anaesthetist assigned a Cormack and Lehane score of grade II. He commented that she was easier to intubate than he had originally anticipated and that this was a relief given the serious circumstances.

Discussion

The Mallampati score is a simple tool used for pre-anaesthetic assessment of a patient’s airway. It grades patients into 4 different classes depending on the view of the pharyngeal structures that can be seen with the mouth wide open and the tongue protruding. Patients belonging to class III or IV can be difficult intubations and a serious cause for concern during emergency anaesthesia (Oberoi and Phillips, 2000). It gives the anaesthetic team an indication of the likelihood of easy or difficult intubation and securement of the airway. This information is important to the anaesthetic technician during set-up for a case and will influence the choice of equipment prepared for airway management.
Mallampati Grades

Class 1: Full visibility of tonsils, uvula and soft palate
Class 2: Visibility of hard and soft palate, upper portion of tonsils and uvula
Class 3: Soft and hard palate and base of the uvula are visible
Class 4: Only Hard Palate visible

http://en.wikipedia.org/wiki/mallampati.score

There are several factors that could account for the Mallampati grading of this patient as a grade III as well as the discrepancy between the Mallampati score and the Cormack and Lehane score. The most obvious would be that during initial examination, the delivery suite room was dimly lit making it more difficult for the anaesthetist to see oral structures and therefore assign an appropriate Mallampati score. The patient was in the second stage of labour with no pain relief and was sitting upright in the bed. The anaesthetist also reported that he had difficulty getting the patient to co-operate with his airway assessment as she was extremely distressed at being told she needed an emergency LSCS. Despite this, he was satisfied that his assessment was appropriately scored.

Although a useful tool, the Mallampati score by itself is not sufficient enough to assess and predict a difficult airway. A study done on almost 2000 patients by Cattano et al (2004) found that the Mallampati score correlated well with the Cormack and Lehane score of - I and II overall. However, it was noted that Mallampati scores of III were associated with a higher incidence of the Cormack and Lehane score being II. Similarly Mallampati of IV best correlated with a Cormack and Lehane score of III. From this study Cattano
et al concluded that the Mallampati score “has a low positive predictive value for difficult intubation. Furthermore, anatomical distances also poorly predict the laryngeal view”. Despite this, Mallampati scores still continue to be the most popular and easiest predictor of a difficult airway in conjunction with measurement of thyromental distance.

In 1995 Pilkington et al studied 242 pregnant women at two different stages during their pregnancy. Two photographs were taken of the patients at 12 and 38 weeks gestation. All patients were sitting in the same position and the lens was pointed at the level of their pharynx. The photographs were evaluated independently by three anaesthetists—a consultant, senior registrar and registrar. They were not told during which gestation period the photographs had been taken. Findings demonstrated that the number of grade IV cases increased at 38 weeks while grades I to III reduced. The researchers concluded that this demonstrated a correlation between weight gain and higher Mallampati scores. It was suggested that this may have been due to fluid retention causing pharyngeal oedema.

During pregnancy the body undergoes many physiological changes. Those which most affect anaesthesia are changes to the respiratory system and gastrointestinal systems. Effects of oestrogen and increased blood volume contribute to oedema of the upper airway mucosa. This can also cause nasal congestion which can lead to bleeding during airway manipulation. Laryngeal oedema can also cause difficulty passing the endotracheal tube, especially in patients with pre-eclampsia (Vasdev, Harrison, Keegan, Burkle, 2008).

The course of active labour can also change the Mallampati score. Farcon, Kim and Marx (1993) observed a healthy primigravida patient who was admitted to the delivery unit in the early stages of labour. She had refused any pain relief. On examination the anaesthetist judged her to be a Mallampati score of I to II. Her labour progressed normally and she began to bear down strenuously with every contraction. At 8 cm dilation she had some fetal decelerations and she was prepared for a possible LSCS. At repeat airway evaluation by the same anaesthetist, he noticed marked oedema of the lower pharynx and gave her a Mallampati score of III to IV. She proceeded to have a vaginal delivery after four and a half hours of bearing down. A further airway assessment was repeated post-delivery and it was still shown to be class III to IV. Twelve hours later the airway assessment was repeated by three independent anaesthetists who all assigned her the original score of I to II.

A further study by Boutonnet, Faitot, Katz, Salomon and Keita (2009) was conducted in France studying 87 pregnant women, again assessing Mallampati scores at different stages throughout pregnancy. The researchers evaluated the patients positioned in a semi-sitting position with their heads in neutral alignment. All airway evaluations were done by the same two anaesthetists. The first anaesthetist performed all the airway assessments on the 87 women during the 8th month of pregnancy (T1). The second anaesthetist performed the assessments on the women at the following three
stages: placement of the epidural catheter (T2): 20 mins post delivery (T3) and 48 hours post delivery (T4).

The Mallampati classes at different time points.

From this study, out of the 87 women evaluated, 32 did not have any change in their Mallampati score. For the remaining patients, the Mallampati class increased between 8th month to placement of the epidural (early labour), and from early labour to 20 minutes post delivery. The score then decreased between immediate post delivery and 48 hours post delivery. From the graph we can see that the biggest increase in Mallampati III and IV grades were at the first and second stage of labour which supports the results from Farcon’s study that Mallampati score can increase during active labour. The study also confirmed that after a period of time post delivery, the Mallampati score significantly decreased although was not fully reversed 48 hours after delivery.

This is an important issue to consider when anaesthetic technicians (ATs) are setting up and preparing for emergency ‘crash’ caesarean sections. Often ATs are with an anaesthetic registrar who is working without direct senior supervision in addition to being ‘after hours’. A woman that may have been examined in DU several hours previously may, after active labour have increased airway oedema as demonstrated by the studies cited above. Not only does this impact on what the AT needs to have available for a difficult airway in terms of equipment, but one could reasonably predict that it may also make the location of, and application of cricoid pressure more difficult. Anaesthetic technicians should always ensure they have a variety of
endotracheal tubes available as well as a selection of different laryngoscope blades (eg. Kessel, Polio, Miller) at hand to aid intubation. Similarly, the AT must actively anticipate that unexpected airway difficulties may eventuate and should ensure they are confident in their knowledge of their hospital difficult intubation algorithm. The anaesthetist may not realise that the airway has changed since they last examined the patient so it is essential that the AT is appropriately prepared.

This research has influenced the way the author regards their anaesthetic set-up and case preparation. Although always fully prepared for cases with the standard airway equipment required for LSCS, she had had not considered that the patients’ airway anatomy may have changed over a period of hours since the insertion of epidural (or first stage of labour) to second stage of labour. It is important to be prepared for events and be able to suggest ideas to the anaesthetist when an unexpected difficult intubation or failed intubation occurs. The incidence of failed intubation in pregnancy is approx 1 in 300 cases compared to 1 in 2200 in the non-pregnant population (Aitkenhead, Smith, Rowbotham 2007). Instead of asking what Mallampati grade the patient is before every general anaesthetic I will also ask when that assessment was performed, if the patient is presenting for an emergency LSCS. If ATs are appropriately prepared for a difficult intubation at the start of the anaesthetic, it will likely contribute to faster intubation and therefore rapid delivery of the foetus. Prolonged and persistent attempts at intubation lead to increased airway trauma and the resultant oedema could make mask ventilation more difficult (Douglas 2004).

Conclusion

The case study described above has been used to illustrate the differences that may occur between airway assessments in patients actively labouring prior to delivery. A number of relevant studies have been cited which demonstrate that Mallampati scores can change due to physiological changes during pregnancy and labour. The author has further made recommendations on the clinical practice aspects of preparing for emergency LSCS and the responsibilities of anaesthetic technicians.

The desired outcome for any of these scenarios is that both mother and baby remain safe during anaesthesia and surgery. This can be achieved if the anaesthetic technicians are able to adapt to changing ideas as we learn more about our sphere of clinical practice. Anaesthetic technicians are an essential element in the conduct of safe anaesthesia and must demonstrate a willingness to be open to learning new ways of working and thinking irrespective of years of experience.
References


