Complications with Supraglottic Airways

Something to Worry About or Much Ado About Nothing?

The supraglottic airways have gained firm places in anesthetic practice since clinical introduction of the laryngeal mask airway (LMA) Classic™ (LMA North America, Inc., San Diego, CA) in 1988. Although they are generally being used safely, serious complications occasionally do occur during the use of the airways. To increase safety, we need to know the types, severity, and possible causative factors of complications, from studies of a large number of patients. In this issue of ANESTHESIOLOGY, Ramachandran et al. report a retrospective observational study, assessing the efficacy of the supraglottic airway (LMA Unique™) in more than 15,000 patients, to find out possible risk factors of failure to use the device during anesthesia.

Main Findings of the Study of Ramachandran et al.

Ramachandran et al. report that the incidence of failure of the LMA Unique™ (defined as an airway event requiring removal of the device and subsequent tracheal intubation) was 1.1% (170/15,795 patients). Significant airway complications (such as hypoxia or pulmonary aspiration) occurred in 106 of these 170 patients (62%). Causes of failure included insufficient ventilation because of gas-leak around the device, airway obstruction because of laryngospasm, dislodgement of the device, and pulmonary aspiration. Four independent risk factors of failure were identified: males, obesity, poor dentition, and rotation of a surgical table.

Are the Supraglottic Airways Being Used Optimally?

The incidence of failure reported by Ramachandran et al. is in agreement with the incidence reported by previous studies. Can we then regard that the failure rate of 1.1% is low enough, and the supraglottic airways are being used optimally? The answer should be "no." This study included only the cases in which the device had to be removed and the trachea intubated. There would have been patients in whom serious complications, such as laryngospasm, occurred during the use of the device, and have been treated by deepening anesthesia and giving a neuromuscular blocking agent, without tracheal intubation. In fact, previous studies indicate that serious complications may occur as high as 5 or 6%. If such a serious complication occurs in 1 of 20 patients, we cannot regard that our clinical practice using a supraglottic airway is optimal.

Although rare, life-threatening complications may occur during the use of a supraglottic airway. In this report, two patients required unplanned admission to the intensive care unit. Among 13,170 patients who underwent day-case anesthesia, 18 (0.14%) required unplanned admission to hospital. Pulmonary aspiration occurred in at least 3 patients (0.02%), the incidence which is similar to that estimated previously. Theoretically, the incidence of pulmonary aspiration during the use of a supraglottic airway should be lower than the incidence during tracheal intubation, because a supraglottic airway is indicated only in patients at a low risk of aspiration. Nevertheless, several studies have shown that the
patient in whom a supraglottic airway was used aspirated as frequently as in the patient whose trachea was being intubated, \(^4\) and the report of the fourth National Audit Project (NAP4), \(^6\) a recent large prospective study in the United Kingdom, has confirmed that the estimated number of death because of pulmonary aspiration during the use of a supraglottic airway (16 in the United Kingdom or 100 worldwide each year\(^7\)) is not far from the reality.

How Can We Reduce the Incidence of Complications?

How can we then effectively reduce the incidence of complications? The NAP4 report indicates that poor standard of care was a major contributing factor of serious airway complications.\(^6\) For example, almost all patients who aspirated were at increased risk of aspiration.\(^6,8\) Therefore, this most frequently occurring life-threatening complication can be reduced by simply avoiding using a supraglottic airway in patients at increased risk of aspiration.\(^9\)

Exact cause of the failure in each case of the Ramachandran et al. study\(^1\) is not clear, but failed insertion of the device to the correct position may well have been the cause. A supraglottic airway may often be placed in a suboptimal position, even when adequate ventilation is obtained: the device may not be inserted deep enough, the tip of the device may be impacting upon the glottis, the mask may be twisted around the long axis of the tube or even folding over on itself. What seems to be overlooked is that a misplaced device may often cause airway complications.\(^1\) For example, a device not inserted sufficiently deep enough is likely to dislodge. If the tip of the device is wrongly inserted toward the glottis, laryngospasm is likely to be induced when anesthesia become light, such as during emergence from anesthesia.\(^9\)

Because a supraglottic airway is usually inserted blindly, its exact position cannot be assured. Therefore, to place the device into the correct position, we need to learn possible types of misplacement and indirect detection methods of misplacement, and to master techniques to place the device correctly.\(^9\)

Anesthesia seems to be maintained often with a lighter depth during use of a supraglottic airway than during tracheal intubation, because the presence of a supraglottic airway does not usually induce airway reflexes. However, if anesthesia is not sufficiently deep, gagging, vomiting, or laryngospasm may be evoked by surgical stimuli or by changing of the patient’s position. We should therefore always be vigilant to adjust the depth of anesthesia so that it is sufficiently deep to prevent these reflexes.

Role of Supraglottic Airways in Difficult Airways

In this issue of Anesthesiology, Ramachandran et al.\(^1\) provide another important finding. Although the number of patients studied was limited to 1,089, they have found that the incidence of difficult facemask ventilation in patients with failure of the LMA\(^\text{TM}\) (5.6\%) was threefold higher than in patients with successful use of the LMA\(^\text{TM}\) (1.9\%).

The supraglottic airways have potential roles in patients with difficult airways.\(^2,10\) In such circumstances, a small percentage of failure to ventilate through a supraglottic airway becomes important, and thus it is necessary to recognize in which situations the device is likely to fail.

We should be aware that, even in patients with “normal airways,” adequate ventilation through a supraglottic airway may not be obtained in up to 10% of cases, and the incidence of failure at the first attempt at insertion can be as high as 30\%.\(^5\) This could be interpreted that insertion of a supraglottic airway may fail much more frequently than tracheal intubation. There are several situations in which both insertion of a supraglottic airway and tracheal intubation can be difficult: a limited mouth opening, restricted head and neck movement, and cricoid pressure.\(^11\) Ramachandran et al.\(^1\) indicate that there may be situations where both a facemask and a supraglottic airway fail. Therefore, prediction methods to detect difficulty in the use of a supraglottic airway will be required to use it reliably as a rescue device in patients with difficult airways.

Conclusions

There is no doubt that the supraglottic airways are now being used safely. Nevertheless, recent studies of a large number of patients (including the study of Ramachandran et al.)\(^1\) indicate that there is also no doubt that even now the incidence of complications associated with the use of a supraglottic airway is not low enough. The supraglottic airways have potential roles in patients with difficult airways, but there had been only one report which focuses on the difficulty in insertion of, or ventilation through, a supraglottic airway,\(^9\) until Ramachandran et al.\(^1\) attempted to shed light to this important topic.

Nearly 20 yr ago, it has been pointed out that misuse of the device may lead to serious complications,\(^12\) and the messages written at that time seem to still be valid. We need to make further efforts not only to elucidate causative factors of complications and difficulties with the use of a supraglottic airway, but also to perform accurate preoperative assessment of patients’ conditions and provide adequate depth of anesthesia, to establish a safe use of a supraglottic airway.

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References


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1184

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