

Pharyngeal ulcer after LMA anesthesia. A case report and review of literature

Abstract

Sore throat is one of the postoperative upper airway problems that may occur after general anesthesia using endotracheal tube or laryngeal mask airway. Dysphagia is one of the patient's complaints that belong to the generic term of "sore throat". A 32-year-old gentleman presented with dysphagia was scheduled for upper gastrointestinal endoscopy which revealed pharyngeal ulcer. The patient had undergone right knee arthroscopy under general anesthesia using a laryngeal mask airway three days ago. The problem was managed with oral non-steroidal anti-inflammatory drugs (NSAIDs) and benzydamine hydrochloride mouthwash. The patient improved slowly over a 2-week period. An over-inflated LMA used for prolonged anesthesia was supposed to produce pressure necrosis and ulceration at the pharynx. Minimum volume of air that prevents leakage should be used for inflation of LMA cuffs. Routine monitoring of LMA cuff pressure should join other ASA standard monitors to avoid such postoperative complications.

Keywords: sore throat, pharyngeal ulcer, LMA, patient, dysphagia

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Ezz F Ismail

Department of Anesthesia and Intensive Care, Al-Azhar University, Cairo, Egypt

Correspondence: Ezz F Ismail, Department of Anesthesia and Intensive Care, Al-Azhar University, Cairo, Egypt, Email ezzismail@yahoo.com

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Abbreviations: LMA, laryngeal mask airway; NSAIDs, non-steroidal anti-inflammatory drugs; GA: general anesthesia; EGADs, extra-glottic airway devices; CLMA, classic laryngeal mask airway; ETT, endotracheal tube

Introduction

Extra-glottic airway devices (EGADs) have been tremendously used in our modern anesthesia practice particularly for day-case surgeries. Postoperative upper airway problems were reduced with the use of such devices. However, those problems did not disappear completely.¹ Sore throat is one of the postoperative upper airway problems that may occur after general anesthesia using endotracheal tube or laryngeal mask airway. Dysphagia is one of the patient's complaints that belong to the generic term "sore throat".

Case description

A 32-year-old gentleman presented with dysphagia was scheduled for upper gastro-intestinal endoscopy. He had undergone arthroscopy for his right knee three days ago under general anesthesia (GA). His physical status was ASA class I and his standard lab investigations were normal. In the endoscopy suit, standard monitors (ECG, non-invasive blood pressure and pulse oximeter) were connected to the patient. Upper gastro-intestinal endoscopy was performed under topical anesthesia of the mouth and pharynx (using 10% lidocaine spray) and sedation that was achieved with I.v. propofol (2mg/Kg bolus) and 0.02mg/kg/min infusion. Nasal cannula was applied to administer oxygen during the procedure. The nasal cannula has a side line through which end-tidal CO₂ was monitored. The only positive result in the endoscopy findings was pharyngeal ulcer. This was managed with oral non-steroidal anti-inflammatory drugs (NSAIDs) and benzydamine hydrochloride mouthwash. The patient improved slowly over a 2-week period. On reviewing the patient's previous anesthesia record, it was found that he received GA using a classic laryngeal mask airway (cLMA) size 4 for his right knee arthroscopy. GA was accomplished with sevoflurane, atracurium and fentanyl. The

duration of that procedure was 120minutes with uneventful outcome. Nothing was mentioned in his previous anesthesia record about the volume of air injected in the LMA cuff or monitoring of the LMA cuff pressure.

Discussion

Post-operative "sore throat" is a generic term for a number of symptoms.² Such symptoms usually include one or more of the following:

- i. Pharyngeal dryness: very common, dryness or feeling of thirst
- ii. Sore throat: continuous throat pain, may be mild, moderate or severe
- iii. Dysphagia: uncoordinated swallowing or inability to swallow or eat
- iv. Odynophagia: pain on swallowing or eating
- v. Dysphonia: hoarseness or voice changes

The site of most applied force is different when comparing insertion of an endotracheal tube (ETT) to a LMA.³ The main force exerted by the LMA is at the end of the soft palate and the pharyngeal wall directly behind, whereas with the ETT, it is the hard palate and the entrance to the trachea and larynx. This explains why dysphonia is more likely to occur with the ETT, whereas dysphagia is more common with the LMA. The following physiological changes have been observed after LMA use:³

- i. Pharyngeal erythema: most common finding
- ii. Arytenoid dislocation: from folding back of the LMA tip
- iii. Epiglottitis: also from folding back of the LMA tip
- iv. Uvular bruising
- v. Nerve palsies: recurrent laryngeal, hypoglossal and lingual

The etiology of sore throat after LMA depends on many factors such as insertion technique; intracuff pressure; size of LMA; use of nitrous oxide; use of lignocaine gel or spray; anticholinergic premedication; and duration of surgery.¹

The inflated mask cuff of the classic LMA exerts pressure on surrounding tissue to allow a seal for ventilation, but excessive cuff pressure can result in complications. The pressure transmitted to the pharyngeal mucosa by the cuff of the cLMA can exceed tissue capillary perfusion pressure.⁴ Presence of a LMA distorts normal pharyngeal architecture, resulting in an increased antero-posterior diameter at the level of the tongue and epiglottis, as well as tilting the larynx anteriorly. Also, this can cause direct pressure on and stretching of the recurrent laryngeal nerve. This can result in vocal cord paralysis, usually unilateral and temporary in nature, but occasionally bilateral and life-threatening.⁵ Over inflation of LMA cuff may be the cause of hypoglossal and lingual nerve palsies reported in the literature.

The effect of limitation of LMA cuff pressure on the pharyngeal mucosa on throat symptoms differ according to patient's ventilation status. There is conflicting evidence in spontaneously breathing patients. However, in patients ventilated through the LMA, minimizing cuff pressure has been shown to cause significantly fewer sore throats postoperatively.⁶ There is evidence that airway sealing pressure is usually optimal at submaximal cuff volumes and pressures, which suggests that it is the matching contours of the cuff and pharynx, rather than the transmitted pharyngeal mucosal pressure, which provide the airtight seal. Volumes need only be enough to achieve a gas-tight seal and this may be acceptable with as little as 4-11ml air in women and 7-14ml in men.⁷ Manufacturer recommendations advise a maximum cuff pressure of 60cm H₂O (44mm Hg) for LMA products and also suggest maximum volumes for air inflation of the cuff. Cuff pressure can vary from patient to patient and excessive cuff pressure is possible with minimal cuff inflation, particularly in pediatric patients.⁸

O'Kelly et al.⁹ showed that when the LMA cuff is inflated with the suggested appropriate volume of gas, a pressure similar to, or greater than, the mucosal perfusion pressure of 32mmHg may be generated.⁹ With a size 3LMA, 10ml of air causes an intracuff pressure of 19mmHg, whereas 20ml of air causes a pressure of 49mmHg. Similarly, 10ml air in a size 4LMA causes 14mmHg pressure, whereas 30ml air causes 54mmHg pressure.⁹ If the maximum volume of air (according to manufacture recommendations) was reached and there is still leakage, one may suspect malposition of the LMA or a bigger size is required.

Diffusion of nitrous oxide (N₂O) into the cLMA cuff has produced intracuff pressures as high as 110mm Hg.¹⁰ Nitrous oxide diffusion into the LMA cuff is associated with an increase in cuff pressure by 20% after 30 minutes⁶ and consequently, a higher incidence of sore throat. In such situations, I recommend deflating the LMA cuff completely with a new syringe (now filled with N₂O diffused in the cuff during the past 30minutes) then inflate the cuff again with the minimum volume (from this syringe containing N₂O) to produce airtight seal. In such way we will minimize (hopefully prevent) further N₂O diffusion into LMA cuff. Even when cuff pressure is measured and adjusted regularly, longer procedures are still associated with more postoperative complaints. Foley et al showed that the incidence increases significantly after surgery of more than 60minutes duration and tends to be worse when active heated humidification is used.¹¹ In addition to nitrous oxide diffusion, the volume of gas in the cuff increases when air inside it is raised from room to body temperature.

Cuff pressure gauges can help to train anesthetists and nurses to correctly estimate cuff pressures of 60cm H₂O from manual palpation of the pilot balloon. Results of just 15minutes of training show an improved accuracy of 95% of operators who estimated within ±10cm H₂O of the target cuff pressure.¹² The incidence of postoperative pharyngo-laryngeal symptoms in a new supraglottic airway with a built-in intracuff pressure indicator was significantly lower than in the LMA Group with standard practice.¹³ Spence et al used the "equilibrium recoil" technique to avoid high LMA cuff pressure.¹⁴ Bick et al.,¹⁵ in their comprehensive editorial hoped to see the general adoption of the safe maximum cuff pressure of 60cm H₂O.¹⁵

In the present case, the patient was 100Kg body weight. Size 4cLMA was used during GA for his knee arthroscopy which lasted two hours. I suppose that the cLMA was over-inflated to produce air-tight seal as this patient may need size 5LMA to match his body weight. The assumed high intra-cuff pressure together with a prolonged procedure could have resulted in pharyngeal ischemia with subsequent necrosis and ulceration. Therefore, it is prudent to avoid over inflation and to monitor and adjust cuff pressure whenever possible.

Conclusion

The variability of intracuff pressures for a given volume of air among individual patients supports a need for routine monitoring of intracuff pressure during the use of cuffed EGADs. Otherwise, it is essential to inflate the LMA cuff with the minimal volume of air that produces just-seal pressure. For those who like to palpate the pilot balloon of LMA cuff and adjust accordingly, it is advisable to maintain it as soft as the lobule of the ear.

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Conflict of interest

The author declares no conflict of interest.

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