

Inferior Alveolar Nerve Injury With Laryngeal Mask Airway

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Citation

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Abstract

Ever since its introduction, LMA associated cranial nerve injuries have been reported on numerous occasions. There have been many factors attributed to this. High cuff volume/pressure and suboptimal use of LMA are the most important etiological factors associated with these complications. We present an unusual case of inferior alveolar nerve damage associated with LMA, with review of potential causative factors and prevention methods. This case highlights the importance of the correct use of LMA without which serious complications could occur even in routine cases without any risk factors

INTRODUCTION

The incidence of damage to the individual cranial nerves and their branches associated with laryngeal mask airway(LMA) is low; there have been case reports of damage to the lingual nerve,^{1,2,3},hypoglossal nerve,^{4,5} and recurrent laryngeal nerve,^{6,7,8}. Occlusion of the pharyngeal mucosal perfusion and direct compression of the surrounding structures by the LMA cuff or tubing can lead to pharyngolaryngeal morbidity^{9,10,11}. High cuff volume/pressure and suboptimal use of LMA are the most important etiological factors associated with these complications. We report an unusual case of vascular compression leading to inferior alveolar nerve injury, associated with LMA, which lasted for two weeks.

CASE REPORT

A male patient of age 35 years, height 175 cm, weight 85 kg and ASA grade I underwent elective repair of anterior cruciate ligament. He had no significant past medical history. On examination, his airway was Malampatti grade I with no anticipated difficult intubation. Anaesthesia was induced with propofol 2.5 mg.kg⁻¹ and supplemented with Fentanyl 1 microgm.kg⁻¹. Face mask ventilation was easy. A disposable (Portex soft seal) LMA size 4 was inserted by an experienced user after lubrication with a water-based jelly. The insertion was easy and atraumatic. The cuff was inflated with 35 ml of air and secured in position with adhesive tape. The head was placed in a neutral position and initially there were movements of the head and neck while obtaining optimal positioning for the procedure. The patient remained in supine position throughout the surgery. Anaesthesia was

maintained with sevoflurane and nitrous oxide 66% in oxygen with spontaneous ventilation. The LMA remained in situ for 120 minutes. There were no adverse events during maintenance or emergence from anaesthesia. The LMA was removed with the cuff deflated when patient responded to verbal commands. There was no blood on the LMA at removal.

The patient noticed numbness in his lower lip in the recovery room. Sensory loss was confirmed by examination. There were no signs of intra or extra oral trauma. The patient also developed extensive scabbing of the lower lip on the second day. The numbness and scabbing started improving after a week, with complete recovery after two weeks.

DISCUSSION

LMA is one of the most widely used airway devices all over the world. Despite the non-invasive nature of the device, pharyngolaryngeal morbidity has been associated with it,^{10,11,12,13}. Most of these complications result from direct or indirect compression of the neurovascular structures. These include sore throat, damage to lingual/recurrent laryngeal/hypoglossal nerves, vocal cord paralysis, alteration of taste and speech, tongue cyanosis or swelling. The pressure exerted by the LMA cuff or its tubing and suboptimal use of LMA are the most important predisposing factors^{1,2,3,4,5,6}. Other rare factors include lateral position¹⁴, lidocaine lubricant¹⁵, inexperience¹⁶ and alternative insertion techniques¹⁷.

In our case we believe that the injury to the inferior alveolar nerve resulted from vascular compression. Inferior alveolar

nerve is the largest branch of mandibular nerve and travels immediately posterior to the lingual nerve initially and then along with the inferior alveolar vessels between the sphenomandibular ligament and the ramus of mandible. The nerve traverses the mandibular canal and divides into 2 branches. The inferior alveolar nerve lies superficially between the last molar tooth and the ramus of the mandible. An anaesthetic block at this site leads to numbness of the lower lip. We believe that the compression occurred at this particular point. This also explains as to why the lingual nerve was spared.

In our review, multiple factors were identified which could have led to the injury. These were, use of maximum volume of air for cuff inflation, use of nitrous oxide, movement of head and neck during surgical positioning, inappropriate size of the LMA, unregulated cuff pressure and inappropriate securing method.

We inflated the cuff with 35 ml of air, which is the maximum volume for LMA size 4.¹³ The cuff should ideally be inflated to achieve an intra cuff pressure of 60 cm H₂O₁₈ or just seal pressure.¹⁹ The inflation amounts mentioned for a given size of the LMA are the maximum inflation volumes. Frequently, only half the maximum volumes are sufficient.^{20, 21} Inflation of the mask with the maximum amount of air, the cuff becomes more rigid and thus becomes less adaptable to the various contours of the pharynx,^{9, 20}

This can lead to pharyngeal mucosal ischemia and malpositioning that is the cuff sitting in the oral cavity.

When nitrous oxide is used,^{22, 23, 24} it is always recommended that the cuff pressure should be periodically checked and gas intermittently withdrawn to maintain "just seal pressure". It has been shown that the pressure exerted by the cuff is not evenly distributed.²⁵ Moreover, the pressure exerted on the pharynx by the non inflatable portions of the LMA i.e. back plate and tubing cannot be measured and hence overlooked.

The selection of size and the securing method of the LMA might have been a considerable factor as well. We used a size 4 LMA in our case. There is evidence by randomized controlled studies and recommendations by the instruction manual to use the size 5 LMA in male adults and size 4 or 5 in female adults.^{11, 13, 26} If the size of the LMA is too small, there is increased chance of malposition and overinflation of the cuff in an attempt to attain the maximum seal.^{9, 13} However there is a widespread tendency for anaesthetists to use size 4 for males and size 3 for females.²⁶ We did not

follow the procedure as given by the manual while securing the LMA. This could also have led to displacement of the LMA.

Cranial nerve injuries associated with the use of LMA are well established but rare complications. These usually present within 48 h of surgery and resolve spontaneously

over a period of weeks or months. Unless there is a strong suspicion, they might go unnoticed and be attributed to other causes.

In summary, we report the first case of transient injury to the inferior alveolar nerve due to vascular etiology, causing scabbing and numbness of the lower lip. Despite the low incidence of cranial nerve injury associated with the use of LMA, vigilant adherence to the evidence based medicine and recommendations by the manufacture's instruction manual can prevent such complications.

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