

# Postoperative Hiccup Induced by LMA—A Case Report with Literature Review

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## Abstract

**Background:** The laryngeal mask airway (LMA) has become popular due to simplicity of its use and its important function in difficult airway management. However, some complications have been associated with its use. A case report and review of literature on hiccups associated with the use of LMA is presented. **Case Report:** A 24-year-old man who presented with a right inguino-scrotal hernia was scheduled for elective surgery under general anaesthesia. He denied any co-existing medical illness. Physical examination showed a normal healthy patient and he was placed in class 1 of the American Society of Anesthesiologist (ASA) physical status category. After premedication with 0.6 mg atropine, general anaesthesia was induced with 200 mg of intravenous propofol. Size 5 classic LMA was inserted, and surgery had lasted for 45 minutes. He had hiccups immediately after removal of the LMA which lasted for 6 minutes, and stopped about 95 seconds after 0.6 mg intravenous atropine was given. **Conclusion:** Complications from the use of LMA may be rare but still possible. It is important to adhere to the guidelines for insertion and removal of the LMA and perioperative use of the device should strictly be by trained personnel.

## Keywords

Laryngeal Mask Airway, Post-Operative Hiccups

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## 1. Introduction

The routine practice of airway management as a whole was changed by the introduction of the classic laryngeal mask airway (LMA) by Brain in 1983 [1]. The popularity of this airway device stems from the simplicity of its use, its important function in difficult airway management and the advantages it has over face mask and tracheal

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tube. Although the use of LMA in general anaesthesia has an excellent safety profile comparable to other alternative airway maintenance devices [2], there are potential problems, one of which is presented here. Obstruction of the LMA by patient's bite causing a fall in arterial oxygen saturation (SaO<sub>2</sub>) and a rise in end tidal carbon dioxide tension (ETCO<sub>2</sub>) has been observed [3]. Other complications such as coughing, retching, vomiting, excessive salivation and airway obstruction have been associated with use and removal of the LMA [4]. After LMA insertion, hiccup has been observed in 2% to 14% of patients [5].

We present a case report and a review of the literature on hiccup associated with the use of the laryngeal mask airway.

**Case Report:** A 24-year-old man with a right inguino-scrotal hernia was to undergo elective surgery under general anaesthesia with a classic LMA. His height was 1.65 m and he weighed 90 kg. There was no history of any chronic medical illness, or previous exposure to surgery. He denied any history of cigarette smoking or use of alcohol. He had no artificial denture and there was no history of drug allergy.

Physical examination revealed a calm healthy young man with a respiratory rate of 18 breaths per minute. The breath sounds in both lung fields were normal. He had a pulse rate of 78 beats per minute and a blood pressure of 120/80 mmHg while the first and second heart sounds were normal. He was placed in American Society of Anesthesiologist (ASA) physical status class 1 and airway assessment was Mallampati 1.

His preoperative packed cell volume was 30% and urinalysis result was normal. An informed consent was obtained from the patient and he observed an overnight fast. The patient refused neuroaxial block anaesthesia and preferred to be asleep during the surgical procedure.

On arrival in the operating room, he was connected to a multi-parameter patient monitor, which showed a pulse rate of 84 beats per minute, non-invasive blood pressure of 120/70 mmHg, an arterial oxygen saturation of 100% and a body temperature of 36.8°C. Intravenous access was established on the left wrist with an 18 G cannula through which an infusion of 500 ml of 0.9% saline was commenced.

Premedication was with 0.6 mg intravenous atropine. Oxygen was administered at a flow rate of 8 litres per minute by face-mask for 3 minutes while anaesthesia was induced with 200 mg of propofol. With loss of verbal contact, a classic LMA size 5 was inserted and the cuff was inflated with 20 ml of air. Anaesthesia was maintained with 2% halothane in oxygen, and ventilation was spontaneous, while intraoperative analgesia was achieved with 30 mg of intravenous pentazocine and 30 mg of intravenous ketorolac. The pulse rate, oxygen saturation and the non-invasive blood pressure were recorded at 5 minutes intervals during the intra-operative period. The pulse rate ranged between 78 beats/min and 84 beats/min. The oxygen saturation was between 96% and 100%, while the blood pressure ranged between 70 to 82 mm Hg diastolic and 110 to 120 mmHg systolic.

At the end of surgery which lasted for 45 minutes, a suction catheter inserted through the mouth was used to evacuate oral and pharyngeal secretions, and administration of halothane discontinued. The patient was awake with recovered airway reflexes before the cuff was deflated and LMA was removed. The patient suddenly developed hiccups which lasted for about six minutes and stopped within 95 seconds after administration of 0.6 mg intravenous atropine. He was put in left lateral position, with supplemental oxygen given by nasal prongs and transferred to the recovery room for further observation. However, the hiccup did not recur for the next 5 days which he stayed in hospital before discharge.

## 2. Discussion

Hiccups consist of sudden onset of erratic diaphragmatic and intercostal muscular clonus. They occur with a sudden inspiration, immediately followed by active closure of the vocal cords leading to a hic sound [6] [7]. The hiccup reflex arc consists of three components, the afferent limb including phrenic, vagal and sympathetic (T6-12) nerves to convey somatic and visceral sensory signals, the central processing unit in the midbrain and the efferent limb travelling in motor fibres of phrenic nerve to diaphragm and accessory nerves to intercostal muscles respectively [6] [8] [9]. Stimulation at any of the above afferent pathways can trigger hiccups.

Hiccups that developed after inserting a laryngeal mask airway following induction of anaesthesia with propofol have been reported by many workers [10]-[12]. The stimulus for hiccups in these intraoperative settings has been attributed to LMA cuff inflation, pain at the surgical site and decreased depth of anaesthesia. The mechanism by which LMA insertion and cuff inflation triggers hiccups is considered to be due to stretching of pharyngeal mechanoreceptors, as demonstrated in cats [13] or upper oesophageal receptors, as demonstrated in humans [14]. Hiccups in this case occurred in the postoperative period just after removal of the LMA. Postopera-

tive hiccups have been reported in subjects who underwent various surgical procedures, for example whipple operation and colectomy. Surgery-related gastroparesis was suggested as one of the mechanisms leading to the hiccups in these cases [15] [16]. Propofol induction during anaesthesia has been associated with perioperative hiccups [10] [12]. Overall, it is uncertain whether some cases of postoperative hiccups are the effect of direct surgery or secondary to anaesthetic agent [17]. Gataure *et al.* [4], compared 50 patients in whom LMA were removed while they were deeply anaesthetized with 50 others in whom the LMA were removed when they were awake and observed that complications during LMA removal were significantly more in the awake group. Although the listed complications did not include postoperative hiccups, but in 14 of the patients who were awake when LMA was removed, the pH of the secretions at the tip of the LMA was less than or equal to 3 compared with only 4 patients in the deeply anaesthetized group. This suggested a significantly greater incidence of gastro-oesophageal reflux in the awake group. And gastro-oesophageal reflux is an aetiological factor for hiccups [11]. They concluded that it may be safer to remove the LMA whilst the patients are deeply anaesthetized in the operating room than when they are awake often in the recovery room.

Atropine which was successfully used in this case has previously been effectively used for treatment of hiccups occurring in the intraoperative period. These hiccups followed the insertion of Laryngeal mask airway after induction of general anaesthesia with propofol [10]. Atropine could act directly on the oesophagus by means of decreasing intra-oesophageal pressure. Atropine can completely abolish the effects of muscarinic receptor agonists, which increase the tone and motility of the gastrointestinal tract and might reduce the peripheral mechanoreceptor-mediated reflex by decreasing intraoesophageal pressure. Furthermore, atropine has an indirect effect on the central nervous system through enhancement of sympathetic nerve activity [10].

Recently, Koteswara *et al.* in a case report noted that dexmedetomidine—a selective alpha-2 adrenergic receptor agonist abolished hiccup in a similar condition, implying that sympatholysis may have a role in suppressing intraoperative hiccup [11]. They proposed the use of dexmedetomidine instead of atropine or ephedrine which have been reported to abolish perioperative hiccups, but may cause unacceptable increases in heart rate and blood pressure [11]. However, dexmedetomidine is not readily available in many centres including ours. Metoclopramide is readily available and has also been successfully used to terminate intraoperative hiccups following LMA insertion after anaesthesia has been induced with propofol [12]. It may also be effective in abolishing hiccups occurring after removal of LMA in postoperative patients in whom anaesthesia was induced with propofol.

In the case reports on hiccups related to laryngeal mask airway insertion or removal after induction of anaesthesia with propofol, it is uncertain whether some cases of perioperative hiccups are the direct effect of surgery [17]. Injury to the delicate tissues of the upper airway during the LMA removal is a possibility in this patient that developed a postoperative hiccup. Prevention of this and other causes of postoperative morbidity associated with LMA removal is very desirable [18].

In spite of care and best intentions, complications from the use of LMA may be rare but still possible. To avert such unpleasant scenario, it is important to adhere to the guidelines of insertion and removal of LMA and perioperative use of this device should strictly be by trained personnel.

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