Reinforced Laryngeal Mask Airway in Ambulatory Otorhinolaryngologic Surgery: Tonsillectomy and/or Adenoidectomy in Paediatric Population

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Abstract

In otorhinolaryngologic procedures, the use of endotracheal tube has been considered the gold standard to maintain the airway. In last years, reinforced laryngeal mask airway (LMA) has been reported as a safe alternative. The purpose of this study was to evaluate the safety of the use of reinforced LMA in tonsillectomy and adenoidectomy in pediatric population.

In 56 pediatric patients undergoing tonsillectomy and adenoidectomy we evaluated the dose of opioid and neuromuscular used, duration of anesthesia induction and intra and postoperative complications. We concluded that tonsillectomy and adenoidectomy can be safely performed in pediatric population using reinforced laryngeal mask airway.

Keywords: laryngeal mask airway; tonsillectomy, adenoidectomy.

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Introduction

Use of the reinforced LMA and endotracheal intubation are both accepted standards of care used to ensure adequate ventilation during a variety of procedures. In otorhinolaryngologic surgeries, the use of LMA remains controversial because surgical field involves the airway making complications such as laryngospasm, bronchospasm and hypoxemia more likely due to the higher incidence of airway hyperreactivity and the presence of blood and secretions (1).

LMA has gained popularity owing to its case of insertion and minimal trauma to the trachea because it is positioned superior to the larynx (2,3). LMA decreases the use of neuromuscular blocking agents and opioids and as result may avoid possible side effects, avoids the need of laryngoscopy and some studies reveals improvements in various post-operative outcomes such as sore throat, cough, desaturation, bronchospasm, laryngospasm, pain, stridor and hoarse voice (2–4). Disadvantages of the LMA in upper airway surgery include difficult visualization of the surgical field, leaking or kinking of the device which lead to difficulties in ventilation, problems with oxygenation and the need to change the LMA in favor to endotracheal tube (2).

Previous studies have demonstrated some advantages of the LMA over endotracheal tube for adenotonsillectomy, though most of them have been small studies (5).

The goal of this study is to evaluate the safety of the use of reinforced LMA in tonsillectomy and adenoidectomy, in pediatric population.

Material and methods

After receiving approval by institutional review board, we performed an observational prospective study from April 1st 2019 to October 30th 2019 at the Hospital de Braga, Portugal. Inclusion criteria were pediatric patients proposed to adenoidectomy, tonsillectomy in ambulatory setting and willingness to participate in the study, demonstrated by signing the informed consent by the legal representative. Patients with known malformations of the airway were excluded.

Anesthesia was provided by attending anesthesiologists. Monitoring consisted of pulse oximetry, electrocardiogram, non-invasive blood pressure and capnography. Anesthesia was induced with inhaled sevoflurane followed by intravenous line insertion. Additional propofol, fentanyl with or without muscles relaxants were administered. The choice of endotracheal tube versus LMA was at the discretion of the attending anesthesiologist, and the group of endotracheal tube was excluded of the study. The size of the LMA was determined according to the manufacturer´s specifications. After the surgery, patients were sent to the ambulatory PACU.

Surveys were given to anesthesiologists and PACU nursing staff. The type of device used in the airway, the duration of anesthetic induction (time between the beginning of anesthesia and the beginning of surgery), the opioid and dose used in induction, the possible use of muscular relaxant and the possible complications (air leaks, regurgitation/aspiration, surgical field obstruction) during the surgery were reported. In postoperative period, possible complications and re-interventions were evaluated (cough, dysphonia, laryngospasm, refusal to feed and haemorrhage).

Results

Fifty-six children proposed to adenoidectomy and/or tonsillectomy were included in this study and descriptive data population is presented in Table 1.

The LMA group was analyzed and included children with ages between 2 and 12 years-old (media 5.63, standard deviation 3.76). Evaluation of this group revealed that 27 patients were female and 29 were male; 42 patients were classified as ASA I and 14 as ASA II. Based on airway evaluation, 49 patients were classified as Mallampati score I and 7 patients as Mallampati score II. Fentanyl was the opioid of choice in all patients and the media of the dose was 2.4 micrograms per kilo. A neuromuscular blocking agent was administered in only 2 patients (3,6%). Induction time was in media 7 minutes. There was only the need to change the airway device in 1 patient after placing an orotracheal tube due to difficulty in ventilation after mouth opener

Table 1. Descriptive data about the study population.

Age	Min	2
	Max	12
	Median	5.63
Gender	Female	27
	Male	29
ASA	I	42
	II	14
Airway	Mallampati I	49
	Mallampati II	7

and none intra-operative complication was reported, as shown in Table 2. In post-operative time of the LMA group, there were 10 cases of complications: 2 cases of cough and in 7 patients' refusal to feed during the recovery period and in 1 patient mild hemorrhage, but not delaying the discharge of the PACU. Of all the patients studied, none needed re-intervention.

Table 2 Descriptive results of the investigation.

Fentanyl induction dose	Min	1
	Max	4
	Median	2
		4
Use of muscular relaxant		2
Induction time	Min	5
	Max	11
	Median	7
Intraoperative complications	Air leak	1
	Regurgitation/aspiration	0
	Surgical field obstruction	0
Postoperative complications	Cough	2
	Dysphonia	0
	Laryngospasm	0
	Refusal to feed	7
	Mild haemorrhage	1

Discussion

The study results demonstrate that reinforced LMA is preferred for the anesthesiologists of our institution for adenoidectomy and tonsillectomy, in a paediatric population. Based on surgeons' opinion it was clear that LMA did not alter surgical field visualization. In one case, the mouth opening altered LMA position causing difficulties in ventilation and it was necessary to change the airway device. This complication has been reported in previous studies (1,5,6). Lalwani and colleagues reported a failure rate of 6,8% and that younger patients are more likely to have LMA failure (5). There were no respiratory complications in intraoperative period such as bronchospasm, laryngospasm or regurgitation.

The dose of opioid was another point of analysis in this study and we found that in media there were used 2.4 micrograms per kilogram of fentanyl, which is less than the 3 micrograms per kilogram used in endotracheal intubation. This dose reduction can be beneficial in reduction of side effects of opioids such as sedation, nausea and vomiting.

In our institution neuromuscular agents are used in almost all cases with endotracheal intubation and in the patients of our study there were only two cases of neuromuscular block in LMA group. Avoiding neuromuscular blocking agents is essential for prevention of postoperative residual curarization.

The induction of general anesthesia the LMA typically takes less time to insert then an endotracheal tube and more time is usually required to extubate a patient with endotracheal tube fully awake. Analysis of the time of induction was another point of the study and we found a very short period (media of 7 minutes). Previous studies had analyzed the time in operating room and failed to demonstrate significant reductions in LMA group if compared with endotracheal intubation groups.(5,7,8)

Previous studies suggested that LMA protects the airway against blood, secretions and debris in ear, nose and throat procedures and that can contribute to the reduction of laryngospasm after extubation (5). In fact, in LMA group there were no laryngospasm reported after anesthesia emergence.

Our investigation has limitations as a result of its observational nature without an endotracheal intubation control group. Our findings cannot be applied to patients with abnormal airways because these patients were excluded of the study. Further investigation is needed with large randomized studies to reinforce the conclusions described here.

Conclusions

We concluded that the use of reinforced LMA in adenoidectomy and tonsillectomy is safe option in pediatric population, with low incidence of complications.

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