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Comparison of Laryngeal Mask Airway and Endotracheal Intubation in Paediatric Patients: A Comparative Study

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Abstract

Aim: The aim of the present study was to compare the subsequent factors that take place during laryngeal mask airway insertion and endotracheal intubation for surgical procedures under general anesthesia. The parameters compared were: Ease of insertion and number of efforts and Postoperative complications like laryngospasm, bronchospasm and sore throat. *Materials and Methods:* The study participants included 80 paediatric patients between the ages of 2–8 years. All the participants were schedule to experience optional surgeries under general anesthesia in the medical hospital. *Results:* LMA had advantages over the tracheal tube in the form of lower incidence of cough during appearance and lower occurrence of postoperative sore throat, though offered no advantage more than tracheal tube in occurrence of bronchospasm or laryngospasm during appearance. *Conclusion:* The LMA provides a reliable airway in children. Incidence of postoperative complications is also less with LMA than endotracheal tubes. Therefore, LMA is a appropriate option to endotracheal intubation for possible short surgical procedures in pediatric patients.

Keywords: Laryngeal mask airway; Endotracheal tube; Pediatric.

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Introduction

The laryngeal mask airway (LMA) is wrought like a large endotracheal tube on the proximal end that connects to an elliptical mask on the distal end. It is intended to sit in the patient's hypopharynx and cover up the supraglottic structures, thus allows comparative isolation of the trachea.[1,2] A laryngeal mask airway (LMA) — also known as laryngeal mask— is a medical device that keeps a patient›s airway open during anesthesia or unconsciousness. It is a type of supraglottic airway.[3] A laryngeal mask is composed of an airway tube that connect to an elliptical mask with a cuff which is inserted through the patient's mouth, down the windpipe, and once deployed forms an airtight seal on top the glottis permits a secure airway to be managed by a health care provider.[4] Laryngeal mask airways come in several types, as follows: The LMA Classic is the original reusable design, The LMA Unique is a disposable version, making it ideal for emergency and prehospital settings and The LMA Fastrach, an intubating LMA (ILMA), is designed to serve as

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a conduit for intubation. They are largely used by anaesthetists to channel oxygen or anesthesia gas to a patient›s lungs during surgery and in the pre-hospital setting for unconscious patients.[5]

The LAM, with its advantages over both the face mask/nasal hood and endotracheal intubation, potentially has a place in oral and maxillofacial surgery by increasing the safety and efficacy of outpatient general anesthesia in specific situations. The LAM also has an important role in acute airway management in the trauma setting or during anesthetic emergencies. Airway control may be established with the LAM when the patient can neither be intubated nor ventilated. In managing the difficult airway, the laryngeal mask airway can be considered before either transtracheal jet ventilation or establishing a surgical airway.

The progress of small sized laryngeal masks authorized its utilize in anesthesia for the paediatric surgical patients. These patients have diverse airway characteristics such as high larynx, large tongue, funnel shaped laryngeal cartilaginous skeleton, lack of teeth, and short neck which makes the likelihood of tricky intubation higher than in adult patients. Added to this is the quick development of hypoxemia during trials of intubation in a some what hard airway of few kilograms infant.[6]

The LMA has many recompense over the endotracheal tube with more hemodynamic stability, and condensed occurrence of perioperative complications such as coughing, bucking, laryngospasm, soft-tissue trauma, laryngeal edema, and sore throat.[7] Adding up the occurrence of postoperative sore throat connected with placement of LMA is fewer than that connected with ETT.[8] The aim of present study is to evaluate the subsequent factors that take place during laryngeal mask airway insertion and endotracheal intubation for surgical procedures under general anesthesia. The parameters compared are: Ease of insertion and number of attempts and Postoperative complications like laryngospasm, bronchospasm and sore throat.

Materials and Methods

The study participants included 80 paediatric patients between the age of 2 – 8 years. All the participants were schedule to undergo elective surgeries under general anesthesia in the medical hospital. The institute ethical committee were informed about the study and the ethical clearance certificate was obtained from them. All the surgeries were short procedures of less than 40 mins. All the study paediatric patients were alienated into two groups with 40 patients each. Study group 1 (group L): LMA of appropriate size was inserted and cuff inflated with appropriate volume of air. Study group 2 (group E): Laryngoscopy and endotracheal intubation with appropriate sized endotracheal tubes was done.

A detailed preanesthetic assessment was finished for all the paediatric patients a day prior the surgery time. A detailed history, airway assessment and physical examination was done to rule out for the exclusion criteria. Exclusion criteria: Patients in ASA grade III and IV, emergency surgeries, Presence of cardiac and pulmonary problems. Inclusion criteria: Paediatric patients between 2 – 8 years, Belonging to ASA I and II grade, Schedule for elective short surgeries.

Induction agent utilized for surgery was 3 mg/kg propofol given over 1 min. For all the patients the IV line is secured, all the children premedicated with inj. Glycopyrollate and inj. Midazolam. Analgesia was provided with Inj. Fentanyl 2 micrograms/kg IV, following which patients were calm with Inj. Scoline 2 mg/kg IV to facilitate insertion of LMA or endotracheal tube. The appropriate sized LMA was chosen based upon the weight of the children as follows: size 1.5 for 5-10 kgs, size 2 for 10-20 kgs, size 2.5 for 20-30 kgs. • The ease of insertion of LMA/ETT was graded as easy, difficult, impossible and number of attempts of insertion of LMA/ETT was noted. With the help of bilateral chest lift and ausculatation of breath sounds the position of ETT/LMA was confirmed. Monitoring of vital signs i.e. heart rate, noninvasive blood pressure, pulse oximetry, EKG lead II was completed in perioperative period. Hemodynamic changes in HR, BP, MAP, SpO_2 were watched just previous to induction (baseline), just following intubation/insertion 0 minute and then at 1, 3, 5, 10, 15, 20 minutes after intubation / insertion of LMA. Postoperative complications like laryngospasm, bronchospasm and sore throat was recorded postoperatively.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA).

Descriptive statistics included computation of percentages, means and standard deviations. For all tests, confidence level and level of significance were set at 95% and 5% respectively. Statistical

comparisons were performed by repeated measures of variance followed by Students '*t*' test. A probability value "*p*" less than 0.05 was regarded as statistically significant.

Results

Our study consisted of 80 children belonging to ASA grade 1 and 2 of either sex, aged between 2-8 years, posted for elective short surgical procedures under general anesthesia. These children were arbitrarily owed to LMA group (40 patients) in whom appropriate size LMA was inserted and ETT group (40 patients) in whom direct laryngoscopy and endotracheal tube was used to secure the airway (Table 1).

Table 1: Demographic data of the patients

Variable	Particulars	LMA	ETT	T	*p*
Age	Mean ± SD	3.6 ± 1.4	4.1 ± 1.4	1.36	0.30 NS
	Range	2–5 years	2–8 years		
Weight	Mean ± SD	15.4 ± 3.25	15.8 ± 2.36	0.25	0.74 NS
	Range	8–25 kg	8–28 kg		
Duration of the surgery	Mean ± SD	30.17 ± 6.8	30.17 ± 6.8	0.55	0.52 NS
	Range	18–40	18–40		

Unpaired t test

In the LMA group, a total of 7 patients belong to ASA class II and 33 patients were ASA class I. In the ETT group, 10 patients belong to ASA II and 30 patients were in ASA I grade (Table 2).

Table 2: ASA grade

ASA	ETT	LMA
I	30	33
II	10	7
Total	40	40

In the ETT group, endotracheal intubation was easy in 81.2% of patients and difficult in 19.7% of patients. In LMA group LMA insertion was graded easy in 95% of patient and difficult in 5% cases. In none of the case was LMA insertion difficult (0%). In none of the patients was endotracheal intubation impossible. In both groups, the ease of insertion is statistically comparable and $p = 0.233$ which is not significant (Table 3).

Table 3: Ease of insertion

	LMA (%)	ETT (%)	*p*
Easy	95	81.2	0.233
Difficult	5	19.7	
Impossible	0	0	

Table 4: Postoperative complications

	LMA	ETT	*p*
Cough	16	0	0.01*
Difficult	7	0	0.001*

In the ETT group 16 children had cough while in LMA group none of the children had cough. The *p* value was < 0.001 which is significant.

In the ETT group 7 children had sore throat post operatively, where as none of the children in LMA group had sore throat. The *p* value was < 0.01 that is statistically significant (Table 4).

In both the groups none of the children had any laryngospasm and bronchospasm.

Discussion

The laryngeal mask was invented by British anaesthesiologist/anaesthetist Archibald Brain in the early 1980s and in December 1987 the first commercial laryngeal mask was made available in the United Kingdom. The laryngeal mask is still extensively utilized today worldwide and a diversity of particular laryngeal masks exist.[9]

A laryngeal mask has an airway tube that attached to an elliptical mask with a cuff. The cuff can either be of the inflating type, or self-sealing.[10] Once inserted accurately the mask conforms to the anatomy with the bowl of the mask facing the space between the vocal cords. After accurate insertion, the tip of the laryngeal mask sits in the throat against the muscular valve that is situated at the upper portion of the esophagus.

Jamil SN, *et al.* reported that the LMA was easily inserted in 94% patients; where as endotracheal intubation was performed effortlessly in only 53% of patients. These results are comparable to our study and also carry the utilization of muscle relaxants to improve the ease of insertion of laryngeal mask airway.

The laryngeal mask airway has fundamentally transformed paediatric anesthesia practice and has become a chief constituent of airway management in children. Our study constituted 80 patients, ASA I or II physical status, aged between 2 and 8 years, who were randomly allocated into 2 groups; the LMA group and ETT group. These patients were posted for elective short surgical procedures under general anaestheisa, using either the LMA or endotracheal tube for airway management. In our study, it was observed that the LMA was easily inserted in 95% of patients, where as the ETT was inserted easily in 81.2% patients.

Respiratory problems in the form of laryngospasm or bronchospasm through emergence or postoperative sore throat and cough are chief regions of concerns whereas opting a tool for paediatric airway management. In our study the occurrence of postoperative complications like cough and sore throat was considerably lower with use of LMA than ETT. However in our study, we did not encounter any incidence of bronchospasm or laryngospasm in any groups.

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