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"A COMPARATIVE STUDY OF HEMODYNAMIC RESPONSES WITH ENDOTRACHEAL TUBE VS LARYNGEAL MASK AIRWAY IN PATIENTS UNDERGOING GENERAL ANAESTHESIA"

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ABSTRACT

The ability to regulate airways is critical for the clinical anaesthesiologist. It is an essential component of general anaesthesia, providing for breathing and oxygenation as well as anaesthetic gas distribution. In terms of both anatomical location and degree of invasiveness, laryngeal mask airways (LMA) have gained popularity in airway management as a missing link between facemask and tracheal tube. The anaesthesiologist values hemodynamic stability for the benefit of the patients, particularly during intubations and laryngeal mask placement. Because of the intensive stimulation of the sympathetic nervous system, laryngoscopy and endotracheal intubation can produce dramatic alterations in hemodynamics. The purpose of this study was to compare the hemodynamic changes that occurred during endotracheal intubation versus laryngeal mask airway placement. **Objectives:** The objective of the study is to compare the hemodynamic responses with endotracheal tube verses laryngeal mask airway in patients undergoing general anaesthesia. **Results:** In terms of demographic data, the two groups were equivalent since there were no significant variations in age, gender, duration of operation, ASA grades, or MPC categorization. Heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) are all greater in the ETT group than in the LMA group, which is statistically significant. **Conclusion:** This study indicated a haemodynamic response consisting of an increase in heart rate, SBP, DBP, and MAP with both ETT and LMA. The reaction induced by ETT insertion on the other hand, is substantially higher than that caused by LMA insertion.

KEYWORDS : Endotracheal Tube, Laryngeal Mask Airway, Hemodynamic Change.

INTRODUCTION

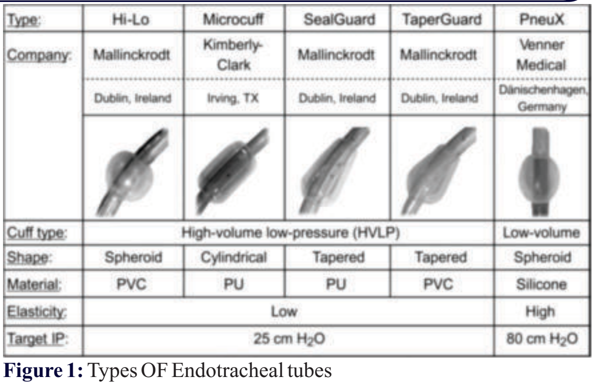
The management of airway during general anesthesia is a critical aspect of patient care, ensuring adequate oxygenation and ventilation. Two commonly employed techniques for securing the airway include endotracheal intubation and the use of laryngeal mask airway (LMA). These techniques have been extensively studied and are associated with their own advantages and limitations. Understanding the hemodynamic responses associated with each method is crucial in selecting the most appropriate technique for patients undergoing general anesthesia.

The hemodynamic response to airway management is an important consideration as it may have significant implications for patients with underlying cardiovascular diseases, compromised hemodynamic stability, or those undergoing high-risk surgical procedures. Hemodynamic changes, such as alterations in heart rate, blood pressure, and cardiac output, can occur in response to various stimuli during airway manipulation. The choice of airway device may influence the magnitude and duration of these responses.

Endotracheal intubation involves the insertion of a tube into the trachea to establish an artificial airway.

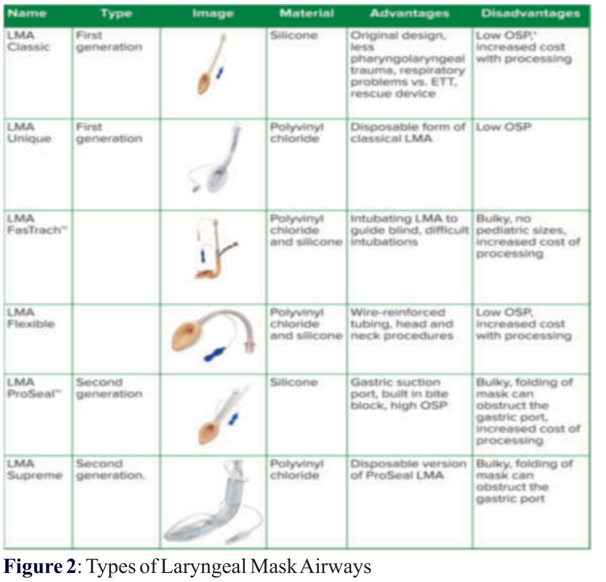
It provides a secure airway, protects against aspiration, and allows for controlled mechanical ventilation. However, endotracheal intubation is an invasive procedure that can stimulate the sympathetic nervous system, leading to an increase in heart rate, blood pressure, and intracranial pressure. The hemodynamic response associated with endotracheal intubation has been extensively investigated, and strategies to attenuate these responses, such as the use of pharmacological agents, have been explored.

In contrast, the laryngeal mask airway is a supraglottic airway device that forms a seal around the larynx, allowing for ventilation while avoiding tracheal intubation. The LMA is considered a less invasive technique compared to endotracheal intubation and may offer advantages such as reduced airway trauma, faster insertion time, and less requirement for muscle relaxation. However, the impact of LMA on hemodynamic responses during airway management remains a subject of ongoing research.



Type:	Hi-Lo	Microcuff	SealGuard	TaperGuard	PneuX
Company:	Mallinckrodt	Kimberly-Clark	Mallinckrodt	Mallinckrodt	Venner Medical
	Dublin, Ireland	Irving, TX	Dublin, Ireland	Dublin, Ireland	Dänischenhagen, Germany
Cuff type:	High-volume low-pressure (HVLP)				Low-volume
Shape:	Spheroid	Cylindrical	Tapered	Tapered	Spheroid
Material:	PVC	PU	PU	PVC	Silicone
Elasticity:	Low				High
Target IP:	25 cm H_2O				80 cm H_2O

Figure 1: Types OF Endotracheal tubes



Name	Type	Image	Material	Advantages	Disadvantages
LMA Classic	First generation		Silicone	Original design, less pharyngolaryngeal trauma, respiratory problems vs. ETT, rescue device	Low OSP,* increased cost with processing
LMA Unique	First generation		Polyvinyl chloride	Disposable form of classical LMA	Low OSP
LMA FasTrach™			Polyvinyl chloride and silicone	Intubating LMA to guide blind, difficult intubations	Bulky, no pediatric sizes, increased cost of processing
LMA Flexible			Polyvinyl chloride and silicone	Wire-reinforced tubing, head and neck procedures	Low OSP, increased cost with processing
LMA ProSeal™	Second generation		Silicone	Gastric suction port, built in bite block, high OSP	Bulky, folding of mask can obstruct the gastric port, increased cost of processing
LMA Supreme	Second generation.		Polyvinyl chloride	Disposable version of ProSeal LMA	Bulky, folding of mask can obstruct the gastric port

Figure 2: Types of Laryngeal Mask Airways

METHODOLOGY

This observational study was conducted at Department of Anaesthesiology, Chettinad Hospital Research Institute, Kelambakkam Chennai, Tamil Nadu for a period of 5 months for patients undergoing surgery under general anaesthesia with endotracheal tube intubation or laryngeal mask airway. Patients of age 18 and above, ASA PS I,II,III, both elective and emergency cases were included and patients undergoing regional anaesthesia, pregnant patients were excluded from the study. Ethical clearance was obtained from institutional human ethics committee with reference no. IHEC-I/0721/22.

All study patients provided informed and written consent after receiving adequate information. All enrolled patients underwent preoperative evaluation prior to surgery. All patients were maintained nil per oral for 8 hours prior to suregry. Once the patient was received in preoperative unit, IV access was secured and shifted to operation theatre, mandatory hemodynamic monitors like ECG, pulse oximetry, blood pressure were connected and closely monitored for every ten minutes. The patients were pre-oxygenated with 100% oxygen for 3-5minutes. Patients were pre-medicated, induced and maintained with muscle relaxants and inhalational agents. Followed by, patients were intubated with endotracheal tube or a laryngeal mask airway of appropriate size by anaesthesiologist and cuff was inflated with air using 10ml syringe. 6-7 ml approximately for ETT and 20-30 ml for LMA after fully deflated and initially keep 30 cmH2O after intubation. The parameters like attempts of laryngoscopy, exposure of N2O, duration of surgery and position was noted. After surgery, the patients will be transferred to the post anaesthesia care unit (PACU).

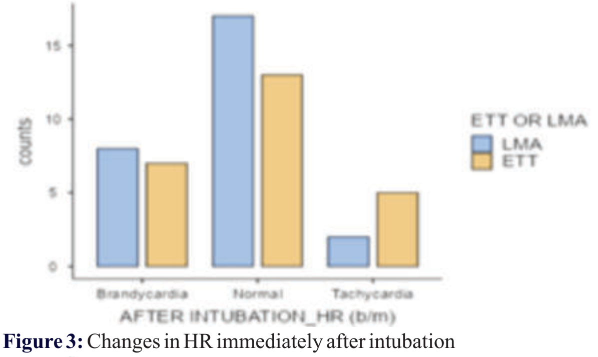


Figure 3: Changes in HR immediately after intubation

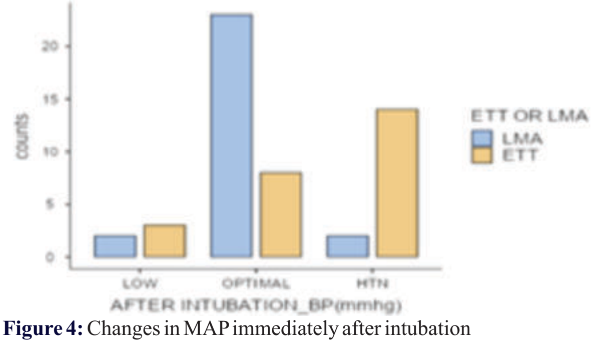


Figure 4: Changes in MAP immediately after intubation

OBSERVATION & DISCUSSION

52 individuals made up the study, which compared and evaluated the haemodynamic responses induced by laryngeal mask airway insertion to those induced by endotracheal intubation. Age, sex, ASA class, length of operation, and baseline hemodynamic parameters were equivalent between the two groups, each consisting of 25 people on the endotracheal tube and 27 participants on the LMA. This study showed that both ETT and LMA insertion result in a haemodynamic response that includes an increase in heart rate, SBP, DBP, and MAP. ETT insertion, however, results in a larger reaction than LMA insertion. Once the ETT was inserted, the HR, SBP, DBP, and MAP all increased. When compared to the ETT group, the LMA group's hemodynamic alterations were noticeably less pronounced. The LMA's decreased response might be because it prevents the sympathoadrenal response brought on by the introduction of the endotracheal tube through the trachea. The study conducted in Japan, which showed that direct stimulation of the glottis by a tracheal tube generates larger cardiovascular responses than stimulation of the glottis through laryngoscopy alone, supports this view. After insertion, the ETT trial group's SBP and DBP were higher than those of the LMA study group. In contrast to their study, where there was an increase in heart rate in both groups with no discernible difference between the groups, the heart rate difference in our study was much higher in the ETT group compared to the LMA group. Similar to their study's findings, the ETT group's HR increase persisted longer in our investigation. We anticipated that the insertion of an LMA would result in a considerably smaller hemodynamic response than tracheal intubation based on the literature. There were barely any hemodynamic reactions to the installation of the LMA. In our study, a significant difference in hemodynamics between LMA insertion and ETT intubation was seen in the ETT group. Changes in pulse rate, systolic blood pressure, diastolic blood pressure, and (in some patients) the emergence of dysrhythmia were present in ETT patients, but these changes were less pronounced in LMA patients whose airway was kept open.

CONCLUSION

In summary, this study showed that both ETT and LMA insertion result in a haemodynamic response that includes an increase in heart rate, SBP, DBP, and MAP. Yet, insertion of the ETT results in a higher response than insertion of the LMA.

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Conflict Of Interest: Nil

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