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Original Research Article

A comparative study of laryngeal mask airway and cuffed Endo-tracheal tube in different surgical procedures

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Abstract
Introduction: Endotracheal intubation is frequently an essential procedure in general anaesthesia. Endotracheal intubation is the trans laryngeal placement of endotracheal tube into the trachea via nose (nasotracheal intubation) or mouth (Oro-tracheal intubation).
Material and Methods: A comparative study of Laryngeal Mask Airway and Cuffed endotracheal Tube in different Surgical Procedures" was carried at Department of Anaesthesiology in a Tertiary care teaching hospital from October 2018 to October 2019 on patients of both sexes, in age group of 20-50 years of ASA grade I and Grade II posted for different surgical procedures under general anaesthesia over a period of 6 months with due permission from the hospital ethices committee and after obtaining informed consent of patients.
Result: All patients were within the weight range of 36 to 80 kg**.** Demographically patients in both the study groups were almost identical with respect to age, weight and sex ratio. Tests of significance were carried out by student t-test or modified t-test. And p value < 0.05 is considered statistically significant and marked as *. Post induction fall of pulse rates in both groups did not show much difference. There is more rise in mean pulse rate in group I than in group II in comparison to post induction value at zero, one and three min.
Conclusion: Thus it may be concluded that use of laryngeal mask airway offers more favorable haemodynamic stability as compared to endo-tracheal intubation with less post operative complications being minimally invasive to the airway it is associated with less post operative complication and may be considered as an important adjunct in the armamentarium of the anaesthesiologists for safe general anaesthesia.

Keywords: Laryngeal mask airway, endotracheal intubation, tracheal intubation

Introduction

Endotracheal intubation is frequently an essential procedure in general anaesthesia. Endotracheal intubation is the trans laryngeal placement of endotracheal tube into the trachea via nose (nasotracheal intubation) or mouth (oro-tracheal intubation) [1].

Laryngeal mask airway insertion is an alternative method to endotracheal intubation for maintaining airway and anesthesia [2]. In contrast to endotracheal intubation laryngeal mask airway insertion does not require instrumentation, i.e.1aryngoscopy of the upper airway. Moreover laryngeal mask airway does not pass through glottis but is placed over the glottis [3]. Laryngoscopy and tracheal intubation or laryngeal mask airway insertion are noxious stimuli which provoke a transient but marked sympathetic response manifesting as hypertension and tachycardia and other intra and post operative complications [3]. Any difficulty in intubation which has or has not been anticipated can lead to clinical delay of serious nature resulting increased morbidity and mortality of the anaesthesised patient [4]. In susceptible patients particularly those with systemic hypertension, coronary heart disease, cerebrovascular disease and intracranial aneurysm even these transient changes can result potentially deleterious effects e.g. left ventricular failure, arrhythmias, myocardial ischaemia, cerebral haemorrhage and rupture of cerebral aneurysm [5].

There are number of ways to blunt these haemodynamic and other complications. They include minimizing the duration of laryngoscopy to less than 15 seconds, the use of intravenous narcotics, the use of intravenous lidocaine, vasodilators and beta - blocking agents [6].

Laryngeal mask airway insertion involves ease of insertion even in inexperienced hands, avoidance of laryngoscopy, lesser mechanical manipulation of upper airway than endotracheal intubation, convenience of use in both spontaneous and controlled ventilation and an invaluable adjunct to the "can't intubate can't ventilate situations". In this study an effort has been made to compare the response to endotracheal intubation and laryngeal mask airway insertion [7].

Material and Methods

"A comparative study of Laryngeal Mask Airway and Cuffed endotracheal Tube in different Surgical Procedures" was carried at Department of Anaesthesiology in a Tertiary care teaching hospital from October 2018 to October 2019 on patients of both sexes, in age group of 20-50 years of ASA grade I and Grade II posted for different surgical procedures under general anaesthesia over a period of 6 months with due permission from the hospital ethices committee and after obtaining informed consent of patients.

Patients with the above mentioned criteria were selected randomly from indoor admittance of different operating units, assessed preoperatively and suitable cases were prepared for the operation and the study.

The patients were divided into two groups at random (30 patients in each group).

Group - I: (control group): Endotracheal tube group.

Group - II: (Study group): Laryngeal mask Airway group.

Patients undergoing various procedures like diagnostic laparoscopy, tubectomy, simple mastectomy, D&C and D&E, Fibroadenoma, Breast abscess, skin grafting, wound debridement, bone biopsy, osteotomy, k wiring, implant removal, appenditectomy, diagnostic arthroscopy, Hernail repair, Lords procedure etc. were selected for the study.

Anaesthetic technique

All the patients were pre-oxygenated for three minutes. Induction of anaesthesia was done with injection propofol 1-2.5 mg/kg body weight. Intubation/ LMA insertion was facilitated by using injection veccuronium 0.08-0.12 mg/kg. Patients were ventilated with 100 percent oxygen for 2-3 min and intubation with the aid of Macintosh laryngoscope or insertion of laryngeal mask airway was carried out. Endotracheal tube or laryngeal mask of appropriate size was used. Time taken for intubation or insertion of laryngeal mask airway did not exceed 20 seconds. Anaesthesia was maintained with intermittent positive pressure ventilation with nitrous oxide and oxygen (66:33), and injection vecuronium (0.04mg/kg body weight). Surgery was allowed to start after the study was completed i.e. for five minutes after intubation/insertion. At the end of surgery residual neuromuscular block was reversed with the mixture of glycopyrolate and neostigmine.

Statistical Analysis

Tests of significance were carried out by student t-test or modified t-test. And p value <0.05 is considered statistically significant and marked as *.

Table 1: Demographic profile of patients (Mean ±SD)

Groups	Mean Age	Mean Weight	Sex M:F
A(ETT)	35.3±8.49	54.7±9.11	16:14
B(LMA)	36.47±7.59	54.13±8.34	14:16

Demographically patients in both the study groups were almost identical with respect to age, weight and sex ratio.

Table 2: Distribution of patients according to the type of surgery

Groups	D&C /D&E	Inguinal hernia Repair	Fistulectomy	Lord' operation	Appendectomy	Skin grafting	Implant removal	K wiring	Fibroadenoma	Tubectomy	Simple mastectomy	Diagnostic laparoscopy	Total
I (ETT)	3	2	1	2	3	04	2	2	04	2	02	03	30
II (LMA)	3	3	1	1	1	06	2	3	05	1	02	02	30

Table 3: Pulse rate (BEATS/MIN)-Mean ± S.D.

Observation Time		I (ETT)	II (LMA)	P-value
Pre Induction		82.2 ± 5.78	81.00±6.66	0.459043
Post Induction		75.93± 5.36	74.30±6.32	0.28489
After intubation/ insertion	0min	85.8±5.65	79.87±6.79	0.00043*
	1min	84.56±5.29	78.83±6.53	0.00043*
	3min	81.26±5.05	77.40±6.02	0.009233*
	5min	76.83±4.78	76.13±6.15	0.624432

Tests of significance were carried out by student t-test or modified t-test. And p value < 0.05 is considered statistically significant. and marked as *.

Post induction fall of pulse rates in both groups did not show much difference.

There is more rise in mean pulse rate in group I than in group II in comparison to post induction value at zero, one and three min.

Table 4: Mean systolic blood pressure in mm of Hg - Mean ± S.D.

Observation Time		I (ETT)	II (LMA)	P-value
Pre Induction		122.53±4.3	122±5.O9	0.66
Post Induction		94.1±6.79	93.67±6.19	0.79
After intubation/insertion	0min	121±4.75	110.53±4.26	<0.0001*
	1min	119.6±4.08	109±5.27	<0.0001*
	3min	107.33±7.19	101.27±4.83	0.00025*
	5min	96.6±5.71	94.33±4.76	0.095

There is Post induction fall of mean systolic blood pressure but between groups values did not show much difference.

There is rise in mean systolic blood pressure in group I and II in comparison to post induction value. There is significant difference in value of rise in group I than group II at zero, one and three min.

Table 5: Diastolic blood pressure in mm of Hg -Mean ± S.D

Observation Time		I (ETT)	II (LMA)	P-value
Pre Induction		80.3±3.9	79.8±4.53	0.65
Post Induction		61.3±2.89	62.20±2.64	0.213
After intubation/insertion	0min	79.8±4.37	73.2±3.31	<0.0001*
	1min	79.23±4.2	72.73±3.62	<0.0001*
	3min	75.27±3.69	68.73±3.26	<0.0001*
	5min	64.83±5.07	62.90±2.47	0.065

There is Post induction fall of mean diastolic blood pressure but between group I and group II did not show much difference.
There is rise in mean diastolic blood pressure in group I and II in comparison to post induction value. There is significant difference in value of rise in group I than group II at zero, one and three min.

Table 6: Mean arterial blood pressure in mm of Hg - Mean ± S.D

Observation Time		I (ETT)	II (LMA)	P-value
Pre Induction		94.76±3.16	93.87±3.69	0.32
Post Induction		72.19±3.34	72.69±3.05	0.55
After intubation/insertion	0min	93.49±3.51	85.64±2.34	<0.0001*
	1min	92.83±3.27	84.82±2.76	<0.0001*
	3min	86.38±3.54	79.58±2.52	<0.0001*
	5min	75.07±3.47	73.38±2.43	0.03*

There is Post induction fall of mean arterial blood pressure but between groups I and group II did not show much difference.
There is rise in mean arterial blood pressure in group I and II in comparison to post induction value. There is significant difference in rise in group I than group II at zero, one, three and five min.

Table 7: Number of attempts at endotracheal intubation and LMA insertion

Groups	One attempt	Two attempts	Three attempts	MEAN	P value
I(ETT)	28	2	0	1.07	0.03277
II(LMA)	23	6	1	1.27	

The number of attempts for LMA insertion was compared with intubation using student t test and was significant.

Table 8: Post-operative complications in 24 hours (Values are in no of patients)

Groups	Cough	Sore throat	Vomiting
I (ETT)	5	6	1
II(LMA)	3	3	2

Significant increase in the incidence of cough and sore throat in the endotracheal group as compared LMA group. The incidence of vomiting was comparable in both groups.

Discussion

In the present study, 60 cases were selected, divided into two equal groups of 30 each. The haemodynamic responses to laryngoscopy & intubation, LMA insertion were in the respective group were compared.
The results of the study were analysed & compared with results of other workers in this field, taking steps to account for differences as for as possible. The discussions of various aspects of the study are as follows: a) Distribution of cases according to age, weight & sex (Table-I, II, III) Patients were comparable demographically in both groups with respect to age, weight and sex [8]. (b) Distribution of patients according to the Type of surgery (Table IV). Types of surgery in two groups were comparable. (c) Haemodynamic changes: Table V, VI, VII, VIII shows the variation in mean pulse rate, mean systolic blood pressure, mean diastolic pressure and mean arterial blood pressure before induction, after induction and after instrumentation at different time intervals.

1. Pulse Rate (Table V): There is decrease in pulse rate in both groups at induction and increase of pulse rate again at instrumentation and decreases gradually thereafter at one, three and five minutes and reaches near the baseline value at five minutes. Post induction fall of pulse rates in both groups did not show much difference. The post instrumentation rise in mean pulse rate (Zero minute) and there after the difference in mean pulse rate (one and three minute) are significantly more in group I than in group II. These finding are similar with the studies of Brimacombe (1995) [9].

2. Mean systolic blood pressure (Table VI): There is decrease in systolic blood pressure in both groups at induction, which again increases during instrumentation and decreased thereafter at one, three and five minutes to reach the near baseline value at five minutes. Post induction fall of systolic blood pressure in both groups did not show much difference. The post instrumentation rise in systolic blood pressure was significantly more in group I than in group II. Wood & Tanaka & Toyooka (1995) also had reported similar findings in their study [10].

3. Mean diastolic blood pressure (Table VII): There is decrease in diastolic blood pressure in both groups at induction and increase of diastolic blood pressure again during instrumentation and decreases at one, three and five minutes to baseline value at five minutes. Post induction fall of diastolic blood pressure in both groups did not show much difference. Group I had more rise than group II in post instrumentation rise of diastolic blood pressure. The finding of our study corroborates with those of Griffin *et al.* (1989) [11].

4. Mean arterial blood pressure (Table VIII): There is decrease in Mean arterial blood pressure in both groups at induction and increase of Mean arterial blood pressure again at instrumentation and decreases thereafter at one, three and five minutes to baseline value. Post induction fall of Mean arterial blood pressure in both groups did not show much difference. The post instrumentation rises in Mean arterial blood pressure were significantly more in group I than in group II. The finding of our study supports the finding of Haqu (1995) [12].

5. Attempts at LMA insertion vs. Endotracheal Intubation (Table IX): Multiple attempts were required for LMA insertion than for endotracheal intubation thus demonstrating that a learning curve is required to hone the skill for instrumentation, proper placement & fixation of LMA as compared to intubation. The findings of the study are similar to Pennat & Walker (1992) [13].

6. Post –operative Complications (table X). Incidence of sore-throat and cough in post operative period was more in the endo-tracheal group as compared to LMA group. The findings of study are comparable to Bugard, Mollhoff & Prien (1996) [14].

Conclusion

Thus it may be concluded that use of laryngeal mask airway offers more favorable haemodynamic stability as compared to

endo-tracheal intubation with less post operative complications being minimally invasive to the airway it is associated with less post operative complication and may be considered as an important adjunct in the armamentarium of the anesthesiologists for safe general anaesthesia. Proper selection and preparation of cases and diligent surveillance can also ensure freedom from any potentially dangerous complications.

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