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A COMPARATIVE STUDY OF HAEMODYNAMIC RESPONSES OBSERVED DURING INSERTION OF PROSEAL LARYNGEAL MASK AIRWAY VERSUS ENDOTRACHEAL TUBE IN PATIENTS UNDERGOING ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY UNDER GENERAL ANAESTHESIA

Anaesthesiology

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ABSTRACT

In laproscopic surgeries use of supraglottic airway devices have become more effective in terms of anatomical position and degree of invasiveness compared to endotracheal tube for airway management. Our study aims to compare the efficacy of Proseal laryngeal mask airway (PLMA) and endotracheal tube (ETT) in patients undergoing laparoscopic cholecystectomy under general anaesthesia. This prospective randomised study was conducted on 60 adult patients, 30 each in two groups, of ASA I-II who were posted for laparoscopic cholecystectomy under general anaesthesia. Haemodynamic changes were compared in both the groups. A properly positioned PLMA proved to be a suitable and safe alternative to ETT for airway management in elective fasted, adult patients undergoing laparoscopic cholecystectomy.

KEYWORDS

Endotracheal tube, laparoscopic cholecystectomy, Proseal LMA

INTRODUCTION

Laparoscopic surgery is an evolving sub-speciality and is not only limited to minor gynaecologic surgery or cholecystectomy but has extended to procedures such as advanced gastrointestinal procedures, appendicectomy, hernia repairs, urologic and gynaecologic procedures. The problems common to all such procedures are

a] carbon dioxide insufflation in the body-intraperitoneal or extraperitoneal
b] raised intra abdominal pressure and
c] potential danger of regurgitation and pulmonary aspiration.

Laryngoscopy and intubation, both being noxious stimuli, elicit remarkable sympathetic activity. The pressor response, represented by an abrupt rise in the arterial blood pressure and heart rate (HR), arising 30 seconds after laryngoscopy and intubation, returns to baseline values steadily within 5–10 minutes. The anaesthesiologist must ensure a patent airway and adequate ventilation, till date cuffed endotracheal tube was considered as the gold standard for providing safe glottic seal, specially for laparoscopic surgeries under general anaesthesia[2] But over a period of time new airway devices have been added to the anaesthesiologist's armamentarium.

To overcome the above complications, Dr. Archie Brain designed the Proseal laryngeal mask airway in 2000, with modifications designed to enable separation of gastrointestinal and respiratory tract, improve airway seal, enable positive pressure ventilation, and diagnose mask displacement. Use of LMA in place of ETT tube has been shown to have less hemodynamic response as its insertion requires neither visualization of cords nor the penetration of larynx.[3]

MATERIALS AND METHODS

This is a prospective randomised comparative study which was done at Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad with a sample size of 60 for a period of 18 months from January 2020 to June 2021.

Inclusion Criteria

- Patients aged between 20 to 60yrs of either gender,
- ASA I and II,
- Mallampati score I & II
- BMI<35kg/m.

Exclusion Criteria

- History of hiatus hernia
- Reflux esophagitis
- BMI >35kg/m^2
- Mallampati score III and IV
- Symptoms related to laryngopharyngeal morbidity.

Informed and written consent obtained from all the 60 patients admitted during the study period in their own language and are included in the study.

Subjects were randomly divided into two equal groups consisting 30 each to the PLMA group, ETT tube group.

Heart rate, mean arterial pressure, end tidal CO_2 values, systolic blood pressure, diastolic blood pressure, FiO_2, tidal volume, respiratory rate, peak pressure was recorded. All subjects will be put nil by mouth for over 8 hours. They were given aspiration prophylaxis with Inj. pantoprazole 40mg IV and tablet alprazolam 0.5mg, the night before surgery. On the day of surgery, patients were premedicated with glycopyrrolate 0.2mg, ondansetron 4mg, midazolam 1mg. After the placement of monitoring devices and preoxygenation, haemodynamic and ventilator parameters were recorded, patients were induced with Inj. propofol 2.5mg/kg iv, Inj. fentanyl 2mcg/kg iv and Inj. Vecuronium 0.1mg/kg iv. Patients were intubated using laryngoscope and cuffed endotracheal tube of appropriate sizes in the ETT group and appropriate sizes of the Proseal laryngeal mask airway used in the PLMA group. Haemodynamic and ventilatory parameters were recorded one minute after insertion, five minutes after insertion and five minutes after creating pneumoperitoneum using carbon dioxide (12 – 14 mm of Hg.) respectively.

OBSERVATIONS AND RESULTS:

Table 1: Heart Rate

Heart Rate	INTUBATING DEVICE				P Value
	PLMA		ETT		
	Mean	SD	Mean	SD	
Before LMA insertion	85.2	13.3	83.1	10.9	0.500
1 minute	83.3	13.4	92.2	14.0	0.015
5 minutes	79.4	12.6	86.3	12.4	0.037
5 minutes PP	84.5	12.0	88.5	12.0	0.211
Means were compared using independent sample t test.					

Mean heart rate before LMA insertion for PROSEAL LMA is 85.2 ± 13.3bpm and that of ETT is 83.1 ± 10.9 bpm. The mean heart rates at 1 minute and 5 minutes after insertion of PROSEAL LMA were 83.3 ± 13.4 and 79.4 ± 12.6 bpm respectively while the mean heart rates at 1 minute and 5 minutes after insertion of ETT were 92.2 ± 14 bpm and 86.3 ± 12.4 bpm. Statistical analysis shows that p values for preinduction heart rate, heart rates at 1 minute and 5 minutes after

insertion of PROSEAL LMA was 0.500, 0.015 and 0.037 respectively and is statistically significant thereby showing that there is difference in the mean heart rates after insertion of PROSEAL LMA and ETT. The mean heart rate following pneumoperitoneum was 84.5 ± 12.0 bpm in PROSEAL LMA group and 88.5 ± 12.0 bpm in the ETT group. The difference in mean heart rates following pneumoperitoneum was not statistically significant with a p value of 0.211.

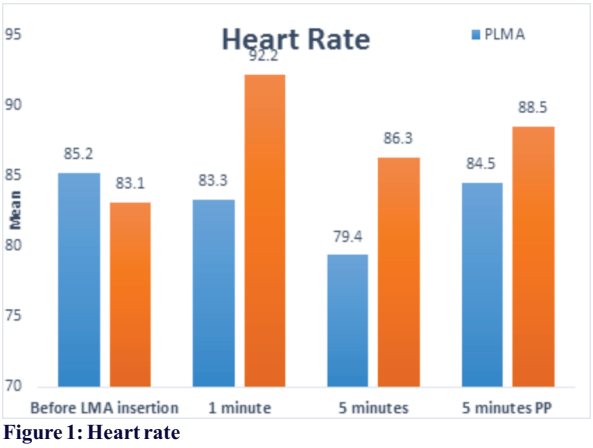

Figure 1: Heart rate

Table 2: Mean Arterial Pressure

Mean Arterial Pressure	INTUBATING DEVICE				P Value
	PLMA		ETT		
	Mean	SD	Mean	SD	
Before LMA insertion	88.57	11.85	88.43	9.4	0.962
1 minute	84.9	11.95	93.07	8.92	0.004
5 minutes	82.37	9.98	86.7	11.47	0.124
5 minutes PP	88.77	9.43	95.27	11.31	0.019
Means were compared using independent sample t test.					

Mean arterial pressure before induction of PROSEAL LMA is 88.57 ± 11.85 mmHg and that of ETT is 88.43 ± 9.4mmHg. The mean arterial pressure at 1 minute and 5 minutes after insertion of PROSEAL LMA were 84.9 ± 11.95 and 82.37 ± 9.98 mmHg respectively while the mean arterial pressure at 1 minute and 5 minutes after insertion of ETT were 93.07 ± 8.92 and 86.7 ± 11.47mmHg. Statistical analysis shows that p-values for Mean arterial pressure, at 1 minute and 5 minutes after insertion was 0.004 and 0.124 were significant at 1 min, not significant at 5 min. The mean arterial pressure values following pneumoperitoneum were 88.77 ± 9.43 for the PROSEAL LMA group and 95.27 ± 11.31 for the ETT groups respectively. The p-values for mean arterial pressure 5 minutes after pneumoperitoneum was 0.019 and is statistically significant thereby showing that there is difference in the mean arterial pressure following pneumoperitoneum after insertion of PROSEAL LMA and ETT.

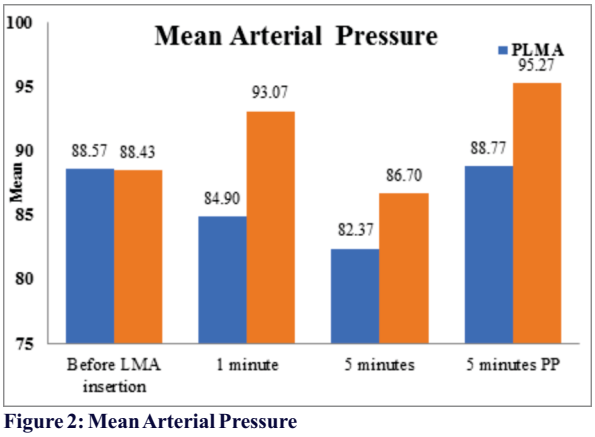

Figure 2: Mean Arterial Pressure

DISCUSSION

The PLMA is a new entrant to the family of LMA with some added features over the classic LMA. The study conducted to compare the two-airway device Proseal LMA and Endo Tracheal Tube (ETT) in view hemodynamic changes The study was conducted in 60 patients of both sexes aged 20-60 years going for elective laparoscopic cholecystectomy.

Heart Rate: The heart rate changes were much less in the PLMA group compared to ETT group and these differences in heart rate is statistically significant at 1 minute and 5 minutes with P-values of 0.015, 0.040. The P-value 5 minutes after creating pneumoperitoneum was 0.211, statistically not significant. Songsong Mao et al these findings are in consistent with studies done on intubation characteristics between laryngeal mask airway and endotracheal intubation for anaesthesia in adult patients undergoing laparoscopic surgeries. Y. Lim et al They studied 180 consecutive patients heart rate between Proseal LMA and ETT with a significant p-value < 0.01 at 2.5min and 5min respectively which is in accordance with present study.

Mean arterial pressure: In the present study the mean of MAP before induction ,1 min ,5 min and after 5 min of pneumoperitoneum in PLMA group was 88.57 ± 11.85, 84.9 ± 11.95, 82.37 ± 9.98 and 88.77 ± 9.43 where as in ETT group mean was 88.43±9.4 , 93.07 ± 8.92 , 86.7±11.47 and 95.27±11.31, the p values are 0.962 ,0.004,0.124 and 0.019. Lavate, Keniya et al. In their study the mean arterial pressure was significantly more in ETT group as compared to PLMA group with p value being less than 0.05. therefore, study was comparable to the present study.

CONCLUSION

Results of this study suggest that patient intubated using Proseal LMA have desirable haemodynamic stability compared to patients intubated using endotracheal tube. There was no alteration in the ventilatory parameters with respect to Proseal LMA in comparison to endotracheal tube. There by the Proseal LMA is the best alternative device to Endotracheal tube in Laparoscopic surgeries under general anaesthesia.

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