THE COMPARISON OF PROSEAL LARYNGEAL MASK AIRWAY AND ENDOTRACHEAL TUBE IN PATIENTS UNDERGOING LAPROSCOPIC SURGERIES UNDER GENERAL ANAESTHESIA

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ABSTRACT: CONTEXT: In spite of tremendous advances in contemporary anaesthetic practice till date, the cuffed tracheal tube was considered as the gold standard for providing a safe glottic seal, especially for laproscopic procedures under general anaesthesia. This study has been under taken to study the role and possible future of proseal laryngeal mask airway (PLMA) in anaesthesia for laproscopic surgeries.

AIM: Aim was to compare the efficacy of PLMA and endotracheal tube (ETT) in patients undergoing laproscopic surgeries under general anaesthesia.

SETTING AND DESIGN, METHODS AND MATERIAL: This prospective randomized study was conducted on 60 ASA I-II adult patients of age group 20-65 years of either sex, 30 in each group. In group P, PLMA and in group E, ETT was inserted nasogastric tube (NGT) was passed in all patients. The ease of insertion of device and NGT, haemodynamic changes, ventilation and perioperative laryngopharyngeal morbidity (LPM) were noted.

RESULT: Statistically group P was observed with better ease of insertion, hemodynamic stability, and reduced perioperative LPM as compared to group E respectively. There was no significant difference in oxygen saturation (SPO_2) or end-tidal carbon dioxide ($ETCO_2$) between the two groups.

CONCLUSION: A properly positioned PLMA proved to be a suitable and safe alternative to ETT for airway management in elective laproscopic surgeries.

KEYWORDS: Endotracheal tube, laproscopy, Proseal LMA.

HOW TO CITE THIS ARTICLE: Ismail J. Namazi, Nikunj Garia, Ravi Bhaskar Kumar, Medha Mozumder, Ahmed Mubariz Uddin, Amruta Pingale. "The Comparison of Proseal Laryngeal Mask Airway and Endotracheal Tube in Patients Undergoing Laproscopic Surgeries Under General Anaesthesia". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 47, November 12, 2015; Page: 8347-8350, DOI: 10.18410/jebmh/2015/1133

INTRODUCTION: In spite of tremendous advances in contemporary anaesthetic practice till date, the cuffed tracheal tube was considered as the gold standard for providing a safe glottic seal, especially for laproscopic procedures under general anaesthesia.(1) The disadvantages of treacheal intubation, which involves rigid laryngoscopy, causing hemodynamic response and damage to the oropharyngeal structures at insertion restricting global utility of endotracheal tube (ETT) and requires a better alternative.(2) Proseal laryngeal mask airway (PLMA) has a dorsal cuff, in addition to the peripheral cuff of LMA, which pushes the mask anterior to provide a better seal around the glottic aperture and permits high airway pressures without leak. The drain tube permits drainage of passively regurgitated gastric fluid away from the airway and serves as a passage for gastric tube.(2) This study was therefore undertake to compare PLMA with standard tracheal tube for ease of insertion, hemodynamic changes, oxygenation, ventilation and introperative and post-operative laryngopharyngeal morbidity (LPM) occurring during general anaesthesia in young healthy adult patients undergoing laproscopic surgeries.

Submission 21-10-2015, Peer Review 22-10-2015,
Acceptance 23-10-2015, Published 12-11-2015.
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DOI: 10.18410/jebmh/2015/1133

METHODOLOGY: After ethical committee approval and written informed consent, this prospective randomized study was conducted on 60 healthy patients. The patients were of either sex belonging to ASA physical status grade I and II, aged 20-65 years and body weight 40-76 kg, who underwent laproscopic procedures under general anaesthesia. Patients with anticipated difficult airway, obesity (body mass index > 35 kg/m2), oropharyngeal pathology, cardiopulmonary disease, cervical spine fracture or instability or at increased risk of aspiration were excluded from the study. Patients in group P were to receive a PLMA and patients in group E were to undergo endotracheal intubation. After intravenous (IV) access, patients were premeditated with inj.ranitidine 50 mg and inj. Metoclopramide 10 mg IV were administered. In the operation theatre, standard monitors were attached and baseline parameters were recorded. Injections of midazolam 0.05 mg/kg, glycopyrrolate 0.005 mg/kg, and fentanyl 2 mg/kg were administered 1-2 min before induction. After preoxygenation with 100% 02 for 3-5

minutes, anaesthesia was induced with injection of propofol 2.5 mg/kg till the loss of verbal commands. Neuromuscular blockade to facilitate placement of device was achieved by Inj. Scholine 2 mg IV. Following induction and adequate paralysis, the corresponding airway was inserted in each group. The Correct placement of the devices was confirmed by adequate chest movements and capnography.

Anaesthesia was maintained with oxygen, nitrous oxide, isoflurane and vecuronium. The outcomes measured were as follows: Insertion characteristics of the PLMA or ETT and the nasogastric tube (NGT) in both groups (Time and attempts).

Hemodynamic responses (heart rate and mean arterial blood pressure) were recorded before induction; at the time of insertion; after pneumoperitoneum, and during removal of devices.

Oxygen saturation (SPO2>95%) and end-tidal carbon dioxide (ETCO2<45mmhg); at a tidal volume of 8ml/kg, fraction of inspired oxygen (Fio2) 0.33, respiratory rate of 12/min and I/E of 1:2 were recorded at insertion, pneumoperitoneum and removal.

Oropharyngeal seal pressure was determined by closing the expiratory valve at a fixed gas flow of 51/min and recording the airway pressure at which equilibrium was reached. The airway pressure was not allowed to exceed 40 cm H2O.

Incidences of gastric distension (by surgeon), regurgitation, aspiration, intraoperative and postoperative laryngopharyngeal morbidity were noted.

Data was collected, tabulated, coded and analyzed using MS Excel 2007 and Statcal software. Numerical variables were presented as mean & standard deviation (SD) while categorical variables in percentage. For comparison between groups, unpaired t test and Chi-square test were applied value <0.05 was considered significant while <0.001 was considered highly significant.

Inclusion Criteria:

1. Patients of age between 20 – 65 years.
2. Weight 40 – 76 kg.
3. ASA grade I & II patients.
4. Type of surgery – elective.

Exclusion Criteria:

1. Morbidly obese (body mass index >35 kg/m2).
2. Patients with anticipated difficult airway.
3. Oropharyngeal pathology.
4. Cardiopulmonary disease.
5. Cervical spine fracture or instability.

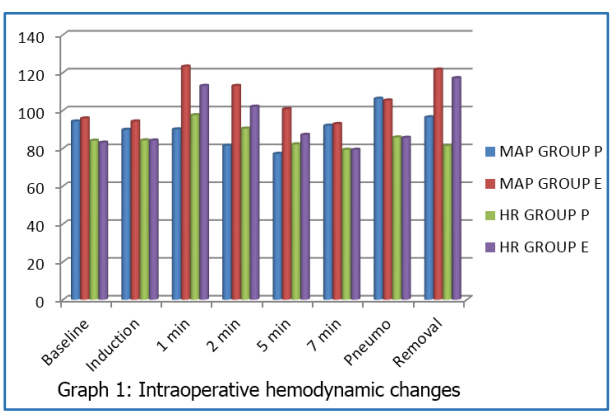
RESULTS: The surgical procedures, patient characteristics and demographic data were comparable in both groups. In our comparative study we found significant difference in time taken for insertion of device and NGT, more time required in Group E. Statistically significant (P<0.05) increase in heart rate (HR) and the mean blood pressure was observed which persisted till 5 minutes after intubation and during the time of extubation in the group E.

ETCO2 was comparable in both the groups throughout the surgery(P >0.05) and did not exceed beyond 40 mm Hg. Oropharyngeal seal pressure for PLMA group observed was 35 mm Hg (median), without leak. Coughing after the removal of PLMA was seen in 3.33% patients and 13.33% after ETT. Blood staining of device on removal was seen in 6.66% patients in group P and in 10% patients in group E.

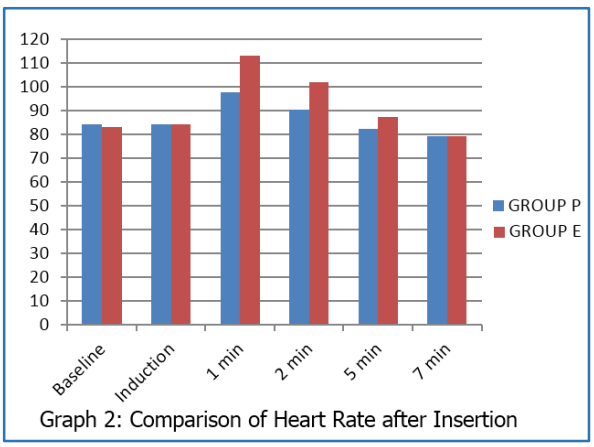
Minor trauma to the lip and gums was seen in 1 patient (3.33%) in group P than 2 patients (6.66%) in group E. There was no incidence of regurgitation or pulmonary aspiration in either group. In 3 patients, gastric distension was successfully decompressed. Sore throat postoperatively was seen in 10% patients in group P and n 23.33% patients in group E.

Airway details	Proseal laryngeal mask airway	Ettube	P value
Size of device (3/4, 7.5/8)	19/11	23/7	
Attempt of insertion (1/2/3 failed)	26/4/0/o	25/5/0/0	
Time taken for insertion of device, mean (sd)	14.23(1.92)	13.30(1)	0.0220**
Attempts at gastric tube insertion (1/2/3/failed)	27/3/0	20/7/3/0	
Time taken for insertion of gastric tube, mean (sd)	11.3(1.20)	9.4(0.96)	<0.0001**
Oropharyngeal pressure	35 cm h_2o(median)		

Table 1: Details of Airway Management



Graph 1: Intraoperative hemodynamic changes



Graph 2: Comparison of Heart Rate after Insertion

DISCUSSION: This study was conducted with the aim of comparing PLMA and ETT as a ventilator device, because intra-abdominal pressure from pneumoperitonium requires higher airway pressures for adequate pulmonary ventilation, for which the PLMA has proved to be adequate in previous[1,2,3] studies. PLMA was easier to insert with higher success rate (86.67%) in the first attempt than the ETT (83.33%), this was not statistically significant. Mean time taken for successful placement was 13.30s and 14.23s for groups P and E, respectively. Studies by Cook, Shroff and coworkers corroborated with our findings.[3,4] Sharma and coworkers in their study of 100 and 1000 PLMA insertions, reported a mean insertion time of 13.51s and 12s, respectively.[1,5]

The mean insertion time taken to insert NGT through PLMA was significantly less (9.4s) than via nose (11.3s) in intubated patients. Similarly, the success rate of NGT in the first attempt was higher (90%) via proseal than via nasal route in intubated patients (66.67%) with endotracheal intubation.[1,2,6]

The increase in heart rate during intubation is attributed to sympathetic stimulation during laryngoscopy.[1,7,8] The PLMA being a supraglottic device does not require laryngoscopy and probably does not evoke a significant sympathetic response due to diminished catecholamine release.[9] Both groups maintained adequate oxygenation and ventilation during pneumoperitoneum and perioperatively.

Maltby et al. and Sharma et al. found no statistically significant differences in SPO_2 or $ETCO_2$ between the two groups before or during peritoneal insufflations. The observed oropharyngeal seal pressures for PLMA group was 35 mm Hg (median), with no clinically audible leak throughout the surgery. This is in accordance with the findings of previous studies.[1,10,5,7]

In three patients, gastric distention was successfully decompressed by suctioning the NGT. There was no incidence of regurgitation or aspiration in either group. Similar results have been reported by others.[1,11,]

The incidence of sore throat was comparatively more in group E (20%) than in group P (10%). Higgins et al. and Shroff et al. also have comparable results.[3,11]

CONCLUSION: We conclude that the PLMA proved to be a suitable and safe alternative to ETT for airway management in elective fasted adult patients undergoing laproscopic surgeries.

Ethical Clearance: The contents have not been published elsewhere and the paper is not being submitted elsewhere.

The manuscript has been read and approved by all co-authors.

Patient consent has been taken for publishing the article and any pictures related to it.

No financial interests, direct or indirect, exist for individual contributors in connection with the content of this paper.

No sources of outside support of the project.

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