

**A COMPARATIVE STUDY BETWEEN PROSEAL LARYNGEAL MASK AIRWAY AND  
ENDOTRACHEAL TUBE IN PATIENTS UNDERGOING LAPAROSCOPIC SURGERY****<sup>1</sup>Dr. Uday Pratap, <sup>2</sup>Dr. Sushil Kumar, <sup>3</sup>DR. Veena Gupta, <sup>4</sup>DR. Navab Singh, <sup>5</sup>DR. Ruchi Gupta**<sup>1</sup>Assistant Professore Geetanjali Medical College Udaipur.<sup>2</sup>Assistant Professore Government Medical College Banda.<sup>3</sup>Professor M.L.B Medical College. JHANSI.<sup>4</sup>Assistant Professore, Department of Anesthesia and Intensive Care, M.L.B Medical College. Jhansi, India.<sup>5</sup>Senior Resident, Obs & Gynae, American international Institute of Medical Science, Udaipur India.**\*Corresponding Author: Dr. Uday Pratap**

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Article Received on 02/03/2017

Article Revised on 23/03/2017

Article Accepted on 14/04/2017

**ABSTRACT**

**Background:** Tracheal intubation and controlled ventilation is the gold standard for the anaesthetic management of a patient undergoing laparoscopic surgery. The ProSeal laryngeal mask airway (PLMA) is being considered as an alternative airway device for laparoscopic surgical procedures. Aim of the study is to evaluate its use during general anaesthesia with positive pressure ventilation in patients undergoing laparoscopic surgery. **Method:** A prospective randomized study of 100 ASA I & II between the age of 18-65 years was done. Insertion characteristics of the PLMA or ETT and of the nasogastric tube (NGT), Haemodynamic responses, oxygen saturation and EtCO<sub>2</sub> measurements at various intervals and intraoperative and postoperative complication were analysed. **Results:** showed that time required for insertion was shorter for PLMA as compared to ETT ( $p < 0.0001$ ). Nasogastric tube insertion was also faster in the PLMA group. There was statistical significant difference in the pulse rate values before and after pneumoperitoneum was created and in MAP. There were no statistically significant differences in oxygen saturation (SpO<sub>2</sub>) or end-tidal carbon dioxide (EtCO<sub>2</sub>) between the two groups before or during peritoneal insufflation. Incidence of complication was lower in PLMA group. No significant difference in laryngopharyngeal morbidity was noted. So, to **conclude** that PLMA is suitable and a safe alternative to cuffed ETT for airway management in elective non obese patients undergoing laparoscopic surgeries under general anaesthesia.

**KEYWORDS:** Endotracheal tube, Proseal laryngeal mask, Laparoscopic surgery, Nasogastric tube.**INTRODUCTION**

Till date, the cuffed tracheal tube was considered as the gold standard for providing a safe glottic seal, especially for laparoscopic procedures under general anaesthesia. But tracheal intubation may cause unwanted hemodynamic responses, damage to the oropharyngeal structures at insertion, postoperative sore throat precludes the global utility of the tracheal tube and requires a better alternative.<sup>[1]</sup>

With the role of an LMA, being restricted to the difficult airway algorithms and a few other selective cases, Dr. Archie Brain came up with a new invention, or rather a modification of the Laryngeal Mask Airway (LMA) in year 2001<sup>[2]</sup> 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.<sup>[3]</sup> It also differs from the standard LMA in having a drain tube in addition to a reinforced airway tube. The drain tube traverses the floor of the mask, opens at the tip opposite the upper esophageal

sphincter, prevents the epiglottis from occluding the airway, eliminating the need for aperture bars, and prevents inadvertent gastric inflation, also permitting access to the gastro intestinal tract (GIT) and aids nasogastric tube insertion. The built in bite-block is an added advantage reducing the chances of damage to the device by involuntary biting of tube by the patient and thus prevent airway obstruction due to external compression of tube.<sup>[4]</sup>

After considerable review of complications and difficulties faced with ETT during laparoscopic surgery, there was need of new supraglottic device. Many authors have studied PLMA in laparoscopic surgery and given their views in favour of either device. This present study was designed to compare ETT and PLMA under following parameter-

- Insertion characteristic.
- Hemodynamic responses.
- Maintenance of Oxygen saturation and end tidal carbon-dioxide.
- Intraoperative and postoperative morbidity.

The study is an author attempt to compare previous gold standard procedure with a new device and prove its efficacy in laparoscopic surgery.

### MATERIAL AND METHODS

Patient undergoing elective laparoscopic surgeries under general anaesthesia were included in the prospective randomized study after approval from the ethical committee of our institution and informed consent from the patient.

### INCLUSION CRITERIA

ASA grade I and II patients.

Patients aged between 18–65 yrs and weighing 35–70 kg.

### EXCLUSION CRITERIA

- \* Anticipated difficult airway.
- \* Pregnant women.
- \* Patients with risk of hiatus hernia.
- \* Oro-pharyngeal pathology.
- \* Lung diseases associated with low compliance/high airway resistance.

After a thorough pre-anaesthetic checkup, all selected patients were subjected for routine and specific investigation as per individual case, and instructed nil per oral status of 8 hours prior to surgery and written informed consent for general anaesthesia was taken. All patients were premedicated night before surgery with Tab. Alprazolam 0.25mg and Tab. Ranitidine 150mg. On the day of surgery patients undergoing general anaesthesia were randomly divided in two groups as decided by random number table.

On arrival in the operating room, the multipara monitor was attached for measuring vital parameters and intravenous line was checked.

### These patients under study were divided into two groups

**Group P-** Airway managed with Proseal LMA (PLMA).

**Group E-** Airway managed with cuffed Endotracheal tube (ETT).

Premedication with intra venous midazolam 1.5mg, glycopyrrolate 0.2mg, fentanyl 1-2microgram/kg was given 5min prior to induction in both groups.

Patients were preoxygenated with 100% oxygen for 5 minutes and then induced with injection 1% propofol 2mg/kg slow intra venous till the loss of verbal command, and placement of airway device facilitated with suxamethonium 1-2 mg/kg IV.

In Group P, an appropriate size PLMA (LMA-PROSEAL™ Laryngeal Mask Company, (U.K.) Limited) was inserted as per recommendations based on weight criteria; i.e., size 3 for patients weighing 30-50 kg and size 4 for 50-70 kg. A clear water based lubricant gel was applied on the dorsal surface of the device. The

distal end of the introducer was placed in the location strap of PLMA and proximal notched end of introducer engaged between the two tubes above the bite block. The PLMA then resembles the intubating laryngeal mask airway. The bowl was placed into the mouth, guided against hard palate and advanced in a smooth arc with the handle, until resistance was encountered. The introducer was then removed, by taking care to avoid dental damage.

The cuff was then inflated with upto 20 ml of air for size 3 and 30 ml of air for size 4 as per manufacturers recommendation. After connecting to the Bain circuit, lungs were manually ventilated to check for an effective airway. The correct placement of PLMA was confirmed by-

- \* B/L equal air entry
- \* B/L equal chest movement
- \* Square wave capnographic tracing
- \* Gel and soap test for malposition of PLMA

After insertion of the PLMA the leak test as recommended by placing a blob of gel on the drain tube for evidence of leak was carried out, in addition to the checking for audible air leakage. Only if the leak was absent the PLMA insertion was considered as successful. Group E – Cuffed Endotracheal tube (7.5 in females and 8.5 in males) was placed, using Mac'intosh curved laryngoscope blade.

Anaesthesia was maintained with nitrous oxide and oxygen (60:40), isoflurane (1-1.5%) and atracurium(0.5mg/kg loading dose and maintenance with ¼ of loading dose) and ventilation was maintained with tidal volume 8 ml/kg, fraction of inspired oxygen (FiO<sub>2</sub>) 0.33, respiratory rate of 12/min and I/E of 1:2. The FiO<sub>2</sub> and respiratory rate were adjusted to maintain SpO<sub>2</sub> > 95 % and EtCO<sub>2</sub> <45 mm Hg (i.e in normal range).

Intra-abdominal pressure (IAP) was maintained <14 mm Hg.

The Ryle's tube of appropriate size 16F in group P and 18F in group E was placed in all the patients.

Following parameters were observed and recorded:

- \* Insertion characters
- Ease of insertion
- Time taken for insertion of the device
- Number of attempts

### \*Hemodynamic respiratory responses

- PR, Systolic and Diastolic BP, MAP, SpO<sub>2</sub>, EtCo<sub>2</sub> was recorded at following intervals:

- \* Baseline,
- \* At induction,
- \* During insertion of device at 1 minute, 3 minutes and 5 minutes,
- \* After pneumo peritoneum.
- \* After removal of device.

\* Incidence of oropharyngeal leaks, oesophageal regurgitation, gastric insufflation, pulmonary aspiration and displacement of device were noted.

\* Postoperative incidence of coughing, blood stained secretion, sorethroat, PONV, dysphasia, dysphonia, dysarthria and trauma to lip and teeth were noted. Which were managed accordingly.

After completion of surgery, the adequate neuromuscular blockade reversal was achieved with glycopyrrolate (10 microgram/kg) and neostigmine (50 microgram/kg).

Patients were shifted to post operative anaesthesia care unit where these patients were observed for 1 -1.5 hr by

the anaesthetists and later shifted to post operative ward under surgery department for further monitoring and care. Statistical is calculated by graphpad software with unpaired t test.

## RESULTS

The demographic data, i.e age, sex, weight, was comparable in both groups. Most of patients in both group were operated for laproscopic cholecystectomy.

Duration of surgery was comparable in both groups. Mean duration being 62.68± 17.01 minutes in group P, while it was 60.66±15.14 minutes in group E.

**Table: 1 Details of Airway Insertion**

Airway details	PLMA Size 3/4	ET TUBE Size 8.5/7.5	P VALUE
No. of patients	20/30	19/31	
Attempt of insertion of device (1/2/3 failed )	42/8/0/0 (1.16±0.37)	40/10/0/0 (1.1±0.40)	0.61
Time taken for insertion of device , mean (SD)sec.	14.14±1.25	12.86±1.69	<0.0001
Attempts at gastric tube insertion (1/2/3/failed)	44/6/0 (1.12±0.32)	32/12/6/0 (1.46±0.71)	0.0026
Time taken for insertion of gastric tube, mean (SD) sec.	9.46±0.86	11.6±1.19	<0.0001

## INFERENCE

Table 1 shows Size 3 and 4 PLMA placements were attempted in 20 and 30 patients respectively and size 8.5 and 7.5 mm ET tubes were attempted in 19 and 31 patients respectively. In group P, Insertion success rate was 84% for the first attempt, and two attempts were made in 16% patients. In Group E, the insertion success rate was 80% for the first attempt; two attempts were

taken in 20% of patients. There was no third attempt or failed insertion found in either group.

There was significant difference in time taken for insertion of airway device, more time required in Group P in comparison to Group E ( $p < 0.0001$ ). A significant difference in time taken for NGT insertion, no. of attempt was noted, more time and attempts were required in Group E.

## HEMODYNAMIC PARAMETERS

**Table: 2 Comparison of Pulse Rate**

Pulse rate	GROUP P (N=50)		GROUP E (N=50)		'p' value
	Mean	SD	Mean	SD	
Baseline	83.12	6.5	82.58	6.87	0.54
Induction	81.94	5.6	81.5	6.83	0.72
1 min	98	13.53	109.52	8.91	<0.0001
3 min	91.82	8.75	100.6	8.42	<0.0001
5 min	85.02	5.24	87.8	9.5	0.073
After pneumoperitoneum	89.16	3.89	90.5	3.5	0.07
After removal of device	90.5	3.53	116.06	10.52	<0.0001

## INFERENCE

In table 2, shows that pulse rate was increased in both groups from the baseline values during insertion of device, but statistically significant increase in PR was noticed in Group E at 1<sup>st</sup> min, 3<sup>rd</sup> min which lasted upto 5<sup>th</sup> min from insertion of device in comparison to Group P. Increase in pulse rate was statistically significant in both the groups after pneumoperitonium but there was no significant difference in increase in pulse rate after

pneumoperitoneum between groups. Pulse rate was increased after removal of device in both groups, but it was statistically significantly higher in group E ( $p < 0.0001$ ).

On comparing trends within group, increase in pulse rate was observed 1 minute after intubation and persisted till 3 minutes and after extubation in both group. But this increase was highly significant in group E ( $p < 0.0001$ ).

**Table: 3 Comparison of Mean Arterial Pressure**

MAP	GROUP P			GROUP E			'p' Value
	No.	Mean	SD	No.	Mean	SD	
Baseline	50	96.25	6.94	50	94.69	6.13	0.23
Induction	50	91.56	6.66	50	93.26	7.47	0.23
1 min	50	103.18	4.40	50	121.15	8.64	<0.0001**
3 min	50	94.66	5.63	50	111.43	6.03	<0.0001**
5 min	50	90.74	6.73	50	94.10	4.3	0.0037
After pneumoperitoneum	50	105.8	8	50	107.5	5.83	0.22
After removal of device	50	108.14	3.07	50	118.78	7.39	<0.0001

**INFERENCE**

Table 3 Mean arterial pressure was increased in both Groups from baseline values during insertion of device, but statistically significant increase in MAP was noticed in Group E at 1<sup>st</sup> min, 3<sup>rd</sup> min ( $p < 0.0001$ ) and it lasted upto 5<sup>th</sup> min ( $p < 0.0037$ ) from insertion of device in comparison to Group P. Increase in MAP was statistically significant in both the groups after pneumoperitoneum but there was no significant difference in increase in MAP after pneumoperitoneum

between groups. MAP was increased after removal of device in both groups, but it was statistically significantly higher in group E ( $p < 0.0001$ ).

On comparing trends within groups, statistically significantly higher ( $p < 0.0001$ ) increase in MAP was observed at 1 minute after intubation and persisted till 3 minutes and after extubation in group E, however, statistically significant increase in MAP in group P was seen only at 1 min after insertion of device.

**Table 4: Comparison of EtCO<sub>2</sub> Changes**

EtCO <sub>2</sub>	GROUP P			GROUP E			'p' Value
	No.	Mean	SD	No.	Mean	SD	
Baseline (after insertion of device)	50	28.76	0.79	50	28.78	1.28	0.92
Pneumoperitoneum	50	34	1.48	50	33.72	1.42	0.33
Deflation	50	28	1.16	50	27.68	1.10	0.32

**INFERENCE**

Table 4 shows, that, there was no significant increase ETCO<sub>2</sub> (<45mm Hg) throughout the surgery and no statistically significant difference in EtCO<sub>2</sub> recording after pneumoperitoneum between the 2 groups.

There was significant increase in EtCO<sub>2</sub> after pneumoperitoneum in both groups. This increase was managed by increase in respiratory rate and tidal volume remain same or decrease.

**Table 5: Comparison of SpO<sub>2</sub> Changes**

SpO <sub>2</sub>	Baseline	Insertion	Pneumoperitoneum	Removal
GROUP P	96.68	99.34	99.8	98.42
GROUP E	97.86	99.68	99.62	98

**INFERENCE**

Table 5 shows, that we did not find desaturation in either group throughout the surgery.

**Table: 6 Peak Airway Pressure**

Airway pressure (cm of water)	Before pneumoperitoneum	P value	After pneumoperitoneum	P value
GROUP P	12.94 ± 1.5	0.07	22.18 ± 1.95	0.20
GROUP E	12.26 ± 2.21		21.44 ± 3.62	

**INFERENCE**

In table 6 shows, that, there was significant increase peak airway pressure after pneumoperitoneum in both

group. which was statistically insignificant, But no any significant difference in between groups, before and after pneumoperitoneum.

Table: 7 Adverse Events

	Group P	Group E	P value
<b>Intraoperative</b>			
A) Oropharyngeal leak	-	-	
B) Gastric insufflation	6	-	
C) Esophageal regurgitation	-	-	
D) Pulmonary aspiration	-	-	
E) Displacement of device	3	-	
<b>Removal</b>			
A) Coughing	2	8	
B) Blood staining of Device	3	8	
C) Vomiting	-	-	
D) Regurgitation	-	-	
E) Laryngospasm	-	1	
F)Trauma; lip & teeth	2	6	
<b>Postoperative</b>			
A)Vomitting	3	5	
B) Sorethroat	3	7	
C) Dysphagia	-	-	-
D) Dysarthria	-	-	-
E) Dysphonia	-	-	-

### INFERENCE

**INTRAOPERATIVE:** Incidences of gastric insufflation noted in 5 (10%)patients, and displacement of PLMA in 3(6%) patients in Group P. There was no incidence of oropharyngeal leak, esophageal regurgitation, and pulmonary aspiration in any group.

### REMOVAL

There were high incidence of coughing 16%, bloodstaining of device 16%, trauma 8% in Group E. Laryngospasm was found in 1 patients in group E. There was no incidence of vomiting and regurgitation in both groups.

### POSTOPERATIVE

High incidence of sorethroat 14% and vomiting 10% in group E in comparison of sore throat 6% and vomiting 6% in group P. There was no incidence of dysphonia, dysarthria and dysphagia in either of the group.

### DISCUSSION

In spite of tremendous advances in conventional anaesthetic practice, advances in airway management continues to be of paramount importance to anaesthesiologists. Till date, the cuffed tracheal tube was considered as the gold standard for providing a safe glottic seal, especially for laparoscopic procedures under general anaesthesia.<sup>[1]</sup>

The PLMA™ is a directional perilaryngeal sealer owing to its unique cuff and double tube design that allows an oropharyngeal seal of >30 cm H<sub>2</sub>O without an increase in the directly measured mucosal pressure, when compared to the classic laryngeal mask airway (cLMA).<sup>[5]</sup> It enables positive pressure ventilation (PPV) at higher peak inspiratory pressure (PIP). When properly placed, its drain tube separates the alimentary and respiratory tracts,

detects malposition and provides protection against aspiration in fasted patients<sup>[6]</sup>

These features, together with the flexible, non-kinkable airway tube increase its safety profile. Although the tracheal tube is considered ideal for laparoscopic procedures, there is a consistent inflow of reports highlighting the safety of PLMA in laparoscopic surgery<sup>[6]</sup>

Hence in an attempt to test the efficacy and safety of PLMA as a airway device over ETT for ventilation, for a variety of commonly performed laparoscopic surgeries, the present study was conducted following institutional committee approval and written informed consent, on 100 patients of either sex, aged 18 to 65 yrs, ASA physical status I and II scheduled for elective laparoscopic surgery and all the patient under study randomly were divided in two groups, GROUP P (PLMA ) and GROUP E (ETT) of 50 each.

The demographic data, i.e age, sex, weight, was comparable in 2 groups. Mean age 36.82± 10.75 years in group P, while it was 36.3±12.99years in group E, male female ratio in both group was 2:3, and hence comparable. Mean weight distribution of patients 52.8±6.9 kg in group P, while it was 53±7.7 kg in group E. Most of patients in both groups were operated for laparoscopic cholecystectomy.

Duration of surgery was comparable in both groups. Mean duration 62.68±17.01 minutes in group P, while it was 60.66±15.14 minutes in group E

The PLMA is a new entrant to the family of LMA with some added features over the classic LMA, PLMA can be inserted using either the introducer, index finger or the thumb. For the purpose of standardization, we used

the introducer for all the cases. Size 3 PLMA placement was attempted in 20 patients, size 4 in 30 patients. Insertion success rate was 84% for the first attempt, and two attempts were made in 16% patients. In Group E, the insertion success rate was 80% for the first attempt; two attempts were taken in 20% of patients. There was no third attempt or failed insertion in either group.

Our results are in accordance to that of *Namita Saraswati et al*<sup>[1]</sup> who reported Insertion success rate was 86.67% for the first attempt, and 13.33% in two attempts. Insertion was easy in 23 and difficult in 7 patients. In Group E, the insertion success rate was 83.37% for the first attempt; two attempts were made in 13.33% of patients and third attempt was required in 3.33% patients, in each group in their study comparing between PLMA and ETT for laparoscopic surgery under general anaesthesia. These difference may be because of neuromuscular blockade was achieved with vecuronium bromide for intubation in above study, While in our study; it was suxamethonium which provide excellent relaxation.

*M.N. Mishra, B. Ramamurthy*<sup>[3]</sup> reported that all the patients in the tracheal tube group were subjected to intubation successfully at first attempt (100%). There was no need for further attempts in this group. On the other hand, PS-LMA group had 88% (44/50) first attempt success at insertion ( $P < 0.01$ ).

PLMA insertion took  $14.14 \pm 1.25$  seconds (mean $\pm$ SD) and conventional ETT insertion took  $12.86 \pm 1.69$  seconds (mean $\pm$ SD), the difference was statistically significant ( $< 0.0001$ ).

*Sharma and coworkers*<sup>[6,7]</sup>, in their study of 100 and 1,000 PLMA insertions, reported a mean insertion time of 13.51 sec. and 12 secs, for PLMA respectively which is comparable to our study.

*Namita Saraswati et al*<sup>[1]</sup> reported Mean time (range) taken for successful placement 15.77 s (12-21 s) and 16.93 s (11-28 s) for PLMA and ETT, respectively. Which are comparable to present study. While in our study, it was suxamethonium which provide excellent relaxation.

*P.P. Shroff, S.K Kamath*<sup>[4]</sup> had reported , PLMA insertion took 15 (10) seconds as compared to 26 (11) seconds for the traditional ETT insertion. The difference in this data is statistically significant.

There was no difficulty in passing nasogastric tube through the PLMA. Insertion of nasogastric tube through the nose took  $11.6 \pm 1.19$  seconds in the ETT group as against  $9.46 \pm 0.86$  seconds in the PLMA group. The difference in this data is highly statistically significant.

Similar result was reported by *Namita Saraswati et al*<sup>[1]</sup> for insertion of NGT in their study comparing between

PLMA (9.77 seconds) and ETT (11.5 seconds) for laparoscopic surgery under general anaesthesia.

*P.P. Shroff, S.K Kamath*<sup>[4]</sup> had reported no difficulty in passing nasogastric tube through the PLMA. Insertion of nasogastric tube through the nose was more time consuming and took 27 (13) seconds in the ETT group as against 14 (6) seconds in the PLMA group. The difference in this data is statistically significant and will be clinically important in patients with hypertension, ischaemic heart disease.

Attempts taken for insertion of NGT in Group P was less than Group E .Maximum three attempts were taken in group E. In Group P, 2 attempts were required in 6/50(12%) patients and in Group E, 2 attempts were taken by 12/50(24%) and 3 attempts were taken by 6/50(12%) patients which was statistically significant.

Our results are similar to that of *Namita Saraswati et al*<sup>[1]</sup> who reported that in Group P, 2 attempts were required in 3/30(10%) patients and in Group E, 2 attempts were taken by 7/30(24%) and, 3 attempts were taken by 3/30(10%) patients between PLMA and ETT for laparoscopic surgery under general anesthesia.

Mean arterial pressure was increased in both Groups from baseline values during insertion of device, but statistically significant increase in MAP was noticed in Group E at 1<sup>st</sup> min, 3<sup>rd</sup> min ( $p < 0.0001$ ) and it lasted upto 5<sup>th</sup> min ( $p < 0.0037$ ) from insertion of device in comparison to Group P. Increase in MAP was statistically significant in both the groups after pneumoperitonium but there was no significant difference in increase in MAP after pneumoperitoneum between groups. MAP was increased after removal of device in both groups, but it was statistically significantly higher in group E ( $p < 0.0001$ ).

On comparing trends within groups, statistically significantly higher ( $p < 0.0001$ ) increase in MAP was observed at 1 minute after intubation and persisted till 3 minutes and after extubation in group E, however, statistically significant increase in MAP in group P was seen only at 1 min after insertion of device.

In Our study, insertion of device in Group P was associated with less hemodynamic change in comparison to Group E. Intubation and extubation was associated with significant higher increase in pulse rate and blood pressure in Group E which may further be disadvantageous in compromised patients.

Our results are similar to that of *Namita Saraswati et al*<sup>[1]</sup> reported, increased in PR and increased in MAP in Group E as which was statistically significant till 3 min, as compared to hemodynamic parameters in Group P.

Our results are in accordance to *Arfat et al*<sup>[8]</sup> who noticed a exaggerated hemodynamic response in terms of increased PR and MAP, at 1, 3, 5 minute after induction.

*M.N. Mishra, B. Ramamurthy (2008)*<sup>[3]</sup>

Noticed a significant rise in HR and MAP in both the PS-LMA (P<0.05) and the TT groups (P<0.01) from their baseline values during insertion of the respective devices. On comparing the degree of rise in HR and MAP between the groups, TT group showed a higher rise in these parameters than PS-LMA group (P<0.05).

Suboptimal oxygenation defined as SpO<sub>2</sub> between 90-95% and hypoxia as SpO<sub>2</sub> < 90 %<sup>37</sup>. Optimal oxygenation was noted in all cases before and after CO<sub>2</sub> - insufflation. All patients had EtCO<sub>2</sub> <45 mm Hg after CO<sub>2</sub> - insufflation. There was a significant increase in the peak airway pressure after pneumoperitonium in both the groups (P < 0.001).

Our study result are similar to that of *Namita Saraswat et al*<sup>[1]</sup> who also reported no change in SpO<sub>2</sub> and EtCO<sub>2</sub> comparing with ETT in laparoscopic surgeries under general anaesthesia.

*Sharma et al*<sup>[6]</sup> and *Maltby et al*<sup>[9]</sup>

Reported no statistically significant differences in SpO<sub>2</sub> or EtCO<sub>2</sub> between the two groups before or during peritoneal insufflations.

Minimal gastric distension, which was noticed by surgeon, was seen in 6/50(12%) patients of Group p. This however did not disturb the field of vision and was not quantitatively measured. But none was seen in Group E. There was displacement of PLMA in 3(6%) patients in Group P. There was no incidence of oropharyngeal leak, esophageal regurgitation, and pulmonary aspiration in both group.

Coughing after removal of PLMA was seen in 4% patients, while it was seen in 16% patients in the ETT group. Blood staining of device on removal was seen in 3/50 (6%) patients in group P and in 8/50(16%) patients in group E. Minor trauma to the lip and gums was seen in 6/50 patient (12%) in group E and 2/50 (4%) patients in group P. Which was statistical significant. There was incidence of laryngospasm in only one patient in group E but none in group P. There was no incidence of regurgitation, vomiting at the time of removal of device in any patient.

There was statistically significant higher incidence of sorethroat and vomiting in group E (14% and 10% respectively) in comparison to group P (6% and 6% respectively), noted within 24 hr of post operative period. There was no incidence of dysphonia, dysarthria and dysphagia in both groups.

The double cuff arrangement of the PLMA prevents the chances of aspiration. Nasogastric tube was inserted in

all our cases via the drain tube, after confirming that there was no evidence of leak, There was no evidence of regurgitation or aspiration seen as evidenced by the maintenance of saturation and the end-tidal carbon dioxide within normal limits during the entire duration of the laparoscopy.

*P.Shroff et al*<sup>[4]</sup> and *Higgins et al*<sup>[10]</sup>

Found the greatest incidence of sore throat in patients undergoing intubation than in those in whom a PLMA was used. The virtual absence of sore throat in PLMA Group could be explained by the fact that it is a supraglottic device and mucosal pressures achieved are usually below pharyngeal perfusion pressures.

## CONCLUSION

So, to conclude PLMA has good ease of insertion, less laryngo-tracheal sympathetic responses with adequate ventilation and less post-operative airway morbidity. Hence, is suitable and a safe alternative to cuffed ETT for airway management in elective non obese patients undergoing laparoscopic surgeries under general anaesthesia.

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