

## Comparison of classic laryngeal mask airway with nasogastric tube versus proseal laryngeal mask airway in adults undergoing laparoscopic cholecystectomy

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### Abstract

**Introduction:** Supraglottic devices are in regular practice in India for laparoscopic cholecystectomy. Repeated use of supraglottic devices lead to risk of malfunction (herniation of cuff, inadequate seal) and transmissible infection. Proseal LMA is commonly used after cleaning many times due to economical factor. We plan this study to compare the leak fraction and incidence of gastric regurgitation after C-LMA with nasogastric tube and P-LMA in patients undergoing laparoscopic cholecystectomy.

**Materials and Method:** Sixty adult patients of American Society of Anaesthesiologist I, II (ASA I, II) undergoing laparoscopic cholecystectomy under general anaesthesia were allocated randomly into two equal group to receive C-LMA with nasogastric tube or P-LMA. Patients who had any contraindication for using supraglottic devices were excluded. The leak fraction, airway pressure, ease to insertion, incidence of gastric regurgitation, postoperative sore throat were compared.

**Results:** All patients were successfully ventilated in both the groups. There were no significant difference noted in leak fraction and incidence of regurgitation in both groups.

**Conclusion:** P-LMA and C-LMA with nasogastric tube are equally effective ventilatory devices for laparoscopic cholecystectomy. As C-LMA with nasogastric tube facilitates drainage even postoperatively and much cheaper, it stays an economical device for laparoscopic cholecystectomy than P-LMA.

**Keywords:** Laryngeal Mask Airway, Laparoscopic, Anaesthesia

### Introduction

Endotracheal intubation with cuffed endotracheal tube remains the standard of care in managing airway in patients undergoing laparoscopic surgeries.<sup>(1,2)</sup> Many studies have come out with good results with supraglottic airway devices.<sup>(3,4)</sup> LMA-classic (C-LMA) and Proseal LMA (P-LMA) were used in earlier studies had showed variable success rate as effective ventilatory device in laparoscopic surgeries.<sup>(5-8)</sup> Fear still exists regarding the risk of aspiration, gastric distension, regurgitation, displacement of device especially in laparoscopic surgeries.

Proseal LMA with its double cuff and suction drainage port showed good airway seal and reduced gastric distension and regurgitation. Proseal LMA is slowly replacing the ET tube as an airway device in patients undergoing laparoscopic surgeries. At our centre laparoscopic cholecystectomy is performed within 30 minutes with at least 10-12 cases continuously with repeated use of P-LMA due to economic factors but repeated use are associated with risk of malfunction (herniation of cuff, inadequate seal) and increased risk of transmissible infection specially spongiform encephalopathy from protein particles.<sup>(9, 10)</sup>

Classical LMA while is being used effectively as an airway device for abdominal surgeries, has been tried in laparoscopic surgeries with encouraging results. Placement of nasogastric tube of 12 Fr diameter and classical LMA over it reduced the incidence of gastric distension, regurgitation. C- LMA is cheaper and

versatile availability makes it an alternative to P-LMA in laparoscopic surgery. Whether C-LMA with nasogastric tube (12 Fr diameters) will be as effective as P- LMA is a question of debate and a hope for future. So this study was undertaken by comparing effectiveness of the classical-LMA with nasogastric tube and P-LMA as an airway device in patient undergoing laparoscopic surgeries.

### Materials and Method

After Institutional Ethical approval and written informed consent, 60 patients of American Society of Anaesthesiologist (ASA) class I or II aged between 18-45 years, of either sex scheduled for elective laparoscopic cholecystectomy were included in this prospective, randomized trial from July 2014 to June 2015. Patient with a history of end organ dysfunction, obesity (BMI > 30 kg/m<sup>2</sup>), pregnancy, GERD, anticipated difficulty in airway, high risk of aspiration were excluded from the study. All patients were randomized into two equal groups: Group C to receive C-LMA with nasogastric tube; Group P to receive P-LMA with suction catheter in suction port.

After routine preoperative evaluation and machine check especially for any circuit leak, (Datex Ohmeda S/5 Avance), laparoscopic procedure was performed under general anaesthesia with controlled ventilation. Premedication included tablet alprazolam (0.50 mg), tablet ranitidine (150 mg), and tablet metoclopramide (10 mg) administered orally on the evening before

surgery and 2 h before the scheduled procedure. On arrival to the operative room, monitors were placed and baseline parameters recorded. All Patients were premeditated with Ondansatron 0.1mg/kg, Fentanyl 2 µg/kg. Anaesthesia was induced with propofol 1-2.5 mg/kg, neuromuscular blockade was obtained using vecuronium 0.1 mg/kg for insertion of device. The device was inserted by an expert Anaesthesiologist, if more than three attempts were needed, then it was regarded as device placement failure. The anaesthesia was maintained using Oxygen, Nitrous Oxide, Isoflurane, Fentanyl, and Vecuronium. All patients were given a tidal volume of 10 ml/kg. Nasogastric tube was inserted before device placement (Group C) and after device placement (Group P) a drainage tube was inserted. Nasogastric tube/suction catheter aspiration done and it was kept open.

Adequate ventilation was assured by normal thoraco-abdominal movement and capnograph. Any leak after placing the device was detected by calculating the leak fraction (difference between inspiratory volume and expiratory volume / inspiratory volume). Airway pressure, leak fraction and ETCO<sub>2</sub> values were recorded before and after pneumoperitoneum (every 10 minutes) and at the end of surgery. Any evidence of postoperative sore throat, PONV was noted. All the recordings were recorded by blinded observer.

## Results

Patient's characteristics were comparable between two groups with regard to age, sex, weight, height, BMI. The mean duration of anaesthesia in both groups was around 35±10 minutes. The mean time of insertion of P-LMA and C-LMA were 45 seconds. The success rates of insertion at first attempt with C-LMA were 80% (24/30) and P-LMA was 74%.

The C-LMA with Nasogastric tube and P-LMA were comparable as effective ventilator devices at tidal volume 10 ml/kg. The ease of insertion at first time has a successful rate of 80% with C-LMA and 74% with P-LMA. There was no incidence of any gastric distension or device dislodgement with both groups. Both C-LMA and P-LMA had average leak fraction of 5%. Though there was leak, it didn't hamper the ventilation. 10% of patients with C-LMA with Nasogastric tube had regurgitation compared to 20% patients with P-LMA. There was no procedure related complications noted. Few patients developed post-op sore throat and blood staining of device in both groups.

Three of 30 patients had regurgitation in C-LMA group and six of 30 patients had regurgitation in P-LMA group. Two of 30 had PONV in C-LMA with nasogastric tube group and four of 30 had PONV in P-LMA group.

**Table 1: Demographic profile**

S. No	Parameters	Group C	Group P
1.	Age (years)	45	44
2.	Sex (M/F)	6/24	7/23
3.	Weight (kg)	54	56
4.	Height (cm)	158	156
5.	BMI	28	29
6.	ASA Status I/II	25/5	27/3

Data are presented as number. BMI: Body Mass Index; ASA: American Society of Anaesthesiologist.

**Table 2: Pulmonary mechanics with cardiorespiratory parameters before and after pneumoperitoneum**

S. No.	Parameters	Group C		Group P	
		Before	After	Before	After
1.	P-Peak(mmHg)	16.5±3	22.3±4	15.4±4	23.7±3
2.	TVi (ml)	490±15	475±13	485±14	472±12
3.	TVe (ml)	460±12	455±10	465±15	453±13
4.	LF%	5%	6%	3%	5%
5.	HR (per minute)	71±8	68±9	73±6	69±7
6.	MAP (mmHg)	74±12.24	89.34±15.67	72±10.98	90.68±16.12
7.	ETCO <sub>2</sub> (mmHg)	34	40	35	41

Data are presented as mean ± SD. P-Peak: Peak airway pressure; TVi: Inspiratory Tidal Volume; TVe: Expiratory Tidal Volume; LF: Leak Fraction; HR: Heart Rate; MAP: Mean Arterial Pressure; ETCO<sub>2</sub>: End Tidal Carbon dioxide.

**Table 3: Comparison between C-LMA and P-LMA**

S. No	Parameters	Group C	Group P
1.	Attempt at insertion 1/2/3	24/4/2	22/6/3
2.	Gastric distension	0	0
3.	regurgitation	3	6
4.	Device dislodgement	0	0
5.	Blood staining	4	5
6.	Sore throat	3	4
7.	PONV	2	4

**Fig. 1: Patient with classical LMA with Nasogastric tube**

### Discussion

Supraglottic Airway device are getting used as an alternative for endotracheal tube in many surgeries including laparoscopic surgeries.<sup>(3,4)</sup> From the old classic LMA to new Proseal LMA various devices were used as ventilator device for laparoscopic surgeries. In our study we found that both C-LMA with nasogastric tube and P-LMA are comparable as effective ventilator devices for laparoscopic surgeries. There was no incidence of device dislodgement or inadequate ventilation with both devices.

The ease of insertion was better with C-LMA than P-LMA. The success rate of device placement at first attempt was 80% with C-LMA and 74% with P-LMA. Many studies also suggest insertion of C-LMA was quicker and easier than P-LMA. Brimacombe et al suggest that the lower rate with P-LMA may be due to larger cuff and the presence of rear cuff.<sup>(6)</sup> Nakayama et al and O Neil et al have reported success rate of C-LMA insertion of 67-99% in children.<sup>(11,12)</sup> There was no failure of placement of device with both groups. Cook et al and Brimacombe et al reported that P-LMA has better airway seal than C-LMA in adults.<sup>(6,7)</sup> In our study we found no difference between the two devices. Both device though had an average leak fraction of 5%, there was no hindrance with ventilation. There was no incidence of any gastric distension with both devices.

Only 10% of patients in C-LMA with nasogastric tube group had regurgitation compared to 20% in P-LMA group. The decreased incidence in C-LMA group

may be due the fact that gastric contents were emptied before induction and the nasogastric tube was kept in place till immediate postoperative period to facilitate gastric drainage. C-LMA with Nasogastric tube group also had less incidence of Postoperative nausea vomiting. There was no procedure related complications in both groups and few patients had blood staining and postoperative sore throat in both groups.

The limitations of our study are small number of patients and obese patients are not included.

### Conclusion

Both C-LMA with nasogastric tube and P-LMA are effective ventilator devices for laparoscopic surgeries. The classic LMA with nasogastric tube with less incidence of regurgitation, more ease to insert and cost effective may stay as an economical disposable ventilator device for laparoscopic surgeries than P-LMA.

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### References

1. Maly JR, Beriault MT, Watson NC, Liepert D, Fick GH. The LMA-Proseal is an effective alternative to tracheal intubation for laparoscopic cholecystectomy. *Can J Anaesth* 2002;49:857-62.
2. Maly JR, Beriault MT, Watson NC, Liepert DJ, Fick GH. LMA-Classic and LMA-ProSeal are effective alternatives to endotracheal intubation for gynaecologic laparoscopy. *Canadian Journal of Anaesthesia* 2003;50:71-7.
3. Brain AIJ, Verghese C, Strube PJ. The LMA "Proseal"—a laryngeal mask with an oesophageal vent. *Br J Anaesth* 2000;84:650-4.
4. Brimacombe JR, Brain AIJ, Berry AM. The laryngeal mask instruction manual for anaesthesia. Henley-on-Thames: Intavent Research Ltd., 1999.
5. Brimacombe J, Keller C. The ProSeal laryngeal mask airway. A randomized, crossover study with the standard laryngeal mask airway in paralyzed, anesthetized patients. *Anesthesiology* 2000;93:104-9.

6. Brimacombe J, Keller C, Fullekrug B, Agro F, Rosenblatt W, Dierdorf SF et al. A multicenter study comparing the ProSeal and Classic laryngeal mask airway in anesthetized, nonparalyzed patients. *Anesthesiology* 2002;96:289–95.
7. Cook TM, Nolan JP, Verghese C, Strube PJ, Lees M, Millar JM et al. Randomized crossover comparison of the Proseal with the classic laryngeal mask airway in unparalyzed anaesthetized patients. *Br J Anaesth* 2002;88:527–33.
8. Lu PP, Brimacombe J, Yang C, Shyr M. ProSeal versus the Classic laryngeal mask airway for positive pressure ventilation during laparoscopic cholecystectomy. *Br J Anaesth* 2002;8:824–7.
9. Wrobel M, Ziegeler S, Grundmann U. Airway obstruction due to cuff herniation of a classic reusable laryngeal mask airway. *Anesthesiology* 2007;106:1255–6.
10. England AJ. Respiratory obstruction secondary to laryngeal mask failure. *Anaesthesia* 2004;59:1030–31.
11. Nakayama S, Osaka Y, Yamashita M. The rotational technique with a partially inflated laryngeal mask airway improves the ease of insertion in children. *Paediatr Anaesth* 2002;12:416–9.
12. O'Neill B, Templeton JJ, Caramico L, Schreiner MS. The laryngeal mask airway in pediatric patients: factors affecting ease of Shimbori et al. use during insertion and emergence. *Anesth Analg* 1994;78:659-62.