

# Standalone use of Laryngeal mask airway supreme for primary airway management in adults undergoing laparoscopic surgeries: A prospective observational study

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## Abstract

**Background:** Laryngeal mask airway (LMA) does not provide definitive airway protection from pulmonary aspiration of potential regurgitated gastric contents. LMA supreme, a recent supraglottic (extraglottic) airway device, shows promising results. Thus, aim of study to evaluate the role of supreme laryngeal mask airway (SLMA) in airway management of patients operated with laparoscopic procedures under general Anaesthesia. **Methods:** The prospective observational study comprised of 274 patients of ASA grade 1 and 2 scheduled for short elective laparoscopic procedures (<1hr.30min) who provided consent. Patients were anaesthetised according to standard protocol, appropriate size of SLMA was chosen and inserted; and complications were noted. Post SLMA removal, recovery and trauma of throat were noted. Postoperative complications such as nausea, vomiting, and throat pain were noted. Binary logistic regression model and Chi-square test of association was performed to analyse data (P<0.05). **Results:** Most participants were female (n=260) with mean age of 31.42±7.24 years. Mean duration of surgery and recovery time was 37.3±5.84 min and 5.85±1.93 min respectively. SLMA size 3 was commonly used (n=245) and majority of insertions were successful in the first attempt (n=244). Post insertion, SLMA had adequate length (n=208) Throat pain (n=37) and vomiting (n=38) were common post-operative complications observed in the patients. A significant association was observed between operative procedure and complication (P=0.0004) and number of attempts (P=0.0004) with trauma being significant (P=0.0039). Trauma was associated with gender (P=0.08) and body weight (P=0.006). **Conclusion:** SLMA can be used as a standalone supraglottic (extraglottic) airway device for airway management in laparoscopic surgeries.

**Keywords:** Laparoscopic surgery, Anaesthesia, LMA-S, Post-operative complications.

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## INTRODUCTION

Laparoscopic procedures involve carbon dioxide insufflation, induces pneumoperitoneum, which can affect cardiopulmonary function, systemic carbon dioxide absorption, extraperitoneal gas insufflation, venous gas embolism, intra-abdominal injuries, and patient positioning.<sup>1</sup> In addition, special care is essential to ensure adequate ventilation and oxygenation. Endotracheal intubation is considered the gold standard technique for airway management in laparoscopic surgeries, to maintain ventilation and to prevent pulmonary aspiration.<sup>2</sup>

However, this procedure is associated with considerable risks and complications such as laryngotracheal injury, hemodynamic changes, and airway manipulation.<sup>3,4</sup> In addition, it is susceptible to failure in critical airway condition.<sup>2</sup> In routine laparoscopic procedures laryngeal mask airway (LMA) is considered as an alternative airway device for airway management.<sup>5,6</sup>

The supreme LMA (SLMA) (SECOND GENERATION) is a one-use airway device made of polyvinyl chloride and has characteristics of the LMA Fastrack, the LMA Proseal, and the LMA Unique. It has an airway tube at 90° angle to ease insertion, a modified cuff without posterior extension, and a gastric channel parallels with posterior midline to facilitate passage of the gastric tube. The cuff ends in a reinforced tip to prevent it from folding over during insertion.<sup>7,8</sup> The study aimed to examine the use of SLMA in laparoscopic surgery.

## MATERIALS AND METHODS

The prospective study was performed, total of 274 consenting patients with ASA grade 1 and 2 posted for laparoscopic procedures for <1Hr.30Min were included in the study. Patients with anticipated airway difficulty, difficult intubation, risk of aspiration, long procedures, and cardiopulmonary disease were excluded from study. A pilot study was performed in 20 patients to familiarize the use of SLMA (LMA Supreme™ Teleflex Medical, USA). Preoperative evaluation of the patients was done a day before surgery and alprazolam (0.25 mg) was advised on the night before surgery. In the operation room, all patients received adequate doses of fentanyl, midazolam, and glycopyrrolate by intravenous route as premedication. Standard premedication for regurgitation and aspiration (Inj. Ranitidine 50 mg, Inj. Metoclopramide 10 mg, Inj. Ondansetron 4mg) pre-emptive analgesia (Inj Diclofenac 75 mg IM 30 min prior to induction) was administered.

Patients were adequately preoxygenated and Fentanyl (2microgram/kg body weight) midazolam (0.04mg/kg) and Glycopyrrolate (0.2mgs) were intravenously administered. Anaesthesia was induced with propofol (2mg/kg) by titration and muscle relaxant vecuronium (.08mg/kg) was administered. Anaesthesia was maintained with gas:oxygen (50:50%) Isoflurane (Titration) or sevoflurane (Titration). Air way device was inserted once the jaw relaxed. The size of SLMA was selected based on gender, weight, and age. Selected SLMA was lubricated and inserted by the anaesthesiologist. The cuff of the device was inflated up to SEALING PRESSURE(Maximum upto 60cm water).<sup>9</sup> In few cases, alternative tricks such as retraction of the mandible and lateral insertion were used for easy insertion of SLMA.

Correct positioning of SLMA was confirmed by visual assessment such as position of incisors in relation to teeth bite portion of SLMA, gel displacement test, capnography and no pharyngeal leak at an airway pressure of 20cms of water and with intra cuff pressure of less than 60cm of water. Minor leak at airway pressure of more than 20cm of water with adequate ventilation and oxygenation is considered as proper placement. Airway pressure was maintained by making an intentional leak. Improper positioning of the SLMA was rectified by reattempts of insertion. Attempts >3, were considered a failure and patients were intubated. Post insertion, complications such as too much inside or too much outside (position of incisor was distal or proximal to midway of bite block in mouth), bronchospasm, down folding of the epiglottis, displacement of SLMA and fracture were noted. Correctly placed SLMA was connected with the close circuit to maintain Anaesthesia and ventilation. Oxygen saturation was maintained at 95% and end-tidal carbon dioxide (EtCO<sub>2</sub>) between 30-40 mmHg with good square waveform at airway pressure less than 20cm of water. Intraoperatively, parameters such as pulse, blood pressure, oxygen saturation, capnography, electrocardiogram, gastric distention, intra-abdominal pressure, content in the suction catheter and time taken for the procedure were recorded. At the end of the surgery, SLMA was removed when the patient resumed spontaneous breathing. Patient recovery time was noted after response of patient to verbal stimuli. Regurgitation and aspiration were confirmed by testing suction catheter tip and inner portion of bowl of LMA for acid by litmus paper. The complaints from the patients such as nausea, vomiting, and throat pain were recorded. Presence blood on SLMA was considered as trauma of throat.

## Statistical analysis

Data was analysed by R studio 1.2.5001 software. The categorical variables were expressed in frequency and percentage, and continuous variables were expressed as mean ± standard deviation. Binary logistic regression model and Chi-square test was performed to find the association between complication and other variables, P-value <0.05 was considered to be significant.

## RESULTS

The average age of 274 patients was 31.42±7.24 years, most were females (n=260) with an average weight of 63.1±5.84 kg. Mean duration of surgery and recovery time was 37.3±5.84 min and 5.85±1.93 min respectively. Hysteroscopy laparoscopy (n=82), ligation (n=63), and diagnostic laparoscopy (n=50) were the common operating procedures in the patients.

**Table 1:** Frequency and percentage of operating procedures

Operating procedures	Frequency	Percentage (%)
Diagnostic laparoscopy	50	18.2
Ectopic pregnancy	2	0.7
Hernia	1	0.4
Hysterectomy polypectomy	3	1.1
Hysteroscopy laparoscopy	82	29.9
Laparoscopy appendectomy	19	6.9
Laparoscopic hysteroscopic myomectomy	3	1.1
Laparoscopy hysteroscopic septum resection	3	1.1
Laparoscopy ligation	2	0.7
Laparoscopy salpingectomy	1	0.4
Ligation	63	23.0
Myomectomy laparoscopy	2	0.7
Opera laparoscopy	13	4.7
Ovarian drilling	29	10.6
Umbilical hernia	1	0.4

The size of SLMA in the female patients was size 3 (n=245), in the remaining (n=10) size 4 was found to be more adequate. In men, size 4 was preferred (n=10). SLMA was successfully inserted in 269 patients with first attempt (n=244) and multiple attempts (n=25). Retraction mandible or lateral insertion (n=16) and reattempt (n=8) was undertaken in those patients requiring multiple attempts. Discontinuation (n=9) was observed due to failure of insertion (n=5) and post insertion fracture (n=4) (table 2). Alternative routes such as gliding over lateral wall (n=38), retraction of mandible (n=43) and additional lubrication (n=1) aided proper SLMA insertion.

**Table 2:** Percentage and frequency of size, insertion, and attempt for insertion of SLMA

	SLMA	Frequency	Percentage (%)
Size	3	250	91.2
	4	24	8.8
Insertion	Failed	5	1.8
	Successful	269	98.2
Attempts	First	244	89.1
	Multiple	25	9.1
	Not inserted	5	1.8

Post insertion, majority of SLMA had adequate length (n=208), with too much outside (n=35), and too much inside (n=26). No leakage was observed in 93.1% SLMA (n=255). Whereas, major and minor leaks were observed in 0.7% (n=2) and 4.4% (n=12) SLMA respectively. Throat pain (n=37) and vomiting (n=38) were common post-operative complications observed in the patients (table 3).

**Table 3:** Frequency and percentage of complications

Complication	Frequency	Percentage (%)
Trauma	25	9
Throat pain	37	14
Nausea	23	8
Vomiting	38	14
regurgitation	10	4
No complication	141	51

A significant association was observed between duration of operative procedure and complication at 5% level of significance (P=0.0004). Similarly, complications were associated with number of attempts of insertion of SLMA (P=0.0004) with trauma being significant (P=0.0039). On gender adjustment, a significant association was observed between trauma and gender male (P=0.08); and body weight (P=0.006). Incidence of throat pain was significantly associated with bodyweight (P=0.034). Nausea, vomiting and regurgitation did not reflect any significant association with the demographic variables. Trauma was additionally higher in cases of multiple insertions (P=0.0039).

## DISCUSSION

SLMA has proven its safety and efficacy as a standalone supraglottic airway and demonstrates its usefulness as a conduit for tracheal intubation in elective surgeries<sup>10</sup>.

Laparoscopic surgery affects the intraoperative pulmonary mechanism, which can challenge the efficacy of the airway device.<sup>11</sup> Numerous studies have demonstrated the operative success under general Anaesthesia using

SLMA.<sup>12-14</sup> SLMA is an alternative airway device with a reduced incidence of airway complications and can be used for laparoscopic surgery.<sup>15,16</sup> High success rate and ease of proper insertion of SLMA has been previously established.<sup>7,16,17</sup> Safety and efficacy of SLMA is dependent on the size and the same varies with weight, height, and pharyngeal geometry of the patients. A superior formula to the one provided in the manufacturer's instruction is sex-related and the same was affirmed here where a clear distinction in the size was observed in male and female patients.<sup>9</sup> Although, the success rate of insertion is high in SLMA, there are incidents where alternative ways of insertion have been necessary.<sup>8</sup> SLMA offers restrained flexibility wherein post insertion, too much inside or outside did not induce any detectable complications, as observed. Low incidence of regurgitation could be due the nature of the procedures undertaken wherein the suction catheter was passed mid oesophagus and not through the gastro-oesophageal sphincter. In addition, the presence of drainage tube in suction port and proper medications could have resulted in absence of aspiration. No cases of abdominal distension were observed which could be due to the appropriate size of SLMA and ports for drainage tube. On observing leaks, major leaks were managed by changing the SLMA to higher size and minor leaks were managed by adequate ventilation and oxygenation with close observation concurrent with a similar study.<sup>8</sup> High incidence of nausea and vomiting could be explained by the innate nature of laparoscopic surgeries as observed previously.<sup>18</sup> Incidence of throat pain is comparable to similar study and could be factored by insertion techniques, repeated attempts and size of SLMA.<sup>19,20</sup> An interesting observation here on the recovery time and bronchospasm implies that SLMA is a superior standalone supraglottic airway for tracheal intubation in elective surgeries. Association between bodyweight and complications, and rapid recovery is in consensus with previous observations.<sup>7,19</sup> However, the limitations of this study are that the nature of procedure being limited to short-duration elective laparoscopy. Better insight on the effectiveness and safety of SLMA could be attained in comparison to other supraglottic devices in high-risk group in non-elective surgeries. It is further recommended that detailed blood gas evaluation for assessment of ventilation and oxygenation, and fiber-optic scope for evaluation of the adequacy of size and folding of SLMA, be done.

## CONCLUSION

Primary investigation demonstrates that SLMA can be used as a standalone supraglottic airway device for airway management in short laparoscopic surgeries.

## REFERENCES

1. Srivastava A, Niranjan A. Secrets of safe laparoscopic surgery: Anaesthetic and surgical considerations. *J Minim Access Surg* 2010;6:91-4.
2. Badheka JP, Jadhwal RM, Chhaya VA, Parmar VS, Vasani A, Rajyaguru AM. I-gel as an alternative to endotracheal tube in adult laparoscopic surgeries: A comparative study. *J Minim Access Surg* 2015;11:251-6.
3. Stauffer JL, Olson DE, Petty TL. Complications and consequences of endotracheal intubation and tracheotomy. A prospective study of 150 critically ill adult patients. *Am J Med* 1981;70:65-76.
4. Grillo HC, Donahue DM, Mathisen DJ, Wain JC, Wright CD. Postintubation tracheal stenosis. Treatment and results. *J Thorac Cardiovasc Surg* 1995;109:486-92.
5. Fabregat-López J, Garcia-Rojo B, Cook TM. A case series of the use of the ProSeal laryngeal mask airway in emergency lower abdominal surgery. *Anaesthesia* 2008;63:967-71.
6. 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;88:824-7.
7. Timmermann A, Cremer S, Eich C, Kazmaier S, Bräuer A, Graf BM, *et al.* Prospective clinical and fiberoptic evaluation of the Supreme laryngeal mask airway. *Anesthesiology* 2009;110:262-5.
8. López AM, Valero R, Hurtado P, Gambús P, Pons M, Anglada T. Comparison of the LMA Supreme™ with the LMA ProSeal™ for airway management in patients anaesthetized in prone position. *Br J Anaesth* 2011;107:265-71.
9. Brimacombe J, Keller C. Laryngeal mask airway size selection in males and females: ease of insertion, oropharyngeal leak pressure, pharyngeal mucosal pressures and anatomical position. *Br J Anaesth* 1999;82:703-7.
10. Wong DT, Yang JJ, Jagannathan N. Brief review: The LMA Supreme™ supraglottic airway. *Can J Anaesth* 2012;59:483-93.
11. Maltby JR, Beriault MT, Watson NC, Liepert D, Fick GH. The LM. A-ProSeal is an effective alternative to tracheal intubation for laparoscopic cholecystectomy. *Can J Anaesth* 2002;49:857-62.
12. Cook TM, Woodall N, Frerk C. Major complications of airway management in the UK: results of the 4<sup>th</sup> National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: Anaesthesia. *Br J Anaesth* 2011;106:617-31.
13. Barreira SR, Souza CM, Fabrizia F, Azevedo AB, Lelis TG, Lutke C. Prospective, randomized clinical trial of laryngeal mask airway Supreme (®) used in patients undergoing general Anaesthesia. *Braz J Anesthesiol* 2013;63:456-60.
14. Maltby JR, Beriault MT, Watson NC, Liepert DJ, Fick GH. LMA Classic™ and LMA-ProSeal™ are effective alternatives to endotracheal intubation for gynecologic laparoscopy. *Can J Anaesth* 2003;50:71-7.
15. Van Esch BF, Stegeman I, Smit AL. Comparison of laryngeal mask airway vs tracheal intubation: a systematic review on airway complications. *J Clin Anesth* 2017;36:142-50.
16. Singam AP, Jaiswal AA, Chaudhari AR. Comparison of laryngeal mask airway supreme™ versus endotracheal intubation in positive pressure ventilation with muscle relaxant for intraoperative and postoperative conditions. *International Journal of Research in Medical Sciences* 2018;6:129-34.

17. Van Zundert A, Brimacombe J. The LMA Supreme™—a pilot study. *Anaesthesia* 2008;63:209-10.
18. Michalek P, Donaldson W, Vobrubova E, Hakl M. Complications associated with the use of supraglottic airway devices in perioperative medicine. *BioMed research international* 2015:13.
19. Cheon G, Siddiqui S, Lim T, *et al*. Thinking twice before using the LMA for obese and older patients—a prospective observational study. *J Anesth Clin Res*. 2013; 4:283.
20. Monteserín-Matesanz C, González T, Anadón-Baselga MJ, Zaballos M. Supreme™ laryngeal mask airway insertion requires a lower concentration of sevoflurane than ProSeal™ laryngeal mask airway insertion during target-controlled remifentanyl infusion: a prospective randomised controlled study. *BMC Anesthesiol* 2020; 20:5.

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