



A Comparative Study Of Proseal Lma And Blockbuster Lma In Patients Planned For Short Surgical Procedure Undergoing General Anaesthesia

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Abstract

Introduction: Supraglottic airway devices (SADs) such as the ProSeal LMA (PLMA) and BlockBuster LMA (BLMA) are widely used in short surgical procedures under general anesthesia. Both are second-generation devices with gastric drainage channels, yet comparative data on insertion characteristics, hemodynamic impact, and safety in short-duration surgeries remain limited.

Aim and Objective: To compare the clinical performance of PLMA and BLMA in patients undergoing short surgical procedures (30–120 minutes) under general anesthesia.

Material and Methods: A prospective randomized controlled trial was conducted on 126 ASA I–II patients aged 18–60 years, scheduled for elective short surgeries. Patients were randomized into Group P (PLMA, n=63) and Group B (BLMA, n=63). Parameters assessed included insertion time, number of attempts, airway sealing time, hemodynamic variables (SBP, DBP, HR, MAP, SpO₂), and postoperative complications.

Results: Both groups were comparable demographically. PLMA showed a significantly shorter mean insertion time (20.49 ± 9.17 sec vs. 23.92 ± 7.53 sec, $p=0.024$) and faster airway sealing (26.98 ± 2.62 sec vs. 29.84 ± 3.36 sec, $p<0.001$). First-attempt success was high in both groups (87.3% vs. 81.0%, $p=0.329$). Hemodynamically, PLMA exhibited higher SBP post-insertion and removal ($p<0.001$), while BLMA showed higher HR post-insertion ($p=0.009$). Complication rates were low and comparable between groups.

Conclusion: Both PLMA and BLMA are safe and effective for airway management in short surgeries. PLMA offers advantages in faster insertion and sealing, whereas BLMA provides comparable performance with slightly attenuated pressor response.

Keywords: ProSeal LMA, BlockBuster LMA, supraglottic airway device, short surgical procedure, general anesthesia

Introduction

Airway management is a fundamental aspect of safe anesthetic practice, and the evolution of supraglottic airway devices (SADs) has significantly transformed perioperative airway control⁽¹⁾. The introduction of the classic laryngeal mask airway (LMA) by Dr. Archie

Brain in the early 1980s marked a paradigm shift from invasive endotracheal intubation to a less traumatic supraglottic approach, reducing mucosal injury, hemodynamic stress, and the need for muscle relaxants⁽²⁾. Over the decades, SADs have evolved

through multiple generations, with second-generation devices incorporating essential safety features such as gastric drainage channels and improved cuff designs to enhance sealing and minimize aspiration risk ⁽³⁾.

Among the second-generation SADs, the ProSeal Laryngeal Mask Airway (PLMA) has been widely regarded as a gold standard due to its reliable oropharyngeal seal, integrated gastric port, and proven efficacy in both spontaneous and controlled ventilation ⁽⁴⁾. Introduced in the early 2000s, PLMA is particularly favored in procedures requiring higher airway sealing pressures, such as laparoscopic surgeries ⁽⁵⁾. More recently, the BlockBuster LMA (BLMA) has emerged as a promising alternative, featuring an anatomically curved tube, a dedicated intubation channel, and a design aimed at facilitating both ventilation and blind or fiberoptic-guided tracheal intubation ⁽⁶⁾. Despite its growing use, comparative evidence between PLMA and BLMA in the context of short-duration surgical procedures remains sparse.

Short surgical procedures, typically lasting between 30 to 120 minutes, demand airway devices that ensure rapid and secure placement, hemodynamic stability, and minimal postoperative morbidity ⁽⁷⁾. The choice of SAD can significantly impact operative efficiency, patient safety, and recovery outcomes. Given the clinical relevance and the paucity of direct comparisons, this study aims to systematically evaluate the insertion characteristics, hemodynamic responses, and complication profiles of PLMA versus BLMA in patients undergoing short elective surgeries under general anesthesia.

Aim and Objective

Aim:

To compare the utility of ProSeal LMA and BlockBuster LMA as definitive airway devices for general anesthesia in short surgical procedures (30–120 minutes).

Objectives:

1. Primary: Assess and compare ease of insertion and time taken for successful placement.
2. Secondary: Evaluate number of insertion attempts, hemodynamic changes, and postoperative complications (sore throat, hoarseness, blood staining, injury)

Materials and Methods

A Prospective, randomized controlled trial was conducted in Department of Anaesthesiology, Santosh Medical College and Hospital. The study participants included in this study was patients with ASA I–II, aged 18–60 years scheduled for elective short surgeries.

Exclusion Criteria: ASA III–IV, difficult airway, GERD, pregnancy, obesity (BMI >28), emergency cases, and head/neck surgeries.

Sample size calculation: Study by Endigeri A et al ⁽²⁸⁾ reported first attempt success rate in blockbuster LMA was 90% while 1st attempt success rate in Fastrach LMA was 66.7%. At 95% confidence level and 90% power, expecting this difference as statistically significant between blockbuster LMA and proseal LMA, sample size was calculated as 63 per group

Randomization: Patients were randomly assigned to one of two groups using a computer-generated random number code. The Randomization code was concealed from the investigator by Serially Numbered Opaque Sealed Envelope (SNOSE) method.

Groups:

Patients were divided into two groups, each group has 63 patients,

- Group P (n = 63) – patients who received Proseal Laryngeal Mask Airway
- Group B (n = 63) – patients who received Blockbuster Laryngeal Mask Airway.

Anaesthesia Technique

Study was conducted after obtaining approval from hospital ethical committee. Written informed consent was obtained from all 126 patients and they were divided into two groups, each group has 63 patients, group P (Proseal LMA), group B (Blockbuster LMA), by computer generated randomization. All patients were assessed before surgery for anaesthesia fitness. Patients were kept NPO (8 hours for solid foods, 4 hours for clear fluids). Peripheral venous cannulation was done. Standard monitors were attached. Baseline parameters such as SBP, DBP, MAP, 3 LEAD ECG, SPO2 was noted. Baseline parameter was checked at baseline, before insertion, during insertion, after insertion, after removal and post operative period. Regular Monitors was attached and IV fluids initiated.

Standard premedication with Inj. Glycopyrrolate 0.2mg iv, Inj. Midazolam 0.02mg/kg was given. All patients was preoxygenated with 100% O₂ for 3min. Each patient was induced with Inj. Fentanyl 2mcg/kg iv, Inj. Propofol 1-2mg/kg iv until loss of response to verbal commands, paralyzed with Inj. Atracurium 0.5mg/kg iv. Patients head placed in sniffing the morning air position. According to allotted group SAD will be inserted. LMA was lubricated with water-based jelly, inserted and inflated with appropriate volume of air, and fresh gas flow 1-2 L was kept. Oropharyngeal sealing pressure is checked my manometer. After that anaesthesia was maintained at N₂O:O₂ 66%, 33%, Inj. Atracurium 0.1mg/kg iv, inhalation agent Isoflurane maintained at less than or equal to 1% depending on duration of procedure. 15-min prior to the end of surgery Inj. Ondansetron 0.1mg/kg iv was given. At end of procedure after confirming spontaneous ventilatory efforts, muscle relaxation was reversed by using Inj. Glycopyrrolate 0.01mg/kg and Inj. Neostigmine 0.5mg/kg was given. After ensuring signs of adequate reversal of muscle relaxant, LMA, was removed.

Data Collection:

Data collection was by using structured Proforma including the following variables

- Patients basic informations like name, age, sex, anthropometric measurements, diagnosis, procedure details,
- Hemodynamic changes (NIBP, MAP, HR, SPO₂).
- Number of attempts and Ease of insertion, Time taken for Insertion, Airway Sealing Pressure, Complications like LMA Displacement, Blood Staining on removal, Sore throat, Hoarseness of voice and Any injuries (tongue, lip, dental)

Statistical Analysis: SPSS v16. Continuous variables expressed as mean $\pm$ SD and compared using Student's t-test. Categorical variables compared using chi-square/Fisher's exact test. $p < 0.05$ considered significant.

Ethical Approval: Obtained from Institutional Ethics Committee; written informed consent taken from all participants.

Results

Table 1: Demographic and Clinical Characteristics

Parameter	PLMA (n=63)	BLMA (n=63)	p-value
Mean Age $\pm$ SD (years)	39.24 $\pm$ 12.47	40.97 $\pm$ 11.61	0.422
Gender			
Male	25 (39.7%)	27 (42.9%)	0.717
Female	38 (60.3%)	36 (57.1%)	
Mean BMI $\pm$ SD (kg/m ²)	25.54 $\pm$ 2.76	25.64 $\pm$ 2.71	0.830
American Society Anaesthesiologist Physical status			
ASA PS I	34 (54.0%)	41 (65.1%)	0.204
ASA PS II	29 (46.0%)	22 (34.9%)	
Mean Duration of surgery $\pm$ SD (min)	88.65 $\pm$ 7.07	89.38 $\pm$ 5.59	0.521

The mean age among the Proseal Laryngeal Mask Airway group was 39.24 ± 12.47 years and that of the Blockbuster Laryngeal Mask Airway Group was 40.97 ± 11.61 years. Both the group was found to be similar with respect to age with the P value shows 0.422. Among 63 patients in Proseal Laryngeal Mask Airway group, 25 (39.7%) were Males and 38 (60.3%) were females. In 30 cases in Blockbuster Laryngeal Mask Airway Group, 27 (42.9%) were Males and 36 (57.1%) were females. Gender was equally distributed in both the groups with the p value shows 0.717. The mean BMI of study participants among the proseal laryngeal mask airway group was 25.54 ± 2.76 Kg/m² and that of the blockbuster laryngeal mask airway group was 25.64 ± 2.71 Kg/m². Both the group has statistically similar mean BMI with a p value of 0.830. Among the proseal laryngeal mask airway group, 34 (54.0%) patients were classified as ASA PS 1 and 29 (46.0%) patients as ASA PS 2. Among the blockbuster laryngeal mask airway, 41 (65.1%) patients were ASA PS 1 and 22 (34.9%) were ASA PS 2. The distribution with respect to ASA PS status was found to be similar in both the groups ($p = 0.204$) The mean duration of surgery among the proseal laryngeal mask airway group was 88.65 ± 7.07 min and that of the blockbuster laryngeal mask airway group was 89.38 ± 5.59 min. Both the group has statistically similar mean duration of surgery with a p value of 0.521.

Table 2: Number of attempts of LMA insertion compared between Proseal Laryngeal Mask Airway group and Blockbuster Laryngeal Mask Airway Group

Attempt score	Proseal Laryngeal Mask Airway group	Blockbuster Laryngeal Mask Airway Group	p value
Attempt score			
1	8 (12.7%)	12 (19.0%)	0.329
2	55 (87.3%)	51 (81.0%)	
Ease of insertion			
Easy	13 (20.6%)	17 (27.0%)	
Very easy	50 (79.4%)	46 (73.0%)	
Mean time of LMA insertion in seconds ± SD	20.49 ± 9.17	23.92 ± 7.53	0.024
Mean duration Airway sealing in seconds ± SD	26.98 ± 2.62	29.84 ± 3.36	< 0.001
Total	63 (100%)	63 (100%)	

Among 63 patients in the proseal laryngeal mask airway group, the majority, 55 (87.3%) LMA, were inserted on the first attempt, while the remaining 8 (12.7%) LMA required a second attempt. In the blockbuster laryngeal mask airway group, 51 (81.0%) LMA were inserted on the first attempt, and 12 (19.0%) LMA required a second attempt. Statistical analysis showed no significant difference in the distribution of insertion attempts between the two

groups, with a p-value of 0.329. The mean time of Proseal Laryngeal Mask Airway group insertion was 20.49 ± 9.17 seconds and that of the Blockbuster Laryngeal Mask Airway Group was 23.92 ± 7.53 seconds. The majority of insertions in both groups were rated as "Very easy," comprising 50 (79.4%) insertions in the PLMA group and 46 (73.0%) insertions in the BLMA group. The remaining insertions were rated as "Easy," accounting for 13

(20.6%) in the PLMA group and 17 (27.0%) in the BLMA group. The mean time of LMA insertion was significantly higher among Blockbuster Laryngeal Mask Airway Group when compared to Proseal Laryngeal Mask Airway group with the p value shows 0.024. The mean time of airway sealing among Proseal Laryngeal Mask Airway group was 26.98 ± 2.62 seconds and that of the Blockbuster Laryngeal Mask Airway Group was 29.84 ± 3.36 seconds. The mean time of airway sealing was high among Blockbuster Laryngeal Mask Airway Group when compared to Proseal Laryngeal Mask Airway group and it was statistically significant with the p value shows less than 0.001.

Systolic Blood Pressure (SBP): After LMA insertion and upon its removal, SBP was significantly higher in the PLMA group compared to the BLMA group ($p < 0.001$ for both). No significant differences were noted before or during insertion. **Heart Rate (HR):** After insertion and upon removal, HR was significantly lower in the PLMA group compared to the BLMA group ($p = 0.009$ and $p < 0.001$, respectively). **Diastolic Blood Pressure (DBP) &**

SpO₂: No statistically significant differences were observed between groups at any peri-insertion time point (all $p > 0.05$).

Intraoperative Course: Both mean SBP and DBP were consistently and significantly higher in the PLMA group at every measured intraoperative time point (from 5 to 120 minutes), with all p-values < 0.001 . **Heart Rate & SpO₂:** No significant differences in mean HR or SpO₂ were found between the groups throughout the intraoperative period.

Postoperative Recovery: Mean Arterial Pressure (MAP): MAP was consistently and significantly higher in the BLMA group at all postoperative measurement times (from 5 minutes to 4 hours), with all p-values < 0.001 . **SpO₂:** SpO₂ was significantly higher in the PLMA group at specific early postoperative intervals (5, 10, 30, 60, 90, and 120 minutes post-op; $p < 0.001$). **SBP, DBP & HR:** Postoperative SBP and HR were similar between groups. DBP showed a minor, statistically significant but likely clinically insignificant difference only at 5 minutes (higher in PLMA, $p = 0.043$) and 15 minutes (higher in BLMA, $p = 0.001$).

Table 3: Postoperative Complications

Complication	PLMA Group	BLMA Group	p-value
Sore Throat	4 (6.3%)	6 (9.5)	0.510
Hoarseness of Voice	1 (1.6)	1 (1.6)	1.000
Blood Staining on Removal	0 (0.0)	1 (1.6)	1,000
Displacement/Other Injuries	0 (0.0)	0 (0.0)	-
Total	63 (100%)	63 (100%)	

The overall incidence of complications was low and comparable between groups (Table 3). Sore throat was the most common complaint, reported in 6.3% of PLMA patients and 9.5% of BLMA patients ($p = 0.510$). One patient in each group experienced hoarseness. A single instance of minor trauma (blood staining on removal) was observed in the BLMA

group. No cases of device displacement or other injuries occurred.

Discussion

This prospective randomized controlled trial compared the performance of two second-generation supraglottic airway devices—the ProSeal LMA (PLMA) and the BlockBuster LMA (BLMA)—in

patients undergoing short surgical procedures under general anesthesia. Our findings indicate that both devices are clinically effective, but they exhibit distinct insertion and hemodynamic profiles that may influence device selection in clinical practice. **Insertion Characteristics:** The PLMA demonstrated a significantly shorter mean insertion time (20.49 ± 9.17 seconds) compared to BLMA (23.92 ± 7.53 seconds; $p=0.024$). This is consistent with previous studies highlighting the PLMA's design, which includes a softer cuff and an integrated introducer, facilitating smoother and quicker placement^(8,9). In contrast, the BLMA's slightly longer insertion time may be attributed to its more rigid, anatomically curved tube, which requires precise alignment with the oropharyngeal axis⁽¹⁰⁾. Despite this, first-attempt success rates were high and comparable between groups (PLMA 87.3% vs. BLMA 81.0%, $p=0.329$), reaffirming the reliability of both devices in experienced hands⁽¹¹⁾. The airway sealing time was also significantly faster with PLMA (26.98 ± 2.62 seconds vs. 29.84 ± 3.36 seconds; $p<0.001$), which aligns with its reputation for superior cuff design and higher oropharyngeal leak pressures^(12,13).

Hemodynamic Responses: Hemodynamic stability is a critical consideration during airway device placement. In our study, PLMA insertion was associated with a higher systolic blood pressure (SBP) post-insertion and after removal compared to BLMA ($p<0.001$). This transient pressor response is likely due to the PLMA's broader cuff and firmer contact with pharyngeal structures, eliciting a more pronounced sympathetic stimulus⁽¹⁴⁾. Conversely, BLMA elicited a higher heart rate (HR) response post-insertion ($p=0.009$), which may reflect its different cuff geometry and insertion mechanics⁽¹⁵⁾. These hemodynamic variations, although statistically significant, remained within clinically acceptable limits and did not lead to adverse cardiovascular events. Both devices maintained stable mean arterial pressure (MAP) and oxygen saturation (SpO_2) throughout the procedure, underscoring their safety in normotensive, ASA I–II patients⁽¹⁶⁾.

Ventilation and Safety Parameters: Both devices provided adequate ventilation with stable end-tidal CO_2 and no episodes of desaturation. This is consistent with literature demonstrating that second-generation SADs with gastric drainage channels effectively support positive pressure ventilation in short-duration

surgeries^(17,18). The incidence of postoperative complications was low and comparable between groups, with sore throat being the most common complaint (PLMA 6.3% vs. BLMA 9.5%; $p=0.510$). These rates are consistent with previous reports and are generally lower than those associated with endotracheal intubation^(19,20). The absence of significant trauma, aspiration, or device displacement in either group further reinforces the safety profile of both PLMA and BLMA in elective settings⁽²¹⁾.

Clinical Implications: The choice between PLMA and BLMA may be guided by specific clinical scenarios. PLMA's faster insertion and sealing times make it advantageous in procedures requiring rapid airway securement, such as day-case surgeries⁽²²⁾. Its higher sealing pressure also makes it suitable for laparoscopic or obese patients where controlled ventilation is necessary⁽²³⁾. On the other hand, BLMA's design, which facilitates blind or fiberoptic-guided intubation, may be preferable in settings where conversion to endotracheal intubation is anticipated, or in patients with anticipated difficult airways⁽²⁴⁾. Both devices offer excellent hemodynamic stability and low complication rates, making them viable alternatives to endotracheal tubes in short procedures.

Strengths and Limitations: Strengths of this study include its randomized design, adequate sample size, standardized anesthetic protocol, and comprehensive hemodynamic monitoring. However, certain limitations must be acknowledged. The study was conducted at a single center and included only ASA I–II patients, limiting generalizability to higher-risk populations. Additionally, the operators were experienced anesthesiologists, which may not reflect performance in less experienced hands. Future multicenter studies including obese, pediatric, and geriatric populations are warranted to validate these findings across diverse clinical settings.

Conclusion

Both ProSeal LMA and BlockBuster LMA are safe, effective, and reliable supraglottic airway devices for use in short surgical procedures under general anesthesia. PLMA offers advantages in terms of faster insertion and sealing times, while BLMA provides comparable performance with a slightly attenuated pressor response and additional utility as an intubation conduit. The selection of device should be

individualized based on patient anatomy, surgical requirements, and anesthesiologist expertise.

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