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Original Research Article

A Comparative Study of Clinical Performance of I-Gel and LMA Blockbuster in Adult Patients Undergoing General Anaesthesia

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Abstract:

Background: Endotracheal intubation is considered the gold standard for airway management, but it is associated with complications. Supraglottic airway devices (SGADs) such as I-GEL and LMA Blockbuster offer practical alternatives.

Aim and Objectives: This study aimed to compare the clinical performance of I-GEL and LMA Blockbuster in adult patients undergoing elective surgery under general anaesthesia. The primary objectives were to evaluate oropharyngeal leak pressure and hemodynamic changes, while secondary objectives included ease of insertion, insertion attempts, gastric tube placement, and postoperative complications.

Methods: This prospective, randomized study included 80 ASA I–II patients aged 18–65 years undergoing short-duration elective surgeries at SVBP Hospital, LLRM Medical College, Meerut. Patients were randomly allocated into two groups: Group A (I-GEL, n=40) and Group B (LMA Blockbuster, n=40). Outcome measures included insertion characteristics, oropharyngeal leak pressure (OLP), hemodynamic parameters, and postoperative complications. Statistical analysis was performed using SPSS v15.0, with $p<0.05$ considered significant.

Results: Baseline demographics (age, sex, BMI) were comparable between groups ($p>0.05$). Ease of insertion was similar in both groups (95% easy insertions), with first-attempt success in 97.5% of I-GEL cases versus 90% in Blockbuster cases ($p=0.166$). Hemodynamic parameters (HR, SBP, DBP, MAP, SpO_2) were stable and not significantly different. However, the LMA Blockbuster demonstrated significantly higher OLP (27.9 ± 1.97 cmH_2O) compared to I-GEL (22.3 ± 2.05 cmH_2O, $p<0.001$). Postoperative complications were minimal and comparable, with only mild sore throat and dysphagia reported.

Conclusion: Both I-GEL and LMA Blockbuster are safe and effective for airway management during elective surgeries. While overall performance was comparable, the LMA Blockbuster achieved higher sealing pressures, suggesting an advantage in situations requiring positive pressure ventilation.

Keywords: I-GEL, LMA Blockbuster, Supraglottic Airway Device, Oropharyngeal Leak Pressure, Hemodynamic Stability.

Introduction

Airway management is a fundamental skill for anesthesiologists and plays a crucial role in general anesthesia as well as in life-threatening conditions. It ensures adequate oxygenation and ventilation and is indispensable during cardiopulmonary resuscitation and critical care [1-3]

Endotracheal intubation has long been the gold standard; however, it is associated with complications such as dental and mucosal trauma, hemodynamic instability, and sore throat [2,3]. To address these limitations, supraglottic airway devices (SGADs) were introduced in 1983 [2,4].

I-GEL, a second-generation SGAD, is designed with a non-inflatable, anatomically shaped cuff made of soft thermoplastic elastomer. It incorporates an airway channel, gastric channel, bite block, and epiglottic blocker, and is available in seven sizes [5-7].

The LMA Blockbuster, introduced by Ming Tian in 2012, is a newer device with a 95° angulated tube, gastric suction port, integrated bite block, and a guiding channel for endotracheal intubation [8-10]. Comparative evaluation of these two devices is essential to guide clinical use.

This study was undertaken to compare I-GEL and LMA Blockbuster in terms of ease of insertion, OLP, insertion attempts, gastric tube placement, hemodynamic stability, and postoperative complications.

Materials and Methods

This prospective, randomized, comparative study was conducted at SVBP Hospital, affiliated with LLRM Medical College, Meerut, Uttar Pradesh, after obtaining approval from the Institutional Ethical Committee of Chaudhary Charan Singh University, Meerut. The study duration was 16 months (October 2023 to February 2025). A total of 80 patients, aged 18–65 years, belonging to American Society of Anesthesiologists (ASA) physical status I and II, of either sex, undergoing various elective surgeries under general anesthesia, were included following written informed consent.

Study Population: Patients who met the eligibility criteria were randomly assigned to two equal groups of 40 each using a computer-generated random number table. Group A consisted of patients in whom the I-GEL supraglottic airway device was used, while Group B included patients managed with the laryngeal mask airway (LMA) Blockbuster.

Eligibility Criteria

Inclusion Criteria: The study included adult patients of either sex, aged between 18 and 65 years, belonging to ASA physical status grade I or II. Eligible patients had a body mass index (BMI) between 18–25 kg/m², a Mallampati airway classification of grade I or II, and a mouth opening greater than 2.5 cm. Only hemodynamically stable patients scheduled for short-duration elective surgeries (1–2 hours) under general anesthesia were considered. All participants were enrolled after providing informed written consent.

Exclusion Criteria: Patients were excluded if they refused to participate, had a Mallampati grade III or IV airway, or presented with a mouth opening of less than 2.5 cm. Individuals with cervical spine pathology, or those with an anticipated high risk of aspiration such as hiatus hernia, full stomach, gastroesophageal reflux disease, or pregnancy, were also excluded. Additional exclusion factors included bleeding or coagulation disorders, uncontrolled hypertension, cardiac disease, upper respiratory tract infection, renal or hepatic impairment, and patients undergoing emergency surgeries. Furthermore, individuals with a history of obstructive sleep apnoea were not considered eligible.

Preoperative Preparation: All patients underwent a detailed pre-anesthetic evaluation, including general physical examination, systemic assessment, airway evaluation, and standard preoperative investigations (complete blood count, blood sugar, blood urea, serum creatinine, serum electrolytes, chest X-ray, and ECG). Patients were kept nil per os for 8 hours before surgery. Intravenous ranitidine (50 mg) and metoclopramide (10 mg) were administered 30 minutes before induction.

Anesthetic Technique: After shifting to the operating room, an intravenous (IV) line was secured with an 18G cannula, and Ringer's lactate infusion was started. Standard monitors (ECG, non-invasive blood pressure, SpO_2, $EtCO_2$) were attached, and baseline parameters were recorded.

Premedication included IV midazolam (0.02 mg/kg), ondansetron (0.1 mg/kg), and glycopyrrolate (0.005 mg/kg). Patients were pre-oxygenated with 100% oxygen for 5 minutes. Anaesthesia was induced with IV fentanyl (2 µg/kg) and propofol (2 mg/kg, titrated until loss of eyelash reflex and adequate jaw relaxation). Neuromuscular blockade was achieved with vecuronium (0.1 mg/kg).

The supraglottic device (I-GEL or LMA Blockbuster, as per group allocation) was lubricated with water-soluble jelly before insertion. I-GEL was inserted in the sniffing position, while the LMA Blockbuster was inserted with the cuff fully deflated in the neutral head position. After placement, correct positioning was confirmed by bilateral chest rise, equal air entry on auscultation, and a square-wave capnograph trace. Devices were secured with adhesive tape, and a lubricated nasogastric tube (14–16 FG) was introduced via the gastric channel.

Anesthesia was maintained with isoflurane (0.6–0.8%) in a 50:50 oxygen–nitrous oxide mixture, along with intermittent doses of vecuronium (0.01 mg/kg). Mechanical ventilation was initiated with a tidal volume of 6–8 ml/kg and a respiratory rate of 14 breaths per minute.

At the end of surgery, anesthetic gases were discontinued, and residual neuromuscular blockade was reversed with neostigmine (0.05 mg/kg) and glycopyrrolate (0.01 mg/kg). Devices were removed once patients were fully awake and able to respond to verbal commands. Postoperative monitoring continued for 24 hours.

Outcome Measures: The primary outcomes of the study included insertion time, defined as the duration from picking up the device to the confirmation of adequate ventilation by capnography, and oropharyngeal leak pressure (OLP), which was measured by closing the expiratory valve at 30 cm H_2O with a fresh gas flow of 4 L/min and auscultating for an audible leak at the mouth or trachea. Secondary outcomes comprised the ease of insertion, assessed on a standardized scale as excellent, satisfactory, or poor, along with the first-attempt success rate. Postoperative complications such as sore throat, cough, nausea,

vomiting, and hoarseness were recorded immediately after device removal and subsequently at 1, 4, and 8 hours. Hemodynamic parameters, including heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, SpO_2, and $EtCO_2$, were also monitored and recorded at baseline, after induction, at 1, 3, and 5 minutes, and then every 15 minutes throughout the intraoperative period.

Statistical Analysis: Data were analyzed using SPSS Version 27.0 (SPSS Inc., Chicago, USA). Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as numbers and percentages. Comparisons of means between the two groups were performed using the Student's t-test, whereas categorical variables were analyzed using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

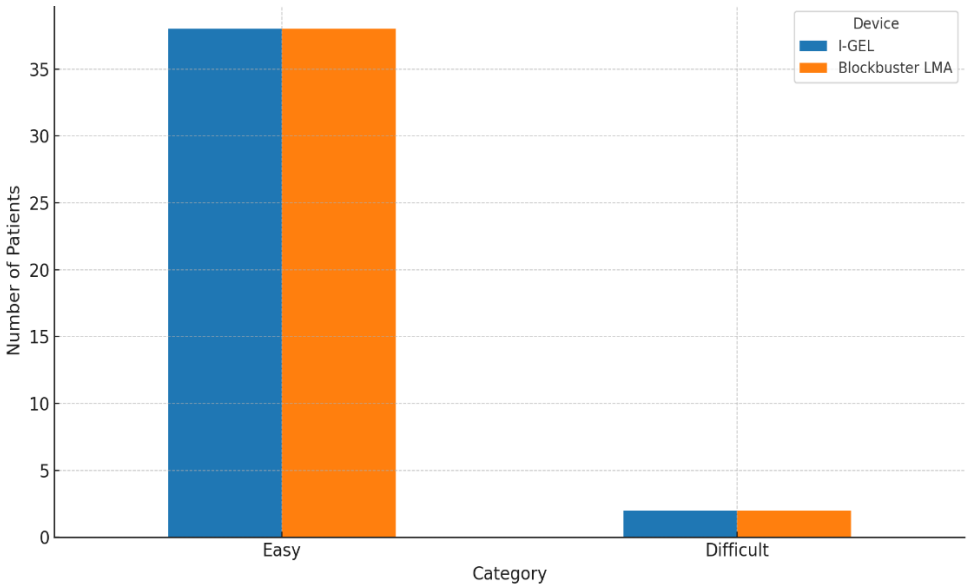
Results

A total of 80 patients were enrolled in the study and randomly allocated into two equal groups: Group A (I-GEL, n=40) and Group B (LMA Blockbuster, n=40). Both groups were comparable with respect to demographic variables such as age, sex, and BMI, with no statistically significant difference (p>0.05).

Ease of Insertion and Attempts: The majority of insertions were graded as easy in both groups (95%). Only 5% of cases in each group experienced some difficulty. First-attempt success was observed in 97.5% of patients in the I-GEL group compared to 90% in the LMA Blockbuster group; however, the difference was not statistically significant (p=0.166).

Table 1: Ease of insertion and insertion attempts

Parameter	I-GEL (n=40)	LMA Blockbuster (n=40)	p-value
Ease of insertion – Easy	38 (95.0%)	38 (95.0%)	1.000
Ease of insertion – Difficult	2 (5.0%)	2 (5.0%)	
1st Attempt Success	39 (97.5%)	36 (90.0%)	0.166
2nd Attempt	1 (2.5%)	4 (10.0%)	



Graph 1: Ease of insertion in both groups

Airway Sealing Pressure: A significant difference was observed in mean airway sealing pressure between the two devices. The LMA Blockbuster demonstrated a higher mean sealing pressure (27.9 ± 1.97 cmH_2O) compared to I-GEL (22.3 ± 2.05 cmH_2O), and this difference was very highly significant (p<0.001).

Table 2: Comparison of airway sealing pressure

Group	Mean ± SD (cmH_2O)	p-value
I-GEL	22.30 ± 2.05	
LMA Blockbuster	27.90 ± 1.97	<0.001

Device-Related Complications: Overall, complications were infrequent and comparable across groups. Mild dysphagia was reported in 7.5% of patients with I-GEL compared to 5% with LMA

Blockbuster. Mild sore throat occurred in 5% of LMA Blockbuster cases versus 2.5% in I-GEL. Blood staining of the device was noted in 7.5% of patients in both groups. No cases of regurgitation, aspiration, bronchospasm, laryngospasm, or trauma to the teeth/lips were observed.

Table 3: Device-related complications

Complication	I-GEL (n=40)	LMA Blockbuster (n=40)	p-value
Blood in the device	3 (7.5%)	3 (7.5%)	1.000
Dysphagia/Dysphonia	3 (7.5%)	2 (5.0%)	0.644
Sore throat (1h/24h)	1 (2.5%)	2 (5.0%)	0.556
Other complications	0	0	–

Hemodynamic Parameters: There were no statistically significant differences between the groups with respect to pulse rate, systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and SpO_2 at any of the observed time intervals ($p>0.05$). Both I-GEL and LMA Blockbuster maintained comparable hemodynamic stability during anesthesia.

Discussion

Our findings showed that both devices were comparable in terms of ease of insertion and first-attempt success. This agrees with earlier studies where I-GEL has been shown to provide high insertion success rates due to its non-inflatable cuff and anatomically contoured design [1,11,12]. Khare et al [10] and Prerna et al [11] similarly reported high success with both devices, with LMA Blockbuster occasionally showing shorter insertion times.

A key finding was the significantly higher oropharyngeal leak pressure with the LMA Blockbuster compared to the I-GEL. This correlates with earlier trials where Blockbuster and other cuffed LMAs demonstrated superior sealing pressures [8,9,12]. Chang et al. compared I-GEL with LMA Protector and reported higher sealing pressures with the latter, attributing it to better tissue contact [12]. Chew et al. also noted similar findings with LMA Supreme [13]. Damodaran et al. found that while I-GEL had adequate OLP, devices like Air-Q and LMA Supreme produced higher sealing pressures [14].

Hemodynamic stability was comparable between groups in our study. This is in line with Singh et al., who showed minimal hemodynamic differences with I-GEL and Proseal LMA compared to endotracheal intubation [15]. Sabuncu et al. also observed that I-GEL and AuraGain maintained stable cardiovascular parameters during laparoscopic surgery [16].

Regarding gastric tube insertion, our results showed easy insertion with both devices, with occasional difficulty in the I-GEL. Previous research confirms this, with Damodaran et al. [14] and Chauhan et al. noting that I-GEL generally allows smoother gastric tube passage than Proseal or Blockbuster. However, Singh et al. [15] found insertion times could be longer with I-GEL compared to Proseal or Supreme LMA.

Postoperative complications were minimal and comparable. Sore throat was slightly more common with Blockbuster (5% vs 2.5%), consistent with studies where cuffed LMAs induced more mucosal pressure than cuffless I-GEL [16,17]. Blood staining was rare, aligning with findings of Liew et al. [17], who reported lower mucosal trauma with I-GEL compared to cuffed devices.

Conclusion

This study demonstrated that both I-GEL and LMA Blockbuster are safe and effective supraglottic airway devices for airway management in adult patients undergoing elective surgeries under general anaesthesia. The two devices were comparable in terms of ease of insertion, first-attempt success, hemodynamic stability, oxygenation, and the incidence of postoperative complications. Notably, the LMA Blockbuster provided a significantly higher mean oropharyngeal leak pressure than the I-GEL, suggesting superior airway sealing and potentially greater protection against aspiration. These findings support the continued use of both devices as reliable alternatives to endotracheal intubation in appropriately selected patients, with I-GEL offering the advantages of atraumatic, cuffless insertion and comfort. At the same time, the LMA Blockbuster may be more beneficial in situations requiring higher sealing pressures or when used as a conduit for intubation. The study, however, was limited by its single-centre design, modest sample size, and inclusion of only ASA I–II patients undergoing short-duration procedures, with postoperative complications assessed for only 24 hours. Based on these results, both devices should be regarded as viable options for routine airway management, and training programs should emphasize proficiency in their use to ensure optimal outcomes. Routine monitoring for postoperative adverse events is advised, and future large, multicentric studies involving high-risk and difficult airway patients are warranted to validate these findings. Further comparative trials with other second-generation supraglottic devices may also help establish the broader clinical role of the LMA Blockbuster.

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