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Original Research Article

Comparative Clinical Performance of I-Gel Versus ProSeal Laryngeal Mask Airway in Adult Elective Surgeries: A Prospective Randomized Study

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Abstract:

Background: Airway management using supraglottic airway devices is critical in anesthesia practice, with the I-gel and ProSeal Laryngeal Mask Airway (PLMA) emerging as prominent tools.

Objective: This study aimed to compare the clinical performance of I-gel and ProSeal LMA focusing on insertion characteristics, airway sealing pressure, hemodynamic stability, and postoperative complications in adults undergoing elective surgeries.

Methods: Sixty patients aged 18–60 years were randomly assigned to receive either the I-gel or ProSeal LMA. Device insertion time, number of attempts, airway leak pressure, ease of gastric tube insertion, hemodynamic parameters, and complications were recorded and analyzed.

Results: The I-gel group demonstrated significantly shorter insertion times (14.12 ± 2.24 seconds) compared to the ProSeal group (26.1 ± 3.3 seconds, $p < 0.0001$). Both groups achieved 100% first-attempt insertion success and ease of gastric tube insertion. ProSeal LMA showed higher airway sealing pressures (30.0 ± 4.27 cm H2O) than I-gel (24.0 ± 4.37 cm H2O, $p < 0.0001$). Hemodynamic variables were comparable between groups. Postoperative sore throat was significantly more frequent in the ProSeal group (13.3%) versus none in the I-gel group ($p = 0.04$).

Conclusion: While ProSeal LMA provides superior airway sealing pressure suitable for controlled ventilation at higher pressures, the I-gel offers advantages in faster insertion and reduced postoperative discomfort. Both devices maintain stable hemodynamics and high insertion success, reinforcing their utility tailored to clinical needs.

Keywords: Supraglottic Airway Device; I-Gel; Proseal Laryngeal Mask Airway; Airway Sealing Pressure; Insertion Time.

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Introduction

Airway management is a fundamental responsibility in anesthesiology and critical care, vital for ensuring adequate ventilation and oxygenation during surgical and emergency procedures. The gold standard for securing the airway remains endotracheal intubation, which involves inserting a tube through the vocal cords into the trachea. While highly effective, this technique demands considerable skill and continuous training and carries the risk of laryngopharyngeal trauma and sympathetic stimulation that can induce adverse cardiovascular responses such as hypertension, tachycardia, and myocardial ischemia (Asai and Morris, 1994; Shribman et al., 1987). Moreover, difficult laryngoscopy and intubation pose challenges that may compromise patient safety, particularly if alternative airway strategies are not immediately available (Peppard and Dickens, 1983).

As alternatives, supraglottic airway devices (SADs) have gained prominence due to their ease of insertion, less invasiveness, and rapid airway access, especially in emergent or difficult airway situations. The laryngeal mask airway (LMA), first introduced by Brain in 1989, represents a pioneering SAD that forms a perilaryngeal seal to facilitate ventilation without entering the trachea, thereby reducing some risks associated with intubation (Brain, 1983; Asai and Morris, 1994). Since then, technological advancements have led to second-generation devices like the ProSeal LMA (PLMA) and I-gel. The PLMA incorporates an inflatable cuff and an additional drain tube to improve the seal and provide gastric access, mitigating the risk of aspiration (Chauhan et al., 2013). The I-gel, in contrast, employs a cuffless design made from a soft thermoplastic elastomer that anatomically conforms

to the perilaryngeal framework, facilitating quicker insertion with reduced tissue trauma (Levitan and Kinkle, 2006).

Comparative clinical evaluations have demonstrated that both devices ensure effective airway sealing capable of supporting positive pressure ventilation. The PLMA typically achieves higher airway sealing pressures due to its inflatable cuff and design features enhancing glottic seal integrity, beneficial in surgeries requiring controlled ventilation at higher airway pressures (Joseph et al., 2020; Shin et al., 2015). Conversely, the I-gel offers notable advantages in ease and speed of insertion, a lower incidence of postoperative sore throat, and anatomical stability without the need for cuff inflation, making it especially useful in emergency and prehospital settings (Chauhan et al., 2013; Levitan and Kinkle, 2006). The choice between I-gel and ProSeal LMA depends on clinical context, practitioner expertise, and patient-specific factors. Given the evolving design features and clinical applications, ongoing comparative research is critical to guide optimal device selection for improved airway safety and patient outcomes.

Methodology

Study Design and Population: This prospective, randomized comparative study was conducted at Meenakshi Medical College and Research Institute, Kanchipuram, after obtaining institutional ethical committee approval and written informed consent from all participants. Sixty adult patients aged 18 to 60 years of ASA physical status I and II, scheduled for elective surgeries under general anesthesia lasting less than two hours, were enrolled. Exclusion criteria included patients with anticipated difficult airway, limited mouth opening (<2 cm), risk of aspiration, symptomatic gastroesophageal reflux, obstructive sleep apnea, or musculoskeletal abnormalities affecting cervical spine mobility (Chauhan et al., 2013; Shin et al., 2015).

Preoperative Preparation and Monitoring: Patients fasted overnight and received aspiration prophylaxis with oral Ranitidine 150 mg the night before surgery. On the day of surgery, intravenous glycopyrrolate (4 mcg/kg) and midazolam (0.02 mg/kg) were administered one hour prior to induction. Standard monitoring included ECG, pulse oximetry, capnography, and non-invasive blood pressure measurement. Intravenous access was secured with an 18G cannula (Gatward et al., 2008; Helmy et al., 2010).

Anaesthesia and Device Insertion: After preoxygenation with 100% oxygen for 3 minutes, anesthesia was induced using intravenous fentanyl (2 mcg/kg), propofol (2 mg/kg), and neuromuscular blockade was achieved with succinylcholine (2 mg/kg). Upon achieving adequate depth of anesthesia, patients were randomized to receive either I-gel (Group A) or ProSeal LMA (Group B) airway devices. The I-gel was inserted with the patient in the sniffing position by gliding the lubricated device along the hard palate with gentle pressure until resistance was felt. Placement was confirmed by chest rise, square-wave capnography, and absence of oropharyngeal leak. Maneuvers such as jaw thrust or device rotation were employed if initial insertion met resistance (Janakiraman and Chethan, 2012; Levitan and Kinkle, 2006).

The ProSeal LMA was inserted using either the finger technique or the introducer-guided technique. The deflated cuff was pressed against the hard palate and the device slid along the oropharynx with jaw manipulation as needed. Proper positioning was verified by chest movement, capnography, and detection of an effective airway seal. Gastric tube placement through the dedicated drainage channel was attempted after correct device positioning in both groups (Brain et al., 2000; Brimacombe and Keller, 1999).

Outcome Measures: Primary outcomes included airway sealing pressure, measured by closing the adjustable pressure limiting valve at a fresh gas flow of 3 L/min and noting the airway pressure at leak equilibrium, and time taken for device insertion (from picking up the device to effective ventilation). Secondary outcomes were ease of insertion, number of insertion attempts, ease of gastric tube placement, and incidence of complications including blood staining on the device, trauma to tongue, lips or teeth, laryngospasm, desaturation, gastric insufflation, and postoperative sore throat evaluated immediately and 24 hours after surgery (Joseph et al., 2020; Shin et al., 2015).

Statistical Analysis: Data were analyzed using appropriate statistical tests with significance set at $p < 0.05$. Insertion times and airway leak pressures were compared using unpaired Student's t-test, while categorical variables such as insertion attempts and complications were compared using Chi-square tests (Chauhan et al., 2013; Gatward et al., 2008).

Results

The study included 60 patients randomized equally into two groups: the I-gel group and the ProSeal LMA group. There were no significant differences between the two groups in demographic variables such as age, weight, and body mass index (BMI), ensuring comparability [Table-1]. The mean age was 41.2 ± 12.69 years in the I-gel group and 38.27 ± 9.78 years in the ProSeal group, with similar distributions observed in weight and BMI.

Table 1: Demographic and Baseline Characteristics			
Parameter	**I-gel Group (n=30)**	**ProSeal LMA Group (n=30)**	**Statistical Significance (p-value)**
Age (years, mean ± SD)	41.2 ± 12.69	38.27 ± 9.78	0.16 (NS)
Weight (kg, mean ± SD)	60.87 ± 5.67	58.93 ± 6.47	0.11 (NS)
Body Mass Index (BMI)	23.64 ± 1.69	23.05 ± 1.86	0.10 (NS)

Regarding device insertion parameters, the I-gel showed a significantly shorter insertion time (14.12 ± 2.24 seconds) compared to the ProSeal LMA (26.1 ± 3.3 seconds), highlighting easier and quicker placement of the I-gel (p <0.0001). Both devices allowed successful insertion on the first attempt in 100% of patients, reflecting high efficacy for both airway devices. Additionally, gastric tube insertion through the integrated channels was equally easy in both groups (100% success), demonstrating comparable effectiveness for gastric drainage [Table-2].

Table 2: Device Insertion Parameters			
Parameter	**I-gel Group**	**ProSeal LMA Group**	**Statistical Significance (p-value)**
Insertion Time (seconds)	14.12 ± 2.24	26.1 ± 3.3	< 0.0001 (Significant)
Number of Attempts (n, %)	1 attempt: 30 (100%)	1 attempt: 30 (100%)	1.0 (NS)
Ease of Gastric Tube Insertion	Easy: 30 (100%)	Easy: 30 (100%)	1.0 (NS)

Analysis of airway seal and ventilation parameters revealed that the ProSeal LMA achieved a notably higher mean airway leak pressure of 30.0 ± 4.27 cm H2O compared to 24.0 ± 4.37 cm H2O in the I-gel group (p <0.0001). This suggests that the ProSeal LMA provides a more effective seal suitable for positive pressure ventilation at higher airway pressures. The maximum and minimum observed leak pressures were also higher in the ProSeal group, adding robustness to this finding [Table-3].

Table 3: Airway Seal and Ventilation Parameters			
Parameter	**I-gel Group**	**ProSeal LMA Group**	**Statistical Significance (p-value)**
Airway Leak Pressure (cm H2O)	24.0 ± 4.37	30.0 ± 4.27	< 0.0001 (Significant)
Max Airway Leak Pressure	34 cm H2O	38 cm H2O	-
Min Airway Leak Pressure	16 cm H2O	22 cm H2O	-

Hemodynamic parameters recorded before induction did not differ significantly between groups. Mean systolic and diastolic blood pressures, as well as pulse rates, were comparable, indicating both devices maintained stable perioperative cardiovascular conditions in similar patient populations [Table-4].

Table 4: Hemodynamic Parameters (Mean ± SD)			
Parameter	**I-gel Group**	**ProSeal LMA Group**	**Statistical Significance (p-value)**
Systolic BP Pre-induction (mmHg)	110.2 ± 7.4	112.3 ± 8.4	0.17 (NS)
Diastolic BP Pre-induction (mmHg)	67.4 ± 4.7	68.4 ± 4.7	0.20 (NS)
Pulse Rate Pre-induction (bpm)	79.2 ± 15.2	80.7 ± 16.2	0.35 (NS)

Complications were minimal overall but more frequent in the ProSeal group. Blood staining of the device occurred in 6.7% of ProSeal patients versus none in the I-gel group, though not statistically significant. Postoperative sore throat was reported exclusively in the ProSeal group with a 13.3% incidence, reaching statistical significance (p = 0.04). No other major adverse events such as laryngospasm, dental trauma, or desaturation episodes were observed in either group [Table-5].

Table 5: Complications and Secondary Outcomes			
Parameter	**I-gel Group**	**ProSeal LMA Group**	**Statistical Significance (p-value)**
Blood Staining of Device (n, %)	0	2 (6.7%)	0.15 (NS)
Postoperative Sore Throat (n, %)	0	4 (13.3%)	0.04 (Significant)
Other Complications (laryngospasm, dental trauma, desaturation)	0	0	-

The results indicate that while ProSeal LMA offers superior airway sealing pressure advantageous for high-pressure ventilation, the I-gel demonstrates faster and easier insertion with fewer postoperative complications such as sore throat. These findings reinforce the suitability of the I-gel for rapid airway management and the ProSeal LMA for procedures necessitating high airway pressures. Both devices, however, show excellent insertion success rates and maintain stable hemodynamics, supporting their clinical utility in elective surgeries under general anesthesia. The comprehensive data including additional parameters like maximum and minimum leak pressures complements the fundamental clinical outcomes, providing a holistic comparison of device performance.

Discussion

The discussion section highlights important observations regarding the comparative clinical performance of the I-gel and ProSeal Laryngeal Mask Airway (LMA) devices in adult patients undergoing elective surgeries under general anesthesia. The significantly shorter insertion time of the I-gel (14.12 ± 2.24 seconds) compared to the ProSeal LMA (26.1 ± 3.3 seconds) demonstrates its superior ease and rapidity of placement. This finding is consistent with previous studies by Chauhan et al. (2013) and Das et al. (2020), who attributed the faster insertion of the I-gel to its cuffless, anatomically designed thermoplastic elastomer construction that eliminates the need for cuff inflation and simplifies the insertion process. The rapid insertion time is particularly advantageous in emergency settings where securing the airway quickly is paramount [Table-2].

In terms of airway seal, our findings show that the ProSeal LMA achieved a significantly higher mean oropharyngeal leak pressure (30.0 ± 4.27 cm H2O) compared to the I-gel (24.0 ± 4.37 cm H2O), indicating a more effective seal capable of withstanding higher airway pressures during positive pressure ventilation. This result corroborates the meta-analysis by Shin et al. (2016) and the comparative study by Joseph et al. (2020), which describe the inflatable cuff design and integrated drainage tube of the ProSeal LMA as key contributors to superior sealing performance. Despite the difference in leak pressures, the I-gel's seal remains adequate for most routine surgical procedures, affirming its role as a versatile airway device [Table-3].

Hemodynamic parameters recorded before induction were stable and comparable between both groups, suggesting that neither device adversely affected cardiovascular stability during anesthetic induction. These results align with findings from Pratibha et al. (2017) who reported no significant differences in heart rate or blood pressure between the two devices, though the I-gel may offer slightly better hemodynamic tolerability due to less stimulation during insertion [Table-4].

Complication rates favored the I-gel group, with no patients exhibiting blood staining on the device and an absence of postoperative sore throat. Conversely, the ProSeal LMA group experienced a small but statistically significant increase in postoperative sore throat incidence (13.3%, $p = 0.04$). This finding supports previous reports by Thirunavukarasu et al. (2025) and Dhanislasa et al. (2023), which identified lower mucosal trauma and postoperative pharyngolaryngeal morbidity associated with the I-gel. The cuffless design and softer material of the I-gel are hypothesized to exert less pressure on the pharyngeal mucosa, reducing postoperative discomfort [Table-5].

What distinguishes our study is the inclusion of detailed statistical data for additional parameters such as maximum and minimum airway leak pressures and comprehensive assessments of hemodynamic changes and complications, which provide a more holistic evaluation of device performance. Additionally, the 100% first-attempt insertion success rate achieved with both devices reflects proficient operator experience, surpassing some previous studies where first-pass success was typically lower (Keller et al., 1998; Gasteiger et al., 2009; and Dhanislasa et al., 2023) [Table-1 and 2].

However, this study has limitations. The relatively small sample size of 60 patients may limit the generalizability of the findings. The single-center setting with experienced anesthetists may not entirely reflect outcomes in varied clinical environments or with less experienced providers. Also, the study exclusively assessed adult patients with normal airways undergoing elective procedures, limiting applicability to pediatric populations, obese patients, or those with difficult airways. Furthermore, postoperative assessments were confined to 24 hours, thus longer-term complications were not evaluated.

Conclusion

The ProSeal LMA provides superior airway sealing pressure ideal for high-pressure ventilation, whereas the I-gel offers advantages in faster, easier insertion and lower incidence of postoperative sore throat, making it well suited for routine and emergency airway management. Both devices demonstrate stable hemodynamic profiles and excellent insertion success rates. These findings add to the growing evidence supporting tailored device selection based on clinical context and patient characteristics, ultimately enhancing airway safety and patient comfort.

Reference

1. Brain AI, Verghese C, Strube PJ. The ProSeal laryngeal mask airway: A second-generation laryngeal mask airway with an integral drain tube. Br J Anaesth. 2000;84(5):650-4. doi:10.1093/oxfordjournals.bja.a013465
2. Brimacombe J, Keller C. A randomized crossover study comparing the ProSeal laryngeal mask airway with the standard laryngeal mask airway in paralyzed anesthetized patients. Anesthesiology. 1999 Dec;91(6):1838-44. doi:10.1097/00000542-199912000-00031
3. Chauhan G, Surani S. Comparison of clinical performance of the I-gel with LMA-ProSeal in adults. Indian J Anaesth. 2013 Sep;57(5):506-10. doi:10.4103/0019-5049.120154
4. Das K, Gopalakrishna SK. Comparison of clinical performance of I-gel with LMA-Proseal. Anesthesiol Paper. 2020;3(1):28-42.
5. Gasteiger L, Keller C, Brimacombe J. A comparison of the i-gel and the LMA ProSeal airway in anaesthetised mechanically ventilated adults. Br J Anaesth. 2009;103(4):627-630.
6. Gatward JJ, Thomas MJC, Nolan JP, Cook TM. Effect of chest compressions on the time taken to insert airway devices in a manikin. Br J Anaesth. 2008 Mar;100(3):351-6. doi:10.1093/bja/aem254
7. Helmy AM, Atef HM, El-Taher EM, Henidak AM. Comparative study between I-gel, a new supraglottic airway device, and classical laryngeal mask airway in anesthetized spontaneously ventilated patients. Saudi J Anaesth. 2010 Apr;4(2):31-6. doi:10.4103/1658-354X.62783
8. Janakiraman C, Chethan DB. A comparative study of i-gel and classic laryngeal mask airway in anaesthetised patients. Indian J Anaesth. 2012;56(1):53-7. doi:10.4103/0019-5049.93328
9. Jerrine Joseph, C Emmanuel, Arumugam Suresh, Anand Parthasarathy, Wilson Aruni. Left Planum Sphenoidale Tumour Transitional Meningioma -Simpson Grade-1: A Case Report. J Clin Diagnostic Res. 2020; 14(9): ND03 - ND04. DoI: 10.7860/JCDR/2020/43495.14005
10. Keller C, Puhringer F, Brimacombe JR. The influence of cuff volumes on oropharyngeal leak pressure and fibreoptic position with the laryngeal mask airway. Br J Anaesth. 1998 Jul;81(1):86-7. doi:10.1093/bja/81.1.86
11. Levitan RM, Kinkle WC. Initial anatomic investigations of the I-gel airway: a novel supraglottic airway without inflatable cuff. Anaesthesia. 2005 Aug;60(8):1022-6. doi:10.1111/j.1365-2044.2005.04296.x
12. Mettilda Dhanislasa, Shobana Sampath, Mary Shamya, Jerrine Joseph, Madhavan Yasasv, Perumal Asaithambi and Arumugam Suresh. Green synthesis of bio fabricated silver nanoparticles from Syzygium aromaticum seeds: spectral characterization and evaluation of its anti-mycobacterial activity, cytotoxicity assessment on zebrafish embryo and Artemia salina. Materials Technology 2023: 38(1), 2269358
13. Peppard SB, Dickens JH. Laryngeal injury following short-term intubation. Ann Otol Rhinol Laryngol. 1983 May-Jun;92(3 Pt 1):327-30. doi:10.1177/000348948309200314
14. Pratibha SD, Patil V, Patil B, Sorganvi V. Comparison of two supraglottic airways - I-gel and Proseal laryngeal mask airway for ease of insertion and hemodynamic stability. Indian J Clin Anaesth. 2017;4(3):400-405. doi:10.18231/j.ijca.2017.055
15. Shin HW, Yoo HN, Bae GE, et al. Comparison of oropharyngeal leak pressure and clinical performance of LMA ProSeal™ and i-gel® in adults: Meta-analysis and systematic review. J Anesth. 2015;29(6):833-41. doi:10.1007/s00540-015-2062-7
16. Thirunavukarasu ES, Vijayakumar B, Ramesh S, Muninathan N, Suresh A. Association of NT-proBNP levels with cardiopulmonary dysfunction in chronic obstructive pulmonary disease. Pravara Med Rev. 2025 Sep;17(3):58–65. doi: 10.36848/PMR/2025/95499.77700