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COMPARISON BETWEEN I-GEL PLUS AND PROSEAL LMA AS SUPERIOR CONDUITS FOR FIBEROPTIC INTUBATION: AN INTERVENTIONAL COHORT STUDY

DR. ANNA MAGDALENE JOSEPH POST GRADUATE),
DR. RUBA VIKNESH (SENIOR RESIDENT) ,
DR. LATHA. N(PROFESSOR), DR. YACHENDRA VSG (PROFESSOR)

SAVEETHA MEDICAL COLLEGE, SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES

INTRODUCTION

Effective airway management is a cornerstone of safe anesthesia practice, particularly in the context of difficult intubation, which occurs in approximately 1–8% of general anesthesia cases. Failure to secure the airway promptly can lead to significant morbidity and mortality. In such scenarios, supraglottic airway devices (SGADs) serve as valuable tools—not only for ventilation but also as conduits for fiberoptic-guided tracheal intubation, offering a less invasive alternative to direct laryngoscopy or surgical airway access. The ideal SGAD conduit should allow easy placement, provide a stable and centered view of the glottis, and facilitate smooth passage of a fiberoptic bronchoscope and endotracheal tube. Among the available SGADs, the ProSeal laryngeal mask airway (LMA) and the i-gel Plus are widely used second-generation devices, each with unique design features.

The ProSeal LMA is characterized by an inflatable cuff and a gastroesophageal drainage channel, which improves sealing pressure and reduces the risk of aspiration. However, its inflatable cuff may require more precise placement and cuff pressure monitoring, potentially complicating its use in emergency or time-sensitive settings.

The i-gel Plus, an advanced version of the original i-gel, features a non-inflatable, thermoplastic elastomer cuff designed to mirror the anatomical shape of the pharyngeal structures. This provides a secure, stable seal without the need for cuff inflation. The device also includes an enlarged gastric channel, fixation tabs, and improved ergonomics to enhance its utility as a conduit for intubation. Its anatomical design is particularly advantageous for achieving optimal glottic alignment, making it well-suited for fiberoptic navigation.

Given the critical role of SGADs in difficult airway scenarios, this study aims to compare the i-gel Plus and the ProSeal LMA in terms of their performance as conduits for fiberoptic-guided endotracheal intubation, evaluating parameters such as intubation time, glottic visualization, ease of scope passage, and associated complications. The goal is to identify which device provides more reliable and efficient airway access in elective surgical patients, thereby informing clinical practice and airway management protocols.

Materials and Methods

- Study Design: Interventional cohort study
  Sample Size: 40 adult patients (ASA I–II), aged 18–65 years, undergoing elective surgical procedures under general anesthesia requiring intubation.

  Groups:
  - Group I (n=20): i-gel Plus
  - Group P (n=20): ProSeal LMA

  Inclusion criteria

- Adults aged 18–65 years undergoing elective surgery with fibreoptic-guided intubation.

- ASA physical status I–III.
- Patients with predicted or known difficult airways.
- Need for a supraglottic airway device (SGAD) as an intubation conduit.
- Provided informed consent.

Exclusion criteria

- Age <18 or >65 years.
- Contraindications to SGAD use (e.g., aspiration risk, GERD, pregnancy).
- Upper airway pathology, trauma, or obstruction.
- Severe cardiopulmonary instability or coagulopathy.
- History of airway surgery or anatomical issues preventing SGAD placement.
- Allergy to I-gel Plus materials.
- Inability or refusal to provide consent.

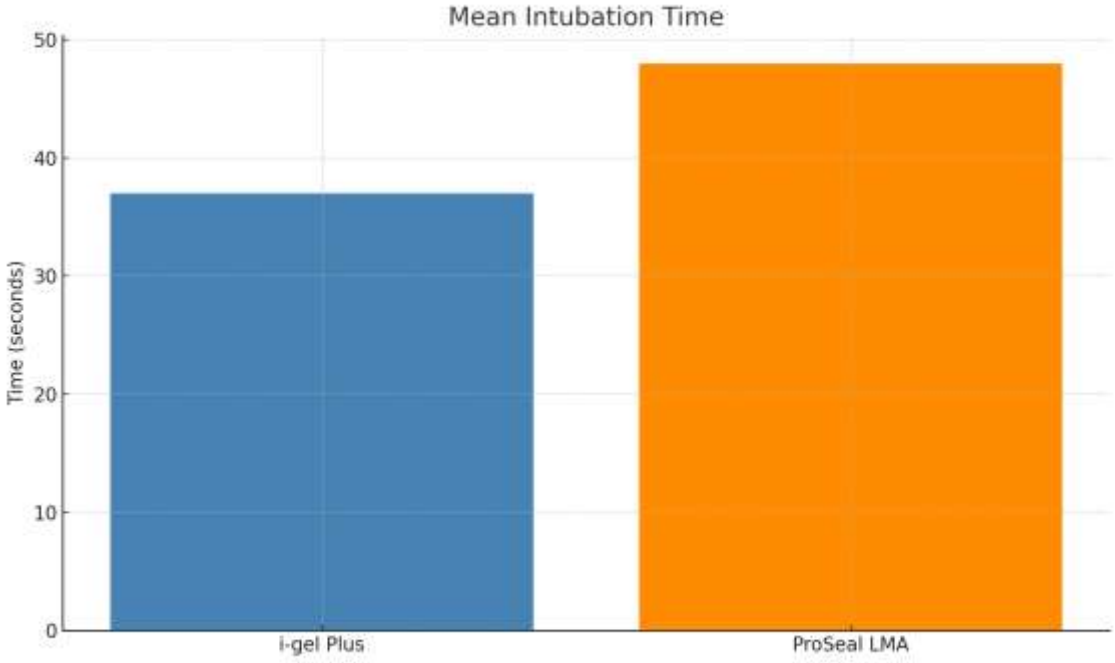
Procedure:
Following standard anesthesia induction, either the i-gel Plus or ProSeal LMA was inserted according to group assignment. A fiberoptic bronchoscope was passed through the device to visualize the vocal cords and trachea. An endotracheal tube (ETT) was then railroaded into the trachea under direct vision.

Recorded Parameters:
- Time to successful intubation
- Ease of fiberoptic navigation
- POGO (Percentage of Glottic Opening) score
- Number of intubation attempts
- Complications such as desaturation – intraoperatively and sore throat, blood staining – postoperatively.

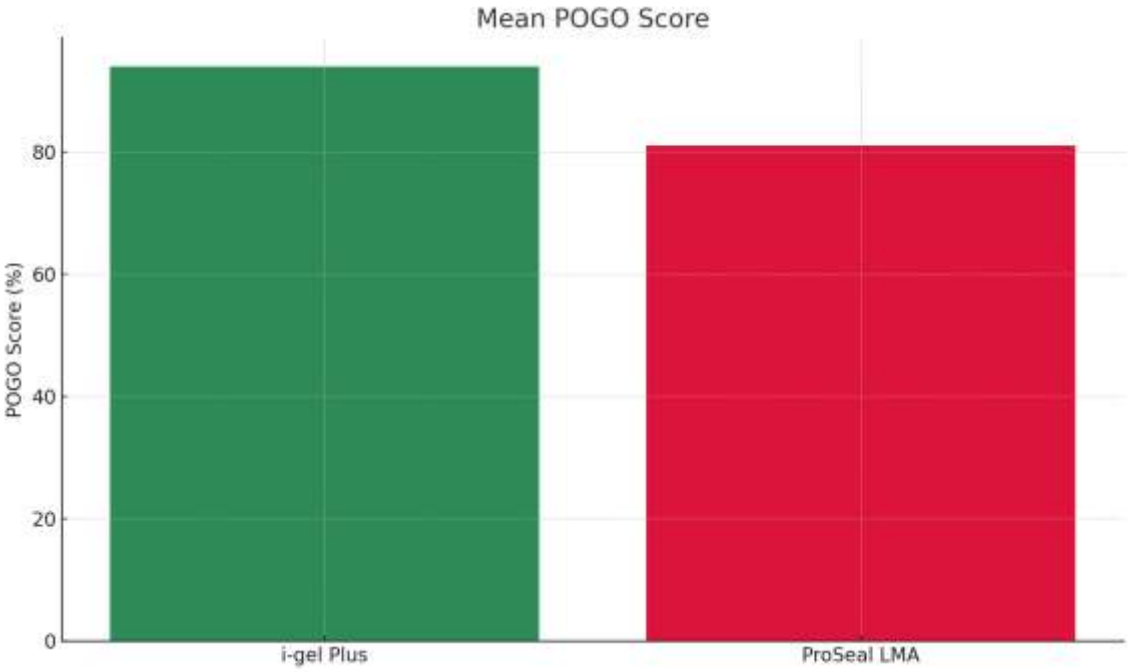
Statistical Analysis: Data were analyzed using SPSS software. Continuous variables were compared using the independent t-test, and categorical variables using the chi-square test. A p-value < 0.05 was considered statistically significant.

Results

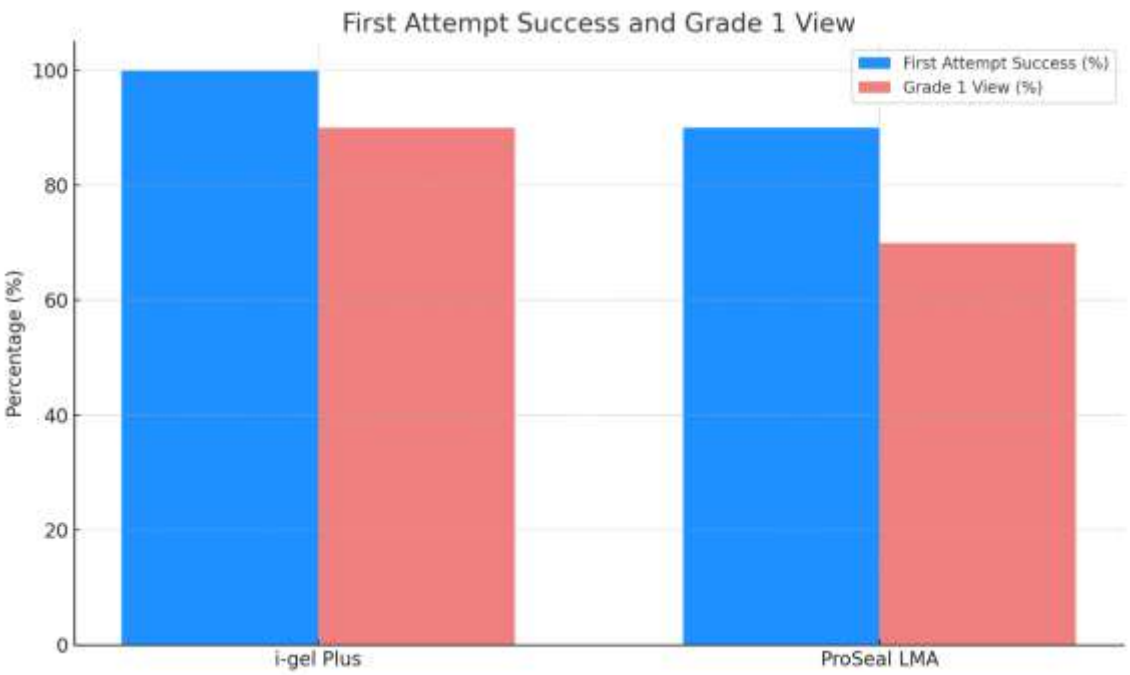
A total of 40 patients were enrolled and successfully completed the study, with 20 patients in each group (Group I: i-gel Plus; Group P: ProSeal LMA). Demographic characteristics such as age, gender, body mass index (BMI), and ASA physical status were comparable between the two groups, with no statistically significant differences.



The mean intubation time in the i-gel Plus group was significantly shorter (37 ± 4 seconds) compared to the ProSeal group (48 ± 5 seconds), with a p-value < 0.01, indicating faster and more efficient intubation using the i-gel Plus. The ease of fiberoptic scope insertion was subjectively rated as "easy" in 90% (18/20) of patients in the i-gel group versus 70% (14/20) in the ProSeal group, showing a statistically significant difference ($p = 0.03$).

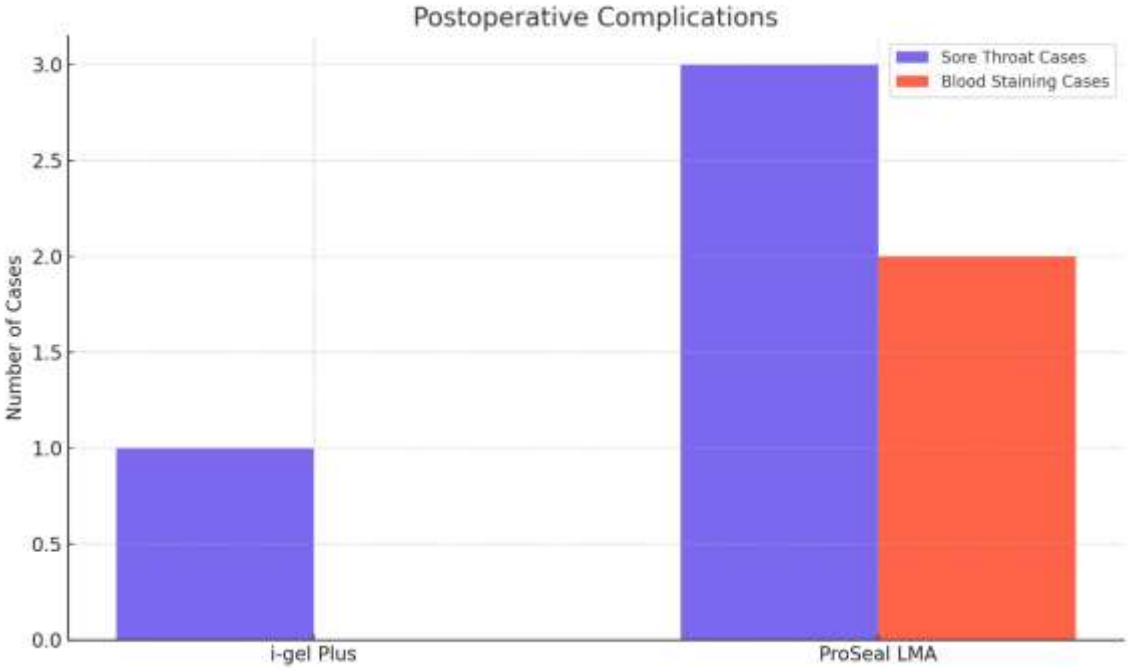


The POGO (Percentage of Glottic Opening) score, which quantifies the view of the glottis during fiberoptic intubation, was notably higher in the i-gel group (mean 94% ± 3%) than in the ProSeal group (mean 81% ± 5%), $p < 0.05$.



First-attempt intubation success was 100% in the i-gel group compared to 90% (18/20) in the ProSeal group. In the two ProSeal cases requiring a second attempt, suboptimal glottic alignment was noted during fiberoptic visualization.

Regarding complications, the i-gel group experienced minimal adverse events, with only one patient reporting a mild sore throat postoperatively. In contrast, the ProSeal group had three cases of sore throat and two instances of visible blood staining on device removal, suggesting greater oropharyngeal trauma. No episodes of hypoxia ($SpO_2 < 94\%$) or laryngospasm occurred in either group.



DISCUSSION

The findings of this study reinforce the clinical advantages of the i-gel Plus over the ProSeal LMA as a conduit for fiberoptic-guided tracheal intubation. The significantly shorter intubation time with the i-gel Plus can be attributed to its anatomical design, non-inflatable cuff, and easier alignment with the glottis, reducing the need for positional adjustments and optimizing the path for endotracheal tube insertion.

The higher POGO scores in the i-gel group reflect superior glottic visualization, likely due to the device's stability and preformed curvature that better matches pharyngeal anatomy. The higher percentage of Grade 1 views and the smoother scope passage support this observation and align with previous literature comparing second-generation supraglottic devices. In contrast, the **ProSeal LMA**, though effective in securing the airway and facilitating ventilation, features an **inflatable cuff** that can sometimes distort surrounding tissue and obscure the glottic view, especially if overinflated. Its bulkier design may also reduce the flexibility and ease of maneuvering a bronchoscope, potentially explaining the lower average POGO score in that group.

Furthermore, the i-gel's soft, gel-like material may contribute to the lower incidence of trauma-related complications, as seen in the reduced rates of sore throat and blood staining. These safety advantages are clinically relevant in scenarios such as difficult airway management, where minimizing patient trauma is critical.

The ProSeal LMA, while effective, may require more manipulation for optimal positioning and sealing, potentially prolonging the procedure and increasing the risk of minor complications. Its inflatable cuff, though useful for sealing, may exert pressure on surrounding structures, contributing to postoperative discomfort.

Overall, the i-gel Plus showed a more favorable profile for use in fiberoptic-guided intubation, supporting its routine inclusion in airway management algorithms, especially where rapid, atraumatic intubation is prioritized.

CONCLUSION

The i-gel Plus is a more effective and safer conduit than the ProSeal LMA for fiberoptic-guided tracheal intubation in elective surgical patients. It offers shorter intubation times, better glottic visualization, higher first-attempt success, and fewer complications. The i-gel Plus should be considered a first-line supraglottic airway device in airway management protocols involving fiberoptic intubation.

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