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COMPARISON OF INTERSURGICAL GEL (I-GEL) VERSUS LARYNGEAL MASK AIRWAY (LMA) IN PATIENTS UNDERGOING SURGERY UNDER GENERAL ANESTHESIA

Zunaira Zaheer Malik[*1], Farouk Atiq Babri[2], Rana IJaz Shoukat[3]

[*1,3]*PG Trainee Anaesthesiology, Ittefaq Hospital Trust Lahore*
[2]*Consultant Anaesthesiology, Ittefaq Hospital Trust Lahore*

[*1]zunaira-malik@hotmail.com

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Corresponding Author: *
Zunaira Zaheer Malik

Abstract

Objective: *To compare the effectiveness of Intersurgical I-gel and the Laryngeal Mask Airway (LMA) based on postoperative sore throat in patients undergoing elective surgeries.*

Study Design: *Randomized controlled trial*

Study Setting and Study Duration: *Department of Anesthesia at Ittefaq Hospital Trust, Lahore, from 01 October 2024 to 31 March 2025.*

Methodology: *The researchers randomly assigned 120 patients aged between 18 and 60 years of both sexes and categorized as ASA physical status I and II into two equal groups. In this regard, Group A was treated with I-gel and Group B was treated with LMA. All patients underwent pre-anesthesia evaluation, which consisted of standard monitoring, preoxygenation, and induction with 2mg/kg of propofol. The assessment of sore throat was made by using a modified four-point scale two hours post-removal of the airway. The chi-square test was used to assess the association between sore throat and both types of airway.*

Results: *The average age of the patients in the I-gel group was 37.31 ± 7.46, while that in the group with LMA was 36.56 ± 9.24. Mean BMI for the I-gel group was 25.49 ± 2.85, and for the LMA group 25.54 ± 2.94. Postoperative sore throat was found in 2 (3.3%) patients in the I-gel group and in 16 (26.7%) patients in the LMA group ($p<0.001$).*

Conclusion: *I-gel was found to be effective in reducing the incidence of postoperative sore throat as compared to LMA in patients undergoing elective surgery under general anesthesia, and thus may be preferable in airway management.*

Introduction:

Having an established airway during general anaesthesia is vital to patient safety. Supraglottic devices (SGA) have become more popular because of their ease of application and less trauma than intubation(1). Out of all SGAs, the Intersurgical I-gel is among the most common SGA devices used due to its effectiveness and ease of use during surgery(2). The Laryngeal Mask Airway (LMA) is another commonly utilized SGA device. These two devices differ in design, which affects ease of insertion, quality of seal, and complications with their application(3).

Worldwide, a network meta-analysis having completed over 12,000 subjects has evaluated several SADs on any and all achievable parameters, including initial success, oropharyngeal leak pressure (OLP), and

postoperative sore throat (POST). The I-gel leads in terms of expediency of placement and first-attempt passing success, while some second-generation laryngeal masks (like LMA ProSeal, LMA Protector) surpass I-gel in OLP performance, making them safer for lengthy and high-pressure ventilation. In Pakistan, up to 18.6% of patients have perioperative respiratory phenomena, whereas the incidence of difficult intubation in the obstetric general anaesthesia group is only 0.69%(4). A multicentre study from Pakistan conducted in 2025 showed anaesthesia-related complications to occur in 16.47% of cases, where 25% of events related to difficult intubation in this group(5). Although there is a significant amount of international information available, comparing I-gel with either traditional or second-generation LMA in randomized head-to-head comparisons is done very rarely when it comes to the Pakistani population in surgery(6,7).

Due to the fact that the medical staff in Pakistan tend to choose the available device and the one they are familiar with, it can lead to undermined airway safety and recovery quality, seriously affecting the freedom of choice. Thus, it is absolutely necessary to conduct a special study that will compare I-gel with LMA since the incidence of complications connected with the use of devices in the Anaesthesiology department is disproportionately high in Pakistan. The investigation aims to compare the efficiency of I-gel with the efficiency of LMA for patients undergoing elective surgeries in general anaesthesia at one of the hospitals in Pakistan.

Methodology:

A randomized controlled trial was conducted from 01 October 2024 to 31 March 2025 at the Department of Anaesthesia, Ittefaq Hospital Trust, Lahore, following the approval of its synopsis and institutional ethics committee. The sample size was determined to be 120 patients, with 60 patients assigned to each group in accordance with a level of significance of 5% and a power of 80% based on a presumed postoperative sore throat frequency of 3.4% for the I-gel and 28.6% for LMA(8).

Inclusion criteria: Patients aged 18-60 years of both sexes who are of American Society of Anaesthesiologists (ASA) physical status I to II and who are undergoing elective surgical procedures under general anaesthesia are included in the study.

Exclusion criteria: Patients suffering from cardiovascular diseases with an ejection fraction of less than 50% as seen in echocardiography, preoperative sore throat history, complete edentulism, and individuals requiring rapid sequence induction were excluded.

Once the hospital's ethics committee of the hospital gave their approval, eligible patients were included in the study from the OT after satisfying the inclusion and exclusion rules. Randomly selected patients were divided into two equal groups (namely groups A and B) by using the lottery technique. Group A was managed with I-gel, whereas group B was managed with a disposable Laryngeal Mask Airway (LMA). Pre-aesthetic assessment included thorough medical and surgical history, general and systemic examination, airway examination, and relevant laboratory investigations such as complete hemogram, chest X-ray, and ECG.

Immediately after peripheral IV cannulation, standard monitoring was done, including non-invasive blood pressure, cardioscope, and pulse oximeter. The baseline readings of pulse rate, blood pressure, saturation, and respiratory rate were recorded. After preoxygenation, induction was done with Propofol at a dose of 2 mg/kg. After the loss of the eyelash reflex and commencement of apnoea, an appropriately sized I-gel or LMA was inserted as per the group allocation. A water-soluble lubricant was used before insertion of the LMA cuff. Evidence of proper airway positioning was given by adequate expansion of the chest, lack of leakage sounds, and absence of stomach inflation. The airway device was fixed to the skin using adhesive tape. Patients were oxygenated with nitrous oxide and isoflurane. After transferring the patients to the post-anaesthesia recovery area, the airway device was removed.

Post-operative sore throat was evaluated after two hours using a modified four-point scale, with a score of 0 indicating absence of sore throat and a score of 3 implying severe sore throat. Sore throat was determined if the score was more than 1. The outcome recordings were made according to a pre-designed format.

Data were analysed using SPSS software version 20.0. Age and BMI parameters were presented as Mean ± SD as they were normally distributed (Shapiro-Wilk>0.05), while variables of gender, ASA grade, and occurrence of postoperative sore throat were presented as frequencies and percentages. The chi-square test was used to analyse occurrences of postoperative sore throat in both groups. Analysis was repeated after stratifying data with respect to age, gender, BMI, and ASA status. A p-value of less than 0.05 was considered to be statistically significant.

Results:

The I-gel group featured a mean age of 37.31 ± 7.46 years, and the LMA group had a mean age of 36.56 ± 9.24 years, resulting in a total mean age of 36.94 ± 8.37 years in all patients. Similarly, the mean BMI in both groups was identical (I-gel 25.49 ± 2.85 kg/m², LMA 25.54 ± 2.94 kg/m²) while the average BMI of all patients was 25.51 ± 2.88 kg/m².

Table I: Comparison of demographic and anthropometric characteristics between I-gel and LMA groups(n=120)

Variable	Inter-surgical Gel (I-gel), Mean ± SD	Laryngeal Mask Airway (LMA), Mean ± SD	Total, Mean ± SD
Age (years)	37.31 ± 7.46	36.56 ± 9.24	36.94 ± 8.37
BMI (kg/m²)	25.49 ± 2.85	25.54 ± 2.94	25.51 ± 2.88

The I-gel group contained about 46.7% females, and the LMA group comprised 48.3% females, while males constituted 53.3% and 51.7%, respectively. ASA I patients accounted for about 68.3% in the I-gel group and 63.3% in the LMA group. About 3.3% of patients in the I-gel group had a postoperative sore throat compared with 26.7% of patients in the LMA group, whereas the absence of sore throat was seen in 96.7% of the I-gel group patients and 73.3% of the LMA group patients.

Table II: Distribution of categorical variables among I-gel and LMA groups(n=120)

Variable	Category	A (I-gel), n (%)	B (LMA), n (%)	Total, n (%)
Gender	Female	28 (46.7%)	29 (48.3%)	57 (47.5%)
	Male	32 (53.3%)	31 (51.7%)	63 (52.5%)
ASA class	I	41 (68.3%)	38 (63.3%)	79 (65.8%)
	II	19 (31.7%)	22 (36.7%)	41 (34.2%)
Postoperative sore throat	No	58 (96.7%)	44 (73.3%)	102 (85.0%)
	Yes	2 (3.3%)	16 (26.7%)	18 (15.0%)

ASA: American Society of Anaesthesiologists; I-gel: inter-surgical gel; LMA: laryngeal mask airway.

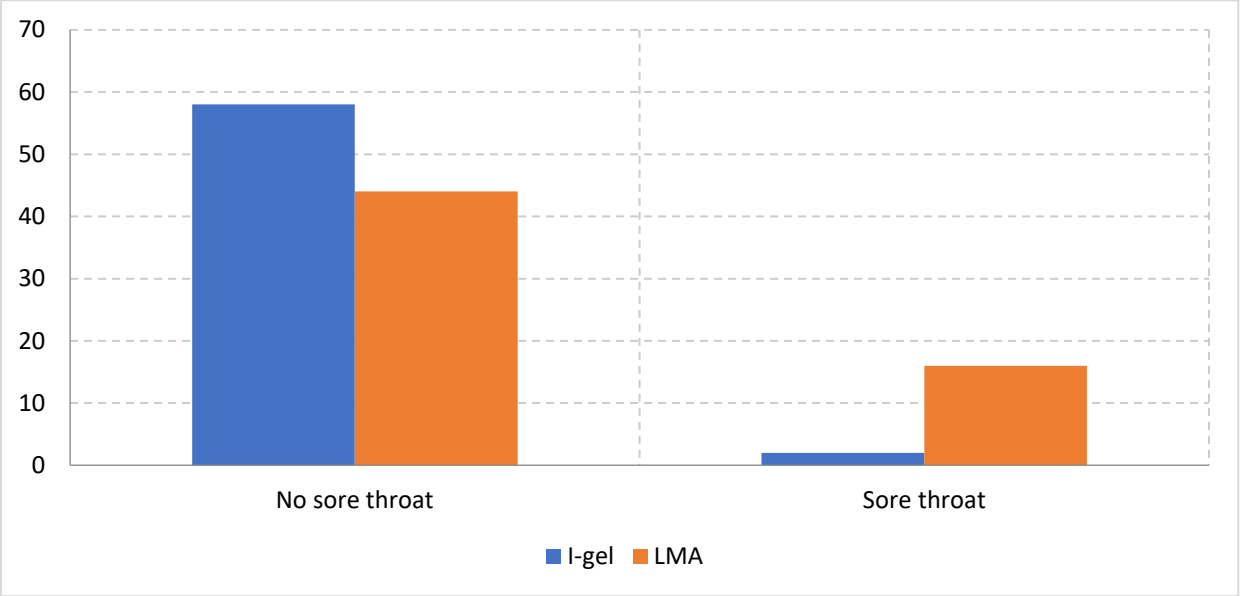

Figure 1: Percentage of postoperative sore throat in the I-gel and LMA groups.

The results of Table 3 illustrate the comparison of the incidence of postoperative sore throat among the two groups. In the I-gel group, postoperative sore throat was found in 58 of the total population (96.7%), while in the LMA group only 44 patients had this complication (73.3%). On the other hand, only 2 (3.3%) subjects in the I-gel group were diagnosed with postoperative sore throat, compared to 16 (26.7%) patients treated within the LMA group. Moreover, the results between the two types of devices showed statistically significant differences ($p<0.001$).

Table III: Comparison of postoperative sore throat between I-gel and LMA groups using Chi-Square test(n=120)

Variable	Category	Study Groups		p-value
		(I-gel), n (%)	(LMA), n (%)	
Postoperative sore throat	No	58 (96.7%)	44 (73.3%)	<0.001
	Yes	2 (3.3%)	16 (26.7%)	

The chi-square test was used for comparison between groups. A p-value <0.05 was considered statistically significant. I-gel: inter-surgical gel; LMA: laryngeal mask airway.

Discussion:

The current research indicated that the I-gel led to a substantially lower rate of postoperative sore throat (POST) than the laryngeal mask airway (LMA): 3.3% vs 26.7% ($p < 0.001$). This means a loss of at least 23.4% of the absolute risk and a relative risk of around 0.125; therefore, such an effect is a considerable clinical advantage for the I-gel. The results are in accordance with modern publications that assert that second-generation supraglottic airways (SGAs) such as the I-gel decrease the incidence of pharyngeal and laryngeal complications in comparison to first-generation LMAs(9). According to a 2021 meta-analysis of 111 randomized studies (12,045 patients), POST was the primary outcome, and the I-gel was deemed to be performing well in terms of POST incidence, bleeding, and successful first attempts, while the POST incidence for different devices ranged from 0% to 73%(10). Likewise, a 2026 review of the literature has shown that the POST incidence is about 5–8% for the I-gel while 10–15% for the LMA, implying its higher safety(11).

In this study, the reported POST rate of I-gel is at the bottom of modern estimations of the same indicator, while the LMA's rate exceeds the frequently quoted figure of 10-15%. This difference may be explained by the variations in design and usage of the devices. The non-inflatable, gel-like thermoplastic cuff for I-gel and its anatomically shaped design provide less pressure and injury to the tissue in comparison with LMA cuffs that are filled with air and are noted for sensitivity to intracuff pressure(12). For example, first-generation LMAs have been reported to be associated with high POST rates when the cuff pressure is not used correctly(13). This trend is believed to be confirmed by other studies: in the 2022 RCT study conducted on 140 adults utilizing I-gel for anaesthesia, it was evidenced that their POST indicator was from low single digits to low teens and that longer time of introduction and higher ASA class are valuable predictors(14). In 2021, in a study among children, I-gel has shown numerically lower POST (5.7% vs. 17.1%); however, this difference was not statistically significant(15). In another Turkish study of 2019, it was found that the POST indicator was 3% in the group of patients(16). These pieces of evidence strengthen the biological plausibility and clinical consistency of the findings of the current study.

In terms of methodology, this study is characterized by randomization and a relatively equal distribution of basic parameters, with a mean age of ~37 years, BMI of ~25.5 kg/m², and an equal proportion of ASA I/II. However, there are a few limitations imposed on the generalizability of the results. First, although the sample size is acceptable (60 participants per group) for the major effect identification, it is not representative enough for conducting subgroup analyses and may lead to overestimating the effect of the findings on the increase in POST rates in LMA patients(17). Second, there were no comments concerning the LMA model and device inflation pressure, and if it was a first-generation device without proper inflation pressure monitoring, then POST event rates could be increased compared to the use of devices that were produced later (e.g., LMA Protector, LMA Supreme)(18).

The third consideration is how the timeline and length of the POST process influence the comparison; some researchers report POST at variable time periods of 0.5, 6, and 24 hours or longer, acknowledging that early achievements might disappear later(19). The fourth variable is the undifferentiated skill level and the method of the procedure. The last consideration is that the trial was done only in one centre and cannot be applied to different centres with other demographic characteristics and perioperative practices.

Aside from POST, the contemporary literature mentions many SGA problems, not limited to blood collecting in the device, pain swallowing, trouble speaking, cough, spasm of vocal cords, enlarged stomach, and aspiration risk. The 2024 meta-analysis identified bleeding as a secondary outcome, where I-gel was doing better than other models according to the notable studies(20). It was indicated by a trial conducted in 2023 that nobody from the I-gel group experienced bleeding, while the LMA group had it in 25% of the cases ($p = 0.02$), which shows how well the I-gel device works(21). Although no specific complication rates other than POST were provided in this research, the significant reductions observed in POST lead us to infer that fewer pharyngeal injuries may have occurred. The 2025 I-gel study found that pharyngeal injury occurred in 5.7–8.6% of the population, depending on whether the individuals were undergoing neuromuscular blockade, thus indicating that minor injuries can occur but that the occurrence might not be as severe as with LMA(22). An analysis of paediatric cases shows different blood staining levels resulting from I-gel use, thus showing that the trauma sustained is a complex topic that may vary according to the patient's age and doctor's experience(8). Frequent complications occurring in cases with the use of I-gel (for example, cough or laryngospasm) could mean that the new device is efficient in lessening airway reflex action; however, aspiration should be treated as an issue with all SGAs, and it is better to use some of the

devices from the next generation (I-gel and LMA ProSeal/Protector) when there is a need to drain the stomach contents.

The strengths of this research are randomization, matching characteristics between patient groups at baseline, outcomes of clinical importance, namely POST, and the statistically significant difference in favour of I-gel. The magnitude of the effect (absolute risk reduction ~23%) is considerable enough to affect clinical practice. As for the limitations of this study, they include the small sample size and lack of precise information about the LMA model and cuff pressure management, variability in the time of the POST assessment, inconsistency in the level of operator's experience, and use of only one medical centre for collecting data.

The findings of the present study, corroborated by several contemporary meta-analyses and prioritizing the prevention of POST and pharyngeal injury, suggest that I-gel may be used instead of LMA whenever possible. Given the favourable standing of I-gel among the reviewed devices pertaining to the prevention of POST, bleeding, and successful first use, the device may be used in various elective surgeries. However, device selection should also hinge on other criteria such as airway sealing, aspiration risk, and operator experience, since some recently developed LMA models (such as LMA Protector or LMA Baska) may offer satisfactory performance in some situations. Further research should compare I-gel with recently developed second-generation LMAs in properly designed RCTs, assess POST rates, and study patient-related predictors.

Conclusion:

The I-gel was shown to be significantly more effective than the LMA in reducing postoperative throat pain in patients having elective surgery with general anesthesia. In fact, only 3.3% of those receiving the I-gel developed throat pain as compared to 26.7% with the LMA, which is statistically significant ($p<0.001$). This information may indicate that the use of the I-gel results in better postoperative airway-related comfort, as it may be seen as superior to the LMA in elective surgical patients. However, the results should be interpreted with caution because of the drawbacks associated with a single-location experiment, a relatively small sample of participants, limited information about LMA characteristics and cuff pressure, and the variability of professional skills among operators.

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