RESEARCH PAPER

Laryngeal Mask Airway: Supreme Vs I-Gel : A Comparison Of First Attempt Success Rate Among Novices

Venkata Padmavathi G[1], Karthik.K[2*], Vishak Manoj Bhaskar[3]

[1]Junior resident, Department of anesthesiology, SRM MCH &RC, padmanaidu1998@gmail.com
[2*]Professor, Department of anesthesiology, SRM MCH & RC, karthikk1@srmist.edu.in
[3]Assistant Professor, Department of Anesthesiology, SRM MCH & RC, manojvishak@gmail.com

Abstract

Background: Supraglottic airway devices have proven to be an important element in the contemporary airway management as an effective alternative to endotracheal intubation particularly in cases where airway control is urgently and reliably required. They are also very easy to use especially to those who have little experience in using airways and in such cases, success on the first one is essential in ensuring the safety of the patient.

Objective: To compare the first attempt success rate of LMA Supreme and I-gel when applied by novice operators and to compare the differences in the time of insertion, overall success rate, airway performance and complications after insertion.

Methods: This randomized controlled trial was conducted in a tertiary care teaching hospital and it included 88 adult patients (ASA I–II) awaiting elective procedures under general anaesthesia. The participants were selected at random into two groups: I-gel (n = 44) and LMA Supreme (n = 44) with a concealed allocation based on the computer-generated order. Novice operators fitted the airway devices following the standard training. The primary measure of outcome was the first attempt success rate. The secondary outcomes included the general success rate, attempts, time of insertion, easy insertion, the need to manipulate airways orally, oropharyngeal leak pressure, haemodynamic reactions, and postoperative airway-related complications.

Results: The success rate of the first attempt was higher with LMA Supreme than I-gel (77.3% vs. 54.5%, $p = 0.025$). In general, every patient in the LMA Supreme group was successful, and 86.4% of the I-gel group ($p = 0.026$). The average number of attempts was reduced with LMA Supreme (1.30 ± 0.59 compared to 1.73 ± 0.87, $p = 0.008$), along with a shorter insertion time (26.20 ± 5.52 seconds versus 33.61 ± 9.78 seconds, $p < 0.001$). Oropharyngeal leak pressure was greater with LMA Supreme (29.15 ± 3.94 compared to 23.86 ± 4.09 cmH_2O, $p < 0.001$). The incidence of sore throat was greater in the LMA Supreme group (43.2% versus 20.5, $p = 0.022$), but other complications were similar.

Conclusion: LMA Supreme showed superior first-attempt success, enhanced airway performance, and quicker insertion when compared to I-gel in novice users. Nevertheless, I-gel was less prone to sore throat cases, which means that there was a trade-off between the efficiency of insertion and post-insertion comfort.

Keywords: Supraglottic airways devices; LMA Supreme; I-gel; Airway management; Randomized controlled trial; Anesthesia

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Introduction

Airway management is fundamental in both anaesthesia and emergency medicine. Though endotracheal intubation is regarded as the gold standard in securing the airway, it requires high skill levels and time and a failure in intubation may cause hypoxia and even death. SADs, on the other hand, offer a rapid and less invasive option of oxygenation and ventilation that can usually omit the need of intubation.[1,2] There is now some support in the guidelines to offer SADs as an adjunct tool in difficult-airway protocols and recommend second-generation SADs (with gastric drainage channels) to reduce the likelihood of regurgitation and aspiration. [3]As a matter of fact, SADs provide efficient ventilation and oxygenation with fewer cardiopulmonary disturbances than tracheal intubation and are commonly used both in the elective and emergency. [4]This has changed the widespread use of SADs in the current anaesthetic and resuscitation practices particularly in cases when immediate airway occupancy is necessary or when intubation is expected to be difficult.

The Laryngeal Mask Airway (LMA) Supreme and the i-gel are two types of commonly used disposable devices among the second-generation SADs.[5] Both machines are fitted with a gastric drainage tube to differentiate between respiratory system and gastrointestinal system plus inbuilt bite blocks to block airways. Nevertheless, there are great design dissimilarities between them. The i-gel has a soft, gel-like, inflatable-free cuff of thermoplastic elastomer, an anatomically shaped bowl, a flattened and widened stem, a rigid bite block, and an

*Author for Correspondence: karthikk1@srmist.edu.in

inbuilt oesophageal vent to allow access to the stomach.[3] On the other hand, LMA Supreme has a constant curved semi-rigid airway tube and inflatable medical-grade silicone cuff. It also incorporates an esophageal drainage port and strengthened tip to enhance placement.[6] Practically, such design differences imply that with the i-gel, cuff inflation and pressure monitoring are unnecessary whereas in the LMA Supreme, the cuff can seal up tighter after it is inflated. The two machines are marketed both as easy to operate and efficient in ventilating, they have become common in elective surgeries, airway rescue and out-of-hospital airway control.[7,8] In adult patients with normal airways, there have been clinical studies comparing the performance of the LMA Supreme and i-gel, but there are inconsistent results. A single trial demonstrated that the LMA Supreme offered superior oropharyngeal leak pressure and was simpler to insert, both of which had equal first-attempt success rates, and low complication rates. Other reports indicated similar ventilation and insertion time, and the i-gel occasionally giving superior fiberoptic views.[9] Similar efficacy and speed were reported in meta-analyses, which reported that the LMA Supreme is able to achieve gastric tube passage though it can result in increased postoperative sore throat.[10]

In the case of novices, the results are less predictable. In simulation experiments, both devices are generally very successful with untrained people (60 - 90%). Nonetheless, a randomized trial on real patients revealed that trained novices were more successful in the first attempt using the LMA Supreme, and leak pressure, although some had mild pharyngolaryngeal discomfort.[11,12] Other studies point out that novices are less successful in the use of such devices, which reflects on the learning curve of these devices.[13] A more recent meta-analysis reported the same rates of success and seal pressures of both devices with the LMA Supreme having an advantage in reaching the stomach.In spite of this information, there is a deficiency of high-quality evidence with specific emphasis on novices.[5,10] Most clinical trials have mixed operator experience or focus on expert users in elective situations. It is highly desirable that the empirical performance of devices with real novices, e.g. junior residents or paramedics immediately after their initial training, is evaluated as it matters in an emergency situation to succeed in the first attempt. Even a failure to get an airway in an emergency can easily lead to low oxygen and thus a device that is easier to operate by novices may be a big boost to safety. In addition, when a single supraglottic airway device is proved to have more first-attempt success when used by inexperienced users, the information may be useful in the design of airway management guidelines and training. In this way, our research will focus on inexperienced practitioners. We had a randomized controlled trial between the insertions of the LMA Supreme and i-gel in the hands of novices (with standardized training). The primary outcome is to evaluate the first-attempt success rates of the two devices. Secondary outcomes are the time of insertion, the overall success rates, functional outcomes (oropharyngeal leak pressure and sufficiency of ventilation), and any airway-related complications. Directly evaluating these factors in a novice group, we aim to close the evidence gap and determine whether a particular device offers a unique advantage in an emergency airway situation or training background.

Methodology

Study design and setting

It was a randomized controlled trial, conducted in the anaesthesia department of a tertiary care teaching hospital, which was a single-centre trial. The period of study was [June 2025 to December 2025]. The institutional Ethics Committee approval [SRMIEC-ST0725-2757] was obtained before the patients were enrolled and the trial was registered in clinical trial registry of India [CTRI/2025/09/114698] before starting the trial. Written informed consent was given by all participants. The trial adhered to the requirements of the CONSORT guidelines to randomized trials.

Study population

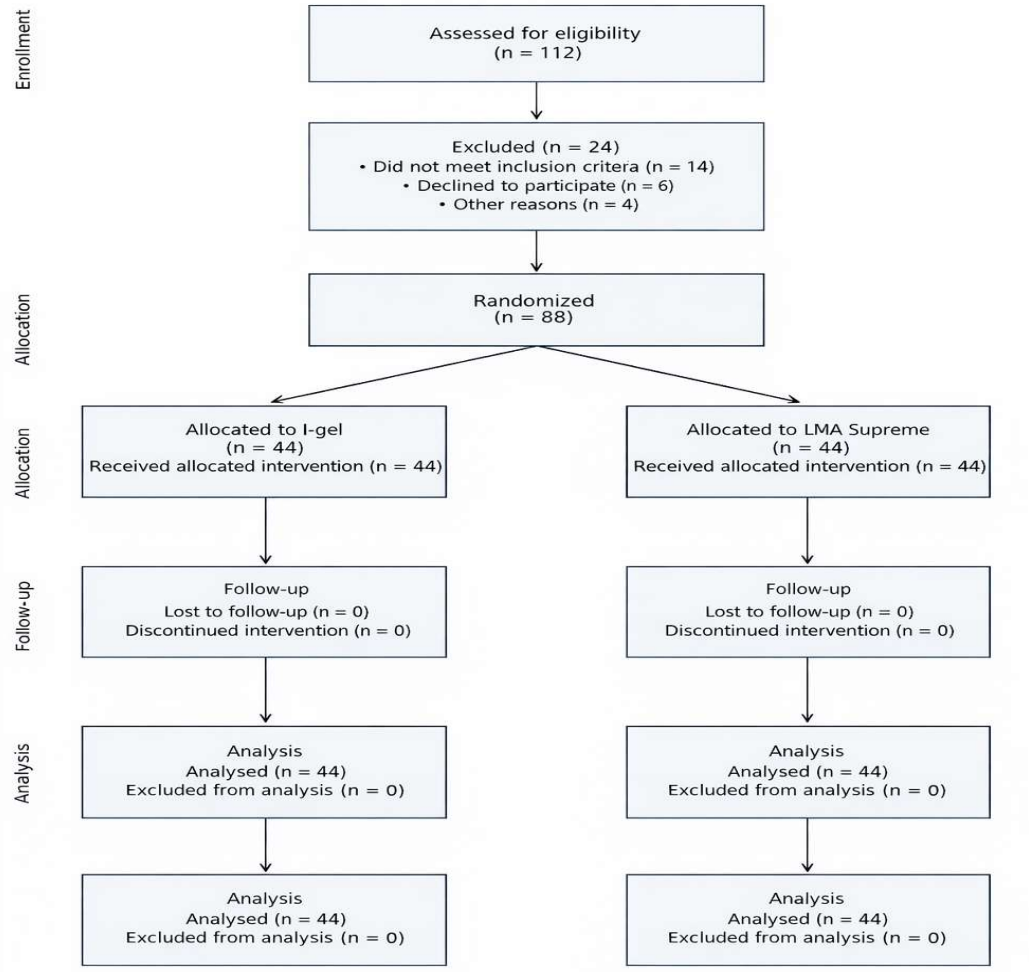
Elective surgery patients (18-65 years) under general anaesthesia were eligible to be included. We recruited American Society of Anesthesiologists (ASA) physical status I- II patients. The main inclusion criteria were planned short-term elective operations (which were expected to last less than 1 hour) under supine positioning. We excluded patients who had a known or predicted intractable airways (like Mallampati 3 -4, Inter-incisor distance less than 2cm, limited neck mobility), limited mouth opening (less than 3cm), at risk of aspiration (full stomach, gastro-oesophageal reflux disease), high body mass index (BMI over 35 kg/m 2), and pregnant patients or those with a major cardiorespiratory disease were excluded as well as any patient who refused to give his consent.

Randomization and sample size

Study sample size was calculated using difference between two proportions formula and the first attempt success rate in insertion was taken as the primary outcome to estimate the sample size. This was calculated based on prior study performed by Ragazzi et al., who stated first-pass success rates of 77% and 54% in LMA Supreme and I-gel, respectively, in the hands of novice users.[11] Based on these anticipated proportions ($p1 = 0.77$, $p2 = 0.54$) and a group allocation ratio of 1:1, beta error of 0.20 which corresponds to 80% power, and alpha error of 0.15, the minimum required sample size was 88. Alpha error of 0.15 was set due to the feasibility-oriented nature of the study, and practical limitations of the availability of cases and time to conduct the study. Each group was allotted 44 participants, making the sample size as 88 patients altogether. A computer-generated randomization sequence was used to assign patients to either the I-gel or Supreme group. Between sequentially numbered, sealed opaque envelopes that were prepared by an investigator who was not involved in patient care, allocation concealment was ensured. After the enrolment, the anaesthetist present opened the

subsequent envelope to know what device was assigned to him, reducing bias. The consort flowchart of recruitment details was given in Figure 1.

Figure 1: Consort flowchart of recruited participants



Operator characteristics

Novice operators did all the airway insertions. We defined a novice as a trainee with no prior experience when inserting supraglottic airway devices. Each operator underwent a short standardised training session prior to patient enrolment: a brief lecture about device insertion and practice on a manikin until mastering the basic technique. These devices were not clinically used by novices prior to the trial.[11]

Preoperative preparation

Every patient was fasted based on the regular recommendations (nil per oral 6-8 hours of solid food, 2 hours of clear fluid). In the operating room, standard monitors (ECG, non-invasive blood pressure, pulse oximetry, end-tidal CO 2) were used. Pre-anesthetic baseline vital signs (Heart rate, systolic and diastolic blood pressure, SpO2) were taken. Antiemetic (e.g. ondansetron) and histamine blocker (where applicable) pre-medication was done as per institutional protocol to reduce the likelihood of aspiration. Antisialagogue (glycopyrrolate 0.2 mg IV) and anxiolytic (midazolam 1–2 mg IV) were given to all patients to reduce secretions and anxiety. An intravenous access was established, and patients were preoxygenated with 100% oxygen (3-5 minutes) prior to induction.

Anesthetic technique

Both groups were induced in a similar manner. The analgesia was administered to all patients with fentanyl (1-2 mcg/kg IV) and the loss of consciousness through titration of propofol (1.5 mg/kg IV to 2.5 mg/kg IV). Before the airway insertion, mask ventilation with 100% oxygen was confirmed to be adequate. We did not use muscle relaxants so that we could be able to have spontaneous breathing in case it was necessary. Maintenance of anaesthesia (post-equipment placement) was either by volatile agents or propofol infusion at the will of the on-call anaesthetist, so that all patients received an identical level of anaesthesia. [8]The depth of anaesthesia at insertion was confirmed by the absence of response to a gentle jaw lift.[14] Two hundred milliliters of intravenous fluids were used to keep the haemodynamic stability.

Airway device insertion

The size of the device was selected based on the recommendations of the manufacturers (such as size 3: 50-70 kg; size 4: 70-90 kg, etc.), as it is a common practice. [15]The head and neck of the patient were placed in the sniffing position, and the airway device (I-gel or LMA Supreme) was placed by the conventional methodology of the same device. The cuff of the LMA Supreme was completely deflated before insertion, and the i-gel moistened with water-based gel. We measured insertion time as the time between the removal of the face mask (or when the device got to the mouth of the patient) and when adequate ventilation was confirmed.[5] Ventilation was also good as the bilateral chest rise was observed and capnographic waveform was stable. An independent observer used a stopwatch to record time. In case of inadequate ventilation, the next two attempts were allowed (with modifications or manoeuvres such as jaw lift, positioning of the head) as necessary.

Adequate chest rise and normal capnographic trace within one minute of device insertion was considered successful insertion. End-tidal CO 2 was used to check correct positioning of the device after insertion. In case a satisfactory airway was not secured after two attempts (with each attempt not taking longer than 30 seconds), the protocol permitted the use of an alternative device or to initiate tracheal intubation as a rescue. [16]

Outcome measures

The main result was the initial success rate of insertion of the devices. Secondary outcomes were overall success rate (success on two attempts), attempts, and the time taken to insert (in seconds). Other secondary endpoints included ease of insertion (rated by the operator on a scale of three points: easy, moderate, difficult), requirement of airway manipulation (e.g. jaw lift, repositioning), oropharyngeal leak pressure (OLP). Measuring leak pressure was done by closing the APL valve and recording the airway pressure when the leak was first detected or the pressure leveled. Hemodynamic measurements (heart rate and mean arterial pressure) were measured at baseline, right after insertion and 1 and 5 minutes post-insertion. Lastly, postoperative complications were documented: in 1 hour and 24 hours of anaesthesia, patients were evaluated using a standardised questionnaire on signs of airway morbidity (sore throat, cough, dysphonia, and other symptoms). Blinded observers were used to collect all data where possible, and on a predesigned case report form.

Statistical analysis

The information was recorded to a spreadsheet (Microsoft Excel) and compared with SPSS version 20.0 (IBM Corp.). Categorical variables (e.g. success rates, complication frequencies) are represented by counts and percentages, and were compared with Chi-square or Fisher exact test as needed. Continuous variables (e.g. insertion time, OLP) are presented in the form of mean ± standard deviation (SD) following a test of normality. Intergroup comparisons of continuous variables were made by independent t-tests. In order to determine independent predictors of the successful outcome of the first attempt, we conducted a multivariate logistic regression analysis to identify the covariates and include them in the analysis (group, age, sex, airway assessment scores, etc.). All statistical tests were two-tailed and a p-value below 0.05 was significant.

Results

A total of 88 patients were included in the study, with 44 patients in each group (I-gel and LMA Supreme). There was no significant difference between the two groups in terms of the baseline demography and airway characteristics (Table 1). The mean age was 41.48 ± 10.82 years in the I-gel group and 40.82 ± 10.28 years in the LMA Supreme group ($p = 0.770$). In the same way, there was no significant difference in the BMI, inter-incisor distance, neck circumference, or sterna-mental distance between the groups ($p > 0.05$). Sex, Mallampati score, ASA grade, and ULBT classification as well as the size of the device used were also similarly distributed across the two groups with no statistical differences found ($p > 0.05$), which is sufficient to show that there is a good level of baseline homogeneity.

Table 1: Baseline characteristics of the participants

Variable	I-gel (n=44)	LMA Supreme (n=44)	p value
Age (years)	41.48 ± 10.82	40.82 ± 10.28	0.770
BMI (kg/m²)	23.86 ± 2.30	23.32 ± 2.21	0.268
Inter-incisor distance (cm)	4.22 ± 0.38	4.25 ± 0.44	0.737
Neck circumference (cm)	34.80 ± 2.87	34.73 ± 2.77	0.913
Sternomental distance (cm)	14.48 ± 1.03	14.80 ± 1.01	0.144
Sex			
Male	15 (34.1%)	19 (43.2%)	0.511

Female	29 (65.9%)	25 (56.8%)	
ASA			
grade 1	20 (45.5%)	24 (54.5%)	0.522
grade 2	24 (54.5%)	20 (45.5%)	
Mallampati score			
1	25 (56.8%)	25 (56.8%)	0.205
2	18 (40.9%)	14 (31.8%)	
3	1 (2.3%)	5 (11.4%)	
Upper lip bite test (ULBT)			
class 1	23 (52.3%)	16 (36.4%)	0.245
class 2	20 (45.5%)	25 (56.8%)	
class 3	1 (2.3%)	3 (6.8%)	
Device size			
3	1 (2.3%)	2 (4.5%)	1.000
4	43 (97.7%)	42 (95.5%)	

Independent t-test was used for continuous variables. Chi-square test was used for categorical variables.

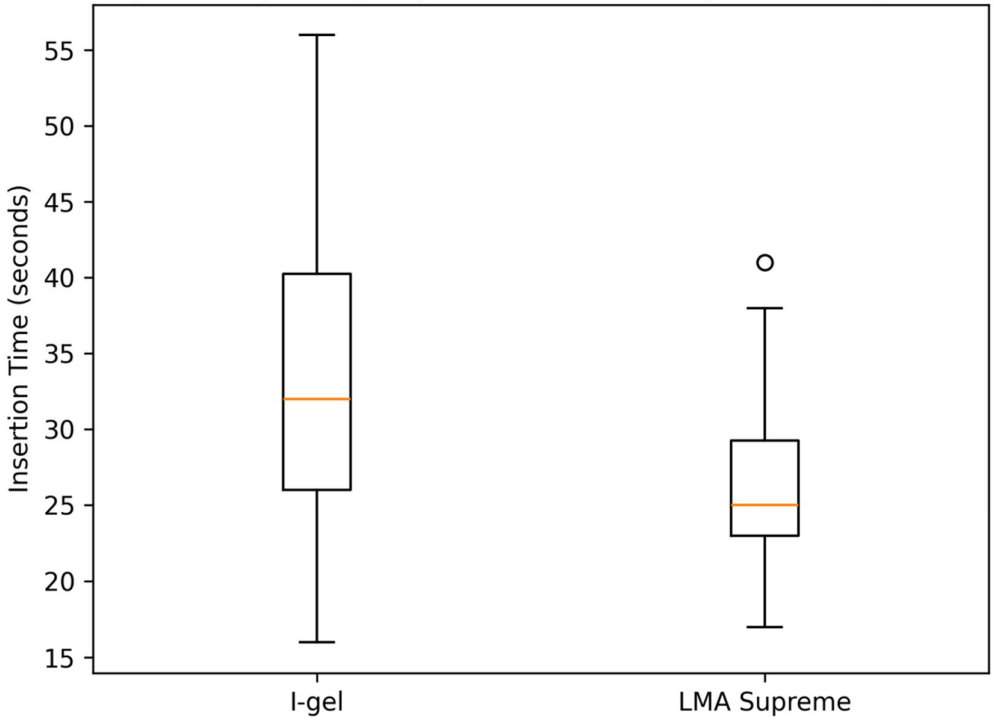
Table 2 shows that the success rate of the first attempt in the LMA Supreme group was much higher than in the I-gel group (77.3% vs 54.5%, p = 0.025). The general success rate in LMA Supreme group (100% vs. I-gel 86.4%, p = 0.026) was also a lot better. The average number of attempts at successful placement in the LMA Supreme group (1.30 ± 0.59) was much less than that in the I-gel group (1.73 ± 0.87, p = 0.008). Moreover, the insertion time was reduced in the LMA Supreme group (26.20 ± 5.52 seconds) as opposed to the I-gel group (33.61 ± 9.78 seconds, p < 0.001). (Figure 2)

Table 2. Primary and secondary outcomes

Outcome	**I-gel (n=44)**	**LMA Supreme (n=44)**	**p value**
First attempt success	24 (54.5%)	34 (77.3%)	**0.025***
Overall success	38 (86.4%)	44 (100.0%)	**0.026***
Number of attempts	1.73 ± 0.87	1.30 ± 0.59	**0.008***
Insertion time (s)	33.61 ± 9.78	26.20 ± 5.52	**<0.001***

Independent t-test was used for continuous variables. Chi-square test was used for categorical variables.

Figure 2: Box-plot comparing Insertion time between I-gel and LMA supreme



The airway performance of LMA Supreme was significantly enhanced over I-gel (Table 3). The LMA Supreme group was much easier to insert with 79.5% of the insertions being easy versus only 47.7% in the I-gel group ($p = 0.002$). Airway manipulation was necessary less in the LMA Supreme group (11.4%) than in the I-gel group (27.3%), but it was not significantly different ($p = 0.059$). The LMA Supreme group (29.15 ± 3.94 cmH 2 O) was found to have a significantly greater Oropharyngeal leak pressure than the I-gel group (23.86 ± 4.09 cmH 2 O, $p < 0.001$). All patients of the LMA Supreme group (100% success rates) were successfully EtCO 2 confirmed, as opposed to 86.4% of the patients of the I-gel group ($p = 0.026$).

Table 3: Comparison of Airway performance between I-gel and LMA supreme

Variable	I-gel (n=44)	LMA Supreme (n=44)	p value
Ease of insertion			
Easy	21 (47.7%)	35 (79.5%)	**0.002***
Moderate	10 (22.7%)	7 (15.9%)	
Difficult	13 (29.5%)	2 (4.5%)	
Ease of mask ventilation			
Easy	39 (88.6%)	40 (90.9%)	1.000
Adequate	5 (11.4%)	4 (9.1%)	
Airway manipulation required	12 (27.3%)	5 (11.4%)	0.059
Oropharyngeal leak pressure (cmH_2O)	23.86 ± 4.09	29.15 ± 3.94	**<0.001***
$EtCO_2$ confirmation	38 (86.4%)	44 (100.0%)	**0.026***

Independent t-test was used for continuous variables. Chi-square test was used for categorical variables.

Most time points had similar hemodynamic parameters in both groups (Table 4). The baseline heart rate and MAP did not differ among the groups ($p > 0.05$). The heart rate accelerated during the insertion period in both groups and subsequently decreased, and there were no significant differences between groups at insertion, 1 minute, or 5 minutes ($p > 0.05$) (Figure 3). Likewise, MAP had a temporary rise at insertion and a subsequent decrease over time. There was a statistically significant difference at 1 minute with the I-gel group (94.68 ± 7.79 mmHg) having a higher MAP than the LMA Supreme group (91.91 ± 6.56 mmHg, $p = 0.048$). Other time points, however, did not report any significant differences ($p > 0.05$). (Figure 4)

Table 4: Comparison of Hemodynamic parameters between I-gel and LMA supreme

Parameter	I-gel (n=44)	LMA Supreme (n=44)	p value
Baseline HR (beats/min)	76.36 ± 6.88	78.95 ± 8.42	0.118
HR at insertion	88.75 ± 9.16	89.30 ± 8.95	0.778
HR at 1 min	83.95 ± 9.30	84.18 ± 9.37	0.909
HR at 5 min	77.36 ± 7.65	79.89 ± 9.00	0.160
Baseline MAP (mmHg)	90.68 ± 6.00	89.73 ± 6.08	0.461
MAP at 1 min	94.68 ± 7.79	91.91 ± 6.56	0.048
MAP at 5 min	91.05 ± 6.96	91.27 ± 6.69	0.876

p values are from independent t-tests comparing the two groups at each time point.

Figure 3: Line diagram comparing Heart rate between I-gel and LMA supreme from baseline to 5 minutes

*Author for Correspondence: karthikk1@srmist.edu.in

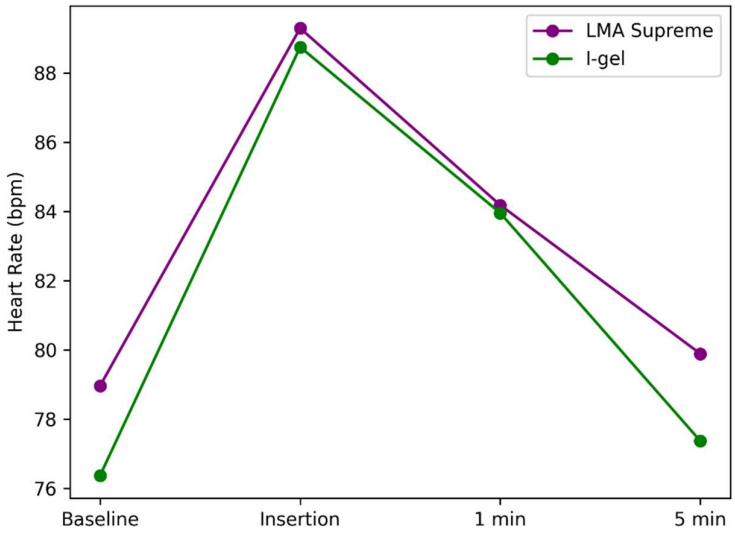
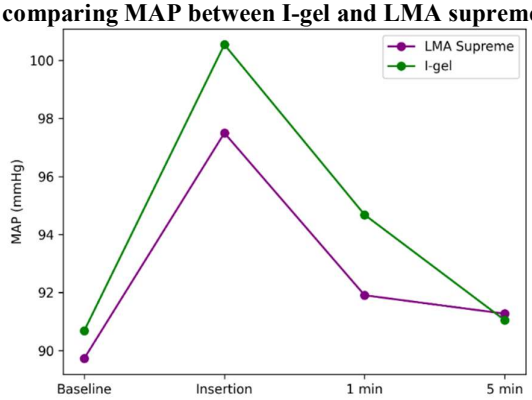


Figure 4: Line diagram comparing MAP between I-gel and LMA supreme from baseline to 5 minutes



The postoperative complications were mostly mild and did not differ among groups (Table 5). The LMA Supreme group had a higher incidence of sore throat (43.2% vs. 20.5% with I-gel, p = 0.022). The other complications such as cough, dysphonia, pain on swallowing, and hoarseness did not significantly differ between the groups (p > 0.05).

Table 5: Comparison of complications between I-gel and LMA supreme

Complication	I-gel (n=44)	LMA Supreme (n=44)	p value
Sore throat	9 (20.5%)	19 (43.2%)	0.022
Cough	4 (9.1%)	6 (13.6%)	0.739
Dysphonia	2 (4.5%)	4 (9.1%)	0.676
Pain on swallowing	4 (9.1%)	8 (18.2%)	0.352
Hoarseness	3 (6.8%)	5 (11.4%)	0.713

The analysis of multivariate logistic regression was conducted to estimate independent predictors of first-attempt success (Table 6). LMA Supreme was independently correlated with a increased likelihood of first-attempt success (adjusted OR 2.99, 95% CI 1.05 - 8.53, p = 0.040). Age was inversely associated with first-attempt success (adjusted OR 0.94, 95% CI 0.89–0.99, p = 0.021), while ASA grade (adjusted OR 3.72, 95% CI 1.22–11.31, p = 0.021) and sternomental distance (adjusted OR 1.76, 95% CI 1.05–2.92, p = 0.031) were significant positive predictors. The other variables, such as BMI, Mallampati score, ULBT, inter-incisor distance, neck circumference, and device size did not significantly correlate with the first-attempt success (p > 0.05).

Table 6: Predictors for first attempt success by Multivariate logistic regression analysis

Predictor	Adjusted OR	95% CI	p value
Group (LMA Supreme vs I-gel)	2.99	1.05-8.53	0.040
BMI	1.18	0.94-1.48	0.159
Mallampati score	1.47	0.59-3.66	0.406

ULBT	1.39	0.57-3.38	0.465
Inter-incisor distance (cm)	0.76	0.19-3.06	0.703
Age (years)	0.94	0.89-0.99	0.021
ASA grade	3.72	1.22-11.31	0.021
Neck circumference (cm)	0.97	0.81-1.17	0.746
Sternomental distance (cm)	1.76	1.05-2.92	0.031
Device size	1.31	0.08-22.75	0.851

Dependent variable: first attempt success (Yes = 1). Adjusted odds ratios are from a multivariable logistic regression model including all listed predictors

Discussion

In our investigation, it was proved that the airway management of novice anaesthesia trainees was better with the LMA Supreme compared to the i-gel. The LMA Supreme had better first-pass success rates, required fewer attempts, and shorter times to insert. It was also with the Supreme that trainees could easily insert and manipulate the airway. It offered a superior oropharyngeal leak pressure, which was a sign of a superior seal, and hemodynamic reactions were comparable between the two devices. The main downside was a higher occurrence of postoperative sore throat. In general, the LMA Supreme was more reliable placed, better ventilated, but with a small pharyngolaryngeal discomfort.

The successful first-attempt LMA Supreme is impressive, which can probably be attributed to its design features. The inflatable silicone cuff of the Supreme can be fitted to the walls of the pharynx, creating a good seal, reducing the leakage; the anatomically curved, semi-rigid tube also fits the mask more consistently with the laryngeal inlet. These are more forgiving design features than might be the case with those with less experience who may not be as sensitive to subtle positioning. Comparatively, the noninflatable gel cuff of the i-gel relies on the accurate sizing and positioning of the gel cuff to provide a sufficient seal. When a fast response is needed or minimal training is involved, a device that always fits well (such as the Supreme in our case study) enhances first-pass success. It is also a comparative picture that is given a thorough picture in previous studies. A study by Henlin et al. on paramedics showed that the i-gel and LMA Supreme showed similar overall success rates; but the i-gel was perceived to be easier to insert in very inexperienced users, and there was no overall benefit in first-pass success.[17] On the other hand, Theiler et al. observed that more recent devices with inflatable cuffs, including LMA Supreme, had a more consistent position and airway seal, which could result in a higher success of insertion in clinical practice.[18] In addition, the need to establish the airways promptly and reliably by non-experts has been established through extensive research on prehospital airway management in both academic and non-academic settings, and data in the AIRWAYS-2 trial have demonstrated the importance of device functionality in such settings.[19] Taken as a whole, these findings suggest that both devices are effective, but the subtle variations in their design and interaction with users can influence the success of the first attempt. The present research adds to this body of evidence by demonstrating the higher first-pass success rate with the LMA Supreme in novice users, thus supporting the notion that device properties are critical to the effective management of the airway in situations where the experience of the operator is low. The first-pass success is essential in the clinical setting because, with every unsuccessful trial, the probability of hypoxia and airway damage increases. As such, a tool with a higher first-attempt success rate when used by novices like the Supreme in our case may improve patient safety in the event of emergency airway management.

The secondary outcomes point out mechanical benefits of the LMA Supreme. Novices used the Supreme faster and needed fewer reinsertions compared to the i-gel due to its preformed curvature and inflatable cuff, which quickly seals the airway. Singh et al. had also observed that the Supreme has a better sealing pressure (mean OLP of 27.9 vs 22.3 cm H 2 O, p=0.001) in adults, which agrees with our observation of better leak pressure.[6] Although they also had a higher challenge in insertion of Supreme (20% vs 5% in the cases of i-gel; p = 0.042), our novices had an easier time to insert. Kundal et al. also reported faster Supreme insertion in children (12.4 vs 15.4 s, p<0.001) suggesting that simple airway management learning may be lessened by the design of Supreme.[12]

A large discrepancy was noted in oropharyngeal seal, with the Supreme recording a higher OLP (approximately 29 vs 24 cm H 2 O) which supported the findings of Singh et al. and Aggarwal et al. in children.[6,20] This is contrary to Kundal et al. who reported the i-gel to be a bit superior in seal among kids.[12] The inflatable cuff used by the Supreme was more effective when used in adults, and resulted in enhanced ventilation, particularly at high airway pressures.[21] The Supreme was found to be 100% end-tidal CO by our novices (as compared to 86% with the i-gel), which means that it can work better with less airway manipulation.

There was similarity in the response of the two devices in terms of hemodynamics. The baseline and post-insertion measurements of the heart rate and blood pressure were similar, with a small and momentary increase at the one minute which was slightly higher in the i-gel group. These findings are in line with previous randomized studies which evaluated second-generation supraglottic airway devices. Ye et al conducted the comparative study of LMA Supreme and I-gel during laparoscopic surgeries, which did not show any significant differences in hemodynamic parameters between the two devices at peri-insertion intervals

despite the differences in airway mechanics.[22] Similarly, a recent randomized trial by Lefevre et al. that compared these devices in fiberoptic intubation showed that both LMA Supreme and I-gel had stable hemodynamic profiles, which can be used to support the cardiovascular safety of these devices when managing airways. [23]Past randomized studies have always demonstrated that the insertion of supraglottic airway apparatus will lead to a limited and short-lived sympathetic response, without any long-term hemodynamic imbalances.[24] Therefore, the minimal increase in pressure observed in this experiment is a physiological response to airway manipulation and not specific to the device. Thus, there is no likelihood of the two devices to cause serious cardiovascular consequences in stable patients.

Airway postoperative pain was different. we found that, of 43% in the Supreme group, versus 21% in the i-gel group, had sore throat (p=0.022). Such a high rate of pharyngolaryngeal discomfort with the cuffed Supreme is no surprise. The mucosa is also pressured by the cuff when inflated to form a seal. Comparatively, the i-gel has a soft and gel-like cuff that easily shapes around tissues without inflation. A minor, yet statistically significant, higher number of sore throat incidents with Supreme were reported by Singh et al. (5% vs. 2.5%), which is consistent with our results, although their absolute numbers were significantly lower.[6] Pediatric study found virtually no sore throats with either device but we think that a formal assessment at 24 hours would have probably identified more mild symptoms.[20] To sum up, our data shows that there is a trade-off between the best insertion and seal, whereas LMA Supreme gives better results in terms of mucosal pressure and throat discomfort.

The independent effect of the type of device was pointed out by our multivariate analysis. Even after accounting for patient characteristics, LMA Supreme had almost three times the odds of successful first-pass insertion (AOR 2.99, p = 0.040). An increase in age was negatively correlated with success, which indicated a slightly lower success rate in older patients. This might be explained by alterations in tissue elasticity or airway reflexes with age. Past studies have shown similar associations between patient factors and supraglottic airway performance. Zhang et al. found out that anatomical airway characteristics play a significant role in predicting successful device placement and the importance of airway geometry on the prediction of device efficacy.[25] Moreover, Kim et al. showed that age and airway characteristics independently influence insertion success and the significance of patient-specific factors in managing supraglottic airways.[26] Interestingly, ASA status II was a predictor of better success; one way this could be explained is that patients with ASA II (who often have some underlying conditions) may have been more sedated or relaxed and therefore able to insert SAD but this observation should be taken with caution. An increased sternomental distance (a sign of easier anatomy of the airway) also was a major predictor of success as expected in the literature on airway anatomy. The main conclusion is that, despite these considerations, the decision between LMA Supreme and i-gel was still a strong indicator of the successful insertion.

These results mean a lot in terms of airways management training and procedures. Novice anesthetists and emergency responders can achieve a more reliable first-attempt ventilation using the LMA Supreme. When used in a training or simulation setting, it might be more effective to focus on devices that contribute to early success, which could make trainees feel more confident and safe. When faced with an emergency situation in Plan B, the more successful first-pass, the lower the number of hypoxic episodes. However, the simplicity of use and fewer complications (minimal hemodynamic impact and less throat discomfort) of the i-gel guarantee its applicability, particularly in cases where rapid deployment is needed, and there is no need to inflate the cuff. Our results indicate that the training programs and institutional protocols should focus on proficiency with the Supreme among novice users as well as making sure that they understand the advantages of using the i-gel. With limited resources or in pre-hospital environments where providers may not be well trained, the decision to use the device that has higher success rate (i.e., Supreme in our data) may be essential in saving lives.

Strengths and limitations: The randomized design and controlled clinical environment are advantages, along with the unique emphasis on true novices in actual patients. We carefully compared technical performance (insertion measures, seal pressure) and patient outcomes (vital signs, complications). However, they have certain limitations. The study was done in one center with a rather small sample; larger multicenter researches would help increase the level of generalizability. The involved novices were not untrained individuals, but instead trained residents who had undergone a recent training so they should be cautious of applying this to fully untrained providers. This may have been biased since the operators and the outcome assessors were not blinded (although objective measures like capnography are very reliable). We just considered the short-term results; more serious complications might be observed in the course of a more extended follow-up. Lastly, we tested the ASA I–II elective cases i.e. the outcomes could be different in emergency scenarios or where we have problem-airway cases.

Conclusion

We find that the LMA Supreme had been more effective in novice users: it was more likely to succeed in the first attempt, to insert more quickly, and to seal better, even though it had more cases of sore throats. The i-gel remained a safe choice, which is easy to place and possesses less mucosal trauma. A balance of these factors will be needed to select the device in clinical practice, although our results suggest that the LMA Supreme can bring a major benefit to novices trying to achieve the airway quickly and efficiently, therefore, increasing patient safety in an emergency setting.

Reference

1. Ramesh S, Jayanthi R, Archana SR. Paediatric airway management: What is new? Indian J Anaesth. 2012 Sep;56(5):448–53. doi:10.4103/0019-5049.103959 PubMed PMID: 23293383; PubMed Central PMCID: PMC3530999.
2. Tan Y, Jiang J, Wang R. Contrast of oropharyngeal leak pressure and clinical performance of I-gel™ and LMA ProSeal™ in patients: A meta-analysis. Wolf A, editor. PLoS ONE. 2022 Dec 15;17(12):e0278871. doi:10.1371/journal.pone.0278871
3. Shiveshi P, Anandaswamy TC. Comparison of Proseal LMA with i-Gel in children under controlled ventilation: a prospective randomised clinical study. Braz J Anesthesiol. 2022;72(2):247–52. doi:10.1016/j.bjane.2021.02.042 PubMed PMID: 33823205; PubMed Central PMCID: PMC9373209.
4. Liew G, Yu E, Shah S, Kothandan H. Comparison of the clinical performance of I-gel, LMA Supreme and LMA ProSeal in elective surgery. smedj. 2016 Aug;57(8):432–7. doi:10.11622/smedj.2016133
5. Keller C, Brimacombe JR, Keller K, Morris R. Comparison of four methods for assessing airway sealing pressure with the laryngeal mask airway in adult patients. Br J Anaesth. 1999 Feb;82(2):286–7. doi:10.1093/bja/82.2.286 PubMed PMID: 10365012.
6. Bal Singh Kethavath, Abhishake Kumar, Anjali Dixit, Subhash Dahiya. A Comparative Study between the Efficiency of LMA-Supreme and I-Gel in Adult Patients Undergoing Elective Surgery: A Randomized Controlled Trial [Internet]. 2024 Sep 30. doi:10.5281/ZENODO.13910062
7. Chen X, Jiao J, Cong X, Liu L, Wu X. A Comparison of the Performance of the I-gel™ vs. the LMA-S™during Anesthesia: A Meta-Analysis of Randomized Controlled Trials. Mandell MS, editor. PLoS ONE. 2013 Aug 12;8(8):e71910. doi:10.1371/journal.pone.0071910
8. Russo SG, Cremer S, Galli T, Eich C, Bräuer A, Crozier TA, et al. Randomized comparison of the I-gel™, the LMA Supreme™, and the Laryngeal Tube Suction-D using clinical and fibreoptic assessments in elective patients. BMC Anesthesiol. 2012 Dec;12(1):18. doi:10.1186/1471-2253-12-18
9. Chew EFF, Hashim NHM, Wang CY. Randomised Comparison of the LMA Supreme™ with the I-Gel™ in Spontaneously Breathing Anaesthetised Adult Patients. Anaesth Intensive Care. 2010 Nov;38(6):1018–22. doi:10.1177/0310057X1003800609
10. Chen X, Jiao J, Cong X, Liu L, Wu X. A Comparison of the Performance of the I-gel™ vs. the LMA-S™during Anesthesia: A Meta-Analysis of Randomized Controlled Trials. Mandell MS, editor. PLoS ONE. 2013 Aug 12;8(8):e71910. doi:10.1371/journal.pone.0071910
11. Ragazzi R, Finessi L, Farinelli I, Alvisi R, Volta CA. LMA Supreme™ vs i-gel™ – a comparison of insertion success in novices. Anaesthesia. 2012 Apr;67(4):384–8. doi:10.1111/j.1365-2044.2011.07002.x
12. Kundal R, Puri K, Agrawal G, Singh R, Pandey M. A randomized controlled study to compare oropharyngeal leak pressure between I-gel™ and laryngeal mask airway supreme™ in children in lateral position under general anesthesia. Ain-Shams J Anesthesiol. 2023 Mar 27;15(1):17. doi:10.1186/s42077-023-00315-9
13. Teoh WHL, Lee KM, Suhitharan T, Yahaya Z, Teo MM, Sia ATH. Comparison of the LMA Supreme vs the i-gel™ in paralysed patients undergoing gynaecological laparoscopic surgery with controlled ventilation*. Anaesthesia. 2010 Dec;65(12):1173–9. doi:10.1111/j.1365-2044.2010.06534.x
14. Townsend R, Brimacombe J, Keller C, Wenzel V, Herff H. Jaw thrust as a predictor of insertion conditions for the proseal laryngeal mask airway. Middle East J Anaesthesiol. 2009 Feb;20(1):59–62. PubMed PMID: 19266827.
15. Tham HM, Tan SM, Woon KL, Zhao YD. A comparison of the Supreme™ laryngeal mask airway with the Proseal™ laryngeal mask airway in anesthetized paralyzed adult patients: a randomized crossover study. Can J Anesth/J Can Anesth. 2010 Jul;57(7):672–8. doi:10.1007/s12630-010-9312-6
16. Frerk C, Mitchell VS, McNarry AF, Mendonca C, Bhagrath R, Patel A, et al. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. British Journal of Anaesthesia. 2015 Dec;115(6):827–48. doi:10.1093/bja/aev371
17. Henlin T, Sotak M, Kovaricek P, Tyll T, Balcarek L, Michalek P. Comparison of Five 2nd-Generation Supraglottic Airway Devices for Airway Management Performed by Novice Military Operators. BioMed Research International. 2015;2015:1–8. doi:10.1155/2015/201898
18. Theiler LG, Kleine-Brueggeney M, Kaiser D, Urwyler N, Luyet C, Vogt A, et al. Crossover Comparison of the Laryngeal Mask Supreme™ and the I-gel™ in Simulated Difficult Airway Scenario in Anesthetized Patients. Anesthesiology. 2009 Jul 1;111(1):55–62. doi:10.1097/ALN.0b013e3181a4c6b9
19. Benger JR, Kirby K, Black S, Brett SJ, Clout M, Lazaroo MJ, et al. Effect of a Strategy of a Supraglottic Airway Device vs Tracheal Intubation During Out-of-Hospital Cardiac Arrest on Functional Outcome: The AIRWAYS-2 Randomized Clinical Trial. JAMA. 2018 Aug 28;320(8):779. doi:10.1001/jama.2018.11597
20. Aggarwal M, Yadav R, Singh S, Department of Anaesthesiology & Critical Care, Command Hospital (SC), Pune, India, Department of Anaesthesiology & Critical Care, Armed Forces Medical College, Pune, India, Bansal D, et al. Clinical Comparison of I-gel and Laryngeal Mask Airway-Supreme Airway Devices During General Anaesthesia in the Paediatric Population. Turk J Anaesthesiol Reanim. 2021 Jun 24;49(3):244–9. doi:10.5152/TJAR.2021.614
21. Hwang J, Hong B, Kim YH, Lee WH, Jo Y, Youn S, et al. Comparison of laryngeal mask airway

supremeTM as non-inflatable cuff device and self-pressurized air-QTM in children: Randomized controlled non-inferiority study. Medicine. 2019 Mar;98(10):e14746. doi:10.1097/MD.0000000000014746

22. Ye Q, Wu D, Fang W, Wong GTC, Lu Y. Comparison of gastric insufflation using LMA-supreme and I-gel versus tracheal intubation in laparoscopic gynecological surgery by ultrasound: a randomized observational trial. BMC Anesthesiol. 2020 Dec;20(1):136. doi:10.1186/s12871-020-01057-z
23. Lefevre RJ, Jelly CA, Schmelz C, Bennett J, Shi Y, Shotwell M, et al. Comparison of I-gel® and LMA® Supreme™ for Facilitating Fiberoptic Endotracheal Intubation: A Prospective Randomized Trial. AANA J. 2024 Jun;92(3):197–205. PubMed PMID: 38758714.
24. Okyay RD, Küçükosman G, Köksal BG, Pişkin Ö, Ayoğlu H. Effects of Supraglottic Airway Devices on Hemodynamic Response and Optic Nerve Sheath Diameter: Proseal LMA, LMA Supreme, and I-gel LMA. Medicina. 2023 Apr 12;59(4):753. doi:10.3390/medicina59040753
25. Zhang K. Supraglottic airway devices: a powerful strategy in airway management. Am J Cancer Res. 2024;14(1):16–32. doi:10.62347/KJRU4855
26. Kim GW, Kim JY, Kim SJ, Moon YR, Park EJ, Park SY. Conditions for laryngeal mask airway placement in terms of oropharyngeal leak pressure: a comparison between blind insertion and laryngoscope-guided insertion. BMC Anesthesiol. 2019 Dec;19(1):4. doi:10.1186/s12871-018-0674-6