Comparison of I-gel and Laryngeal mask airway (LMA) Supreme during laparoscopic Gynecological procedure

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Abstract

Background: The I-gel is a latex-free SAD that has a non-inflatable cuff and medical-grade thermoplastic elastomer. The design allows for a more close interaction when engaging with supraglottic tissue. The goal of the present prospective study was to compare the performance of the I-gel with that of the LMA-Supreme.

Methods: The present prospective study was conducted on 100 adult patients with age between 18 to 60 years with American Society of Anesthesiologists (ASA) physical status I or II who were scheduled to undergo elective laparoscopic Gynecological procedure under general anesthesia were included in the study. Patient having gastric reflux, Obesity (BMI >30kg/m2), cervical spine disease or difficult airway were excluded from the study. The study was conducted after obtaining approval from the Institutional Review Board. A written informed consent for participation in the study was obtained from each patient.

Results: The mean time for insertion in the Group SLMA was 29 sec which was significantly more as compared to 21 sec in Group I-gel ($p<0.0001$). 84% cases from the Group I-gel had ease of insertion which was significantly more as compared to 82% among the Group SLMA. There was no significant difference in the incidence of post-operative complications between the groups ($p>0.05$).

Conclusion: In conclusion, both devices were similarly successful ventilatory devices for gynaecological laparoscopic procedures in terms of ease of insertion, first-time success rates, time to insertion, and oropharyngeal leak pressure.

Key words: I-gel, Laryngeal mask airway (LMA) Supreme**,** laparoscopic Gynecological procedure,

Introduction

Airway management has become more refined with the introduction of many airway devices. In the past several decades, a variety of supraglottic airway devices (SADs) have been introduced with the goal of a more convenient replacement of tracheal intubation. Stable hemodynamic, easy insertion, favorable respiratory mechanics, and reduced airway congestion are advantages of SADs[1].The I-gel is a latex-free SAD with a non-inflatable cuff and medical-grade thermoplastic elastomer. The design provides for more close interface for interacting with supraglottic tissue[2]. For both controlled ventilation and spontaneous breathing during anesthesia, I-gel provides a good sealing[3-5].

The LMA Supreme device consists of a curved and rigid airway tube, a drain tube placed within the center of the airway, and a fairly large inflatable cuff made of medical-grade plastic that gives high airway leak pressure. There is a remarkable interest in both devices. In a various situations, number of studies has been conducted to respond to concerns about their safety and effectiveness [6-8].

Many features can influence the choice of a supraglottic airway device (SAD), including ease of insertion, adequate ventilation pressures and lack of adverse effects. The goal of the present prospective study was to compare the performance of the I-gel with that of the LMA-Supreme.

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Materials and Methods:

The prospective study was conducted on 100 adult patients with age between 18 to 60 years with American Society of Anesthesiologists (ASA) physical status I or II who were scheduled to undergo elective laparoscopic Gynecological procedure under general anesthesia were included in the study. Patient having gastric reflux, Obesity(BMI >30kg/m2), cervical spine disease or difficult airway were excluded from the study. The study was conducted after obtaining approval from the Institutional Review Board. A written informed consent for participation in the study was obtained from each patient.

Data collection procedure:

The patients were randomly allocated into the I-gel or SLMA group (50 patients in each group)

All patients given premedication of Inj. Glycopyrolate 0.004 mg/kg, InjOndansetron0.15 mg/kg

Then patients taken on operation table & monitors by using ECG, pulse oximeter & NIBP attached. All patients preoxygenated with 100% O2 by mask for 3 minutes (ETCO2 attached to mask)

After that, Inj Midazolam 0.02 mg/kg &Inj Fentanyl 2 mcg/kg was given, patients induced with Inj. Propofol 2-2.5 mg/kg. Muscle relaxation achieved with Inj Vecuronium 0.1 mg/kg. Patients were monitored from time of propofol induction at 2 min, 4min, 6 min, 8 min 10 min and after that every 5min till end of procedure.

After ventilating patient for 5minutes, SAD was introduced after lubricating with water based jelly. Device connected to circuit, capnograph checked & bilateral air entry noted. Ease of insertion was studied which was defined as no resistance to insertion of device in pharynx in single attempt. Time taken for insertion of device noted.

If an effective airway was not achieved then manipulations were done in the form of giving jaw thrust, chin lift or changing the size of device. A gastric tube was placed through the gastric vent tube of the device. If the insertion of an SAD required more than four attempts, it was considered a failure, and a tracheal tube was inserted.

Anaesthesia was maintained with O2:N2O:sevoflurane & Inj Vecuronium. At the end of surgery, Inj Neostigmine 0.05 mg/kg and Glycopyrrolate 0.008 mg/kg were used to reverse the effects of Vecuronium.

At end of the procedure, all the patients were ventilated with 100% oxygen during emergence from anaesthesia. The device was removed when the patient was able to open the mouth on command. The patient was inspected for any injury to lips, teeth or tongue and the device was inspected for the presence of any blood stains. The mask of the airway was inspected for the presence of any gastric contents to confirm regurgitation. All the patients were observed for a period of 24 hours for any complaints of sore throat.

Sore throat incidence was evaluated using a 3 point scale

0 -	No complaints
1 (mild) -	Throat discomfort
2 (moderate) -	Continuous throat pain.
3 (Sever) -	irritating continuous throat pain which require intervention like nebulization, analgesics

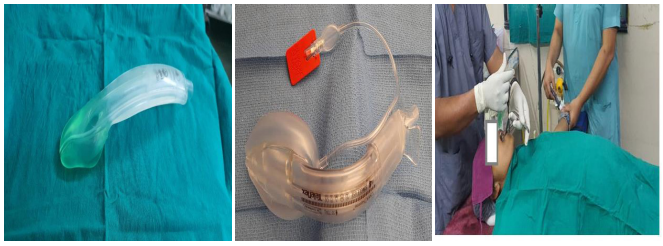

Fig.-1: I-gel and SLMA

Statistical analysis:

Descriptive statistics such as mean, SD and percentage was used to present the data. Comparison between groups was performed by using t-test for continuous data and Chi-square test or Fisher's exact test for categorical data. A p-value less than 0.05 were considered as significant. Data analysis was performed by using software SPSS v20.0

Result:

Table 1 :Basic characteristics

Parameter	I Gel Group		SLMA Group		P value
	Mean	SD	Mean	SD	
Age (yrs)	31.3	6.7	32.4	5.9	0.87
Weight (Kg)	49.45	11.25	50.35	10.78	0.41
Type of surgery					
Diagnostic laparoscopy	34 (68)		32 (64)		0.67
Ovarian cystectomy	6 (12)		9 (18)		0.40
Lap myomectomy	4 (8)		5 (10)		0.73
Total lap Hysterectomy	6 (12)		4 (8)		0.50

Both the groups were comparable with respect to basic characteristics and there was nostatistically significant difference between the groups (p>0.05).

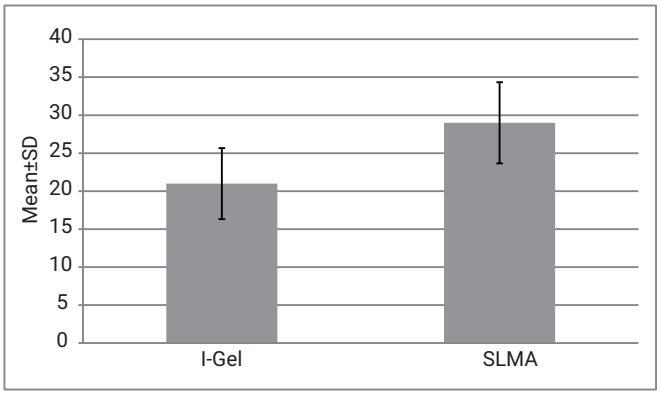

Fig.-2 : Comparison of mean time for insertion between two groups

The comparison of mean time required for insertion of the insertion of device between Group I-gel and Group SLMA. The mean time for insertion in the Group SLMA was 29 sec which was significantly more as compared to 21 sec in Group I-gel (p<0.0001) (Fig.-2)

Table2 :Comparison of ease of insertion between two groups

Ease of insertion	I-gel Group		SLMA Group	
	No.	%	No.	%
Attempts				
One	42	84%	41	82%
Two	5	10%	8	16%
Change of size	3	6%	1	2%
intubation	-	0%	-	0%
Audible leak	5	10%	3	6%
Peak ventilatory pressure	32 cm of H2O		33 cm of H2O	

84% cases from the Group I-gel had ease of insertion which was significantly more as compared to 82% among the Group SLMA.

In I-gel group, 42 (84%) were successfully inserted in first attempt, 5 (10%) in 2nd attempt & 3 (6%) required change of size of I gel

In SLMA group, 41 (82%)were successfully inserted in 1st attempt while 8 (16%) require 2ndattempt & 1 (2%) required change of size.

After pneumoperitoneum change of size of I gel require in 3 (6%) patients while 1 (2%) in SLMA. Though it is not statistically significant, it can be related to cuff inflation available in SLMA.

During pneumo-peritoneum, an audible air leak occurred with 5 (10%) patients in the i-gel group and 3 (6%) patients in the SLMA group.

The comparison of airway manipulations required to achieve an effective airway. Airway manipulations (e.g., pushing and pulling of the device, jaw thrust, chin lift, neck extension, or flexion)were required in 5 (10%) patients in the i-gel group and 4 (8%) patients in the SLMA group (Fig.-3).

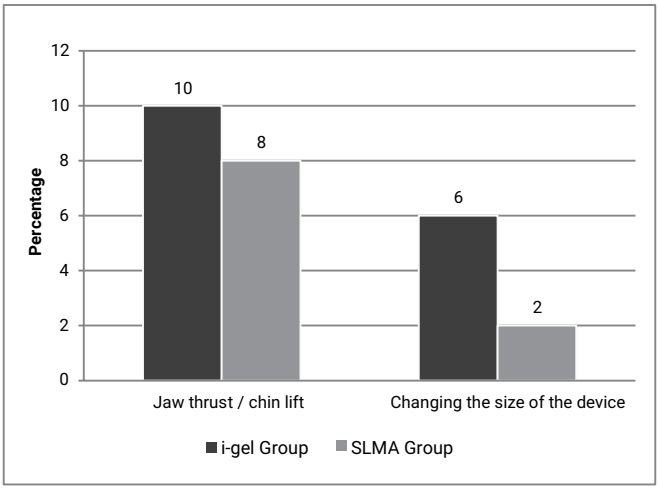

Fig.- 3 : Profile of airway manipulations required

Table 3 :Comparison of complications between groups

Complications	I Gel Group (%)	SLMA Group (%)	p value
Repositioning during surgery	1 (2)	2 (4)	0.58
Blood on device	1 (2)	1 (2)	1.0
Sore throat (zero/ mild/mod/sev)			
Normal	39 (78)	36 (72)	0.49
Mild	8 (16)	12 (24)	0.32
Moderate	3 (6)	2 (4)	0.65
Severe	0	0	-
Cough (zero/mild/ mod/sev)			
Normal	42 (84)	41 (82)	0.79
Mild	6 (12)	8 (16)	0.56
Moderate	2 (4)	1 (2)	0.56
Severe	0	0	-
Dysphagia (zero/ mild/mod/sev)			
Normal	48 (96)	49 (98)	0.56
Mild	2 (4)	1 (2)	0.56
Moderate	0	0	-
Severe	0	0	-
Dysphonia (zero/ mild/mod/sev)			
Normal	49 (98)	49 (98)	1.0
Mild	1 (2)	1 (2)	1.0
Moderate	0	0	-
Severe	0	0	-

There was no significant difference in the incidence of postoperative complications between the groups (p>0.05). Blood on the device was observed one case in both group. No sore throat seen in 39 (78%) patients inI-gel group & 36 (72%) patients in SLMA group. Mild sore throat seen in 8 (16%) of I gel group & 12 (24%) of SMLA group. While Moderate sore throat seen in 3 (6%) in I gel group & 2 (4%)in SMLA group.

Similarly for Cough, no cough seen in 42 (84%) patients inI-gel group &41 (82%) patients in SLMA group. Mild cough seen in 6 (12%) of I gel group & 8 (16%) of SMLA group. While Moderate cough seen in 2 (4%) in I gel group &1 (2%)in SMLA group.

For Dysphagia, no Dysphagia seen in 48 (96%) patients inI-gel group & 49 (98%) patients in SLMA group, whereas no Dysphonia seen in 49 (98%) patients both groups.

Discussion:

Teoh W H et al. found good success rates on the first attempt and no changes in leak pressure in 100 sedated and paralyzed female patients undergoing gynaecological procedures when comparing the LMA-Supreme with the I-gel[9].

Chew E E et al. studied anesthetized adult patients who were spontaneously breathing. They found that, the LMA Supreme had greater leak pressures than the i-gel [25.6 (5.1) cm H2O vs 20.7 (5.9) cm H2O, respectively], but their initial and overall successful insertion rates were not statistically different. Tidal volume and airway leak pressure were also comparable[10].

Russo et al. reported that the two devices had equal leak pressure, insertion duration, and insertion success rate[11].

Although it took slightly longer to implant the LMA-Supreme than the i-gel, the clinical significance of this finding is remains questionable. The mean difference was barely eight seconds, which was most likely due to cuff inflation.

I-gel had a shorter mean device insertion time (21 ± 4.67 seconds) than SLMA (29 ± 5.34 seconds) (p<0.0001). Zundert V et al and Fernandez et al reported opposite findings, demonstrated in their study that the SLMA was easier to introduce and had a shorter effective airway time than the I-gel[12,13]. However, Radhika KS et al. and Park SY et al. reported that the insertion time was the same for both devices[14,15].

The i-gel group had a higher first-time insertion success rate than the LMA-Supreme group (84% vs 82%, respectively) in the present study. Similar findings also reported by Teoh W H et al[9], 96% success rate for I-gel and a 94% success rate for SLMA on the first attempt, whereas Liew GHC et al found that the success percentage of the first insertion attempt was higher for I-gel (90%) than SLMA (82%)[16]. Radhika reported that the first attempt insertion success rate for I-gel was 76% compared to 71% for SLMA, which is lower than the rate seen in this study[14].

There was no significant difference in post-operative complications such as sore throat, cough, and dysphagia between the two devices. Chen X et al., conducted a meta-analysis that included 10 studies comparing the I-gel to the LMA-Supreme. They found that both devices were comparable, with high success rates and fast insertion times. When compared to the i-gel, gastric tube insertion through the LMA-Supreme was easier and associated with additional sore throat[17].

Despite the fact that the i-gel and LMA-Supreme performed similarly well in terms of ventilatory and leak pressures, clinicians frequently pick these SADs because the design is meant to limit the risk of pulmonary aspiration. Both devices have an esophageal drain that is supposed to reduce the volume of air trapped in the stomach while also acting as a vent in the event of regurgitation.

Although a proper examination of the SAD's drain tube's preventive role against the risk of pulmonary aspiration is still required, this study reveals that the drain tubes in the i-gel and the LMA-Supreme are, in the vast majority of cases, correctly positioned with relation to the oesophagus. Even if the SAD provides appropriate ventilation, the drain is not in the proper place in 4% of cases.

This study demonstrates that the performance of the i-gel and the LMA-Supreme operate similarly in terms of leak or peak ventilatory pressures, drain tube alignment, and side effects. The I-gel took a few seconds less to install than the LMA-Supreme. Many factors can influence the selection of a SAD. The most desirable aspects we seek for in such devices are ease of insertion, sufficient ventilation pressures, and a lack of side effects. The absence of an inflatable cuff, which makes the I-gel easier to manipulate, is one of its distinguishing features. The inflatable cuff of the LMA Supremes, on the other hand, may enable a more personalised fit in the pharynx and hypopharynx. According to our findings, both devices have comparable successful insertion rates as well as corresponding leak and peak inspiratory pressure.

Conclusion:

In conclusion, we established in this study that the seal pressure of the i-airway gel is similar to that of the LMA Supreme. Both devices were similarly effective

ventilatory devices for gynaecological laparoscopic procedures in terms of ease of insertion, success rates on the first attempt, time to insertion, and oropharyngeal leak pressure in our study.

References

1. *Sharma B, Sehgal R, Sahai C, Sood J. PLMA vs. I-gel: A Comparative Evaluation of Respiratory Mechanics in Laparoscopic Cholecystectomy. J Anaesthesiol Clin Pharmacol. 2010 Oct;26(4):451-7. PMID: 21547168; PMCID: PMC3087251.*
2. *Jeon WJ, Cho SY, Baek SJ, Kim KH. Comparison of the Proseal LMA and intersurgical I-gel during gynecological laparoscopy. Korean J Anesthesiol. 2012 Dec;63(6):510-4. doi: 10.4097/kjae.2012.63.6.510. Epub 2012 Dec 14. PMID: 23277811; PMCID: PMC3531529.*
3. *Uppal V, Gangaiah S, Fletcher G, Kinsella J. Randomized crossover comparison between the i-gel and the LMA-Unique in anaesthetized, paralysed adults. Br J Anaesth. 2009 Dec;103(6):882-5. doi: 10.1093/bja/aep292. Epub 2009 Oct 20. PMID: 19846406.*
4. *Francksen H, Renner J, Hanss R, Scholz J, Doerges V, Bein B. A comparison of the i-gel with the LMA-Unique in non-paralysed anaesthetised adult patients. Anaesthesia. 2009 Oct;64(10):1118-24. doi: 10.1111/j.1365-2044.2009.06017.x. PMID: 19735404.*
5. *Uppal V, Fletcher G, Kinsella J. Comparison of the i-gel with the cuffed tracheal tube during pressure-controlled ventilation. Br J Anaesth. 2009 Feb;102(2):264-8. doi: 10.1093/bja/aen366. PMID: 19151051.*
6. *Theiler LG, Kleine-Brueggeney M, Kaiser D, Urwyler N, Luyet C, Vogt A, Greif R, Unibe MM. Crossover comparison of the laryngeal mask supreme and the i-gel in simulated difficult airway scenario in anesthetized patients. Anesthesiology. 2009 Jul;111(1):55-62. doi: 10.1097/ALN.0b013e3181a4c6b9. PMID: 19512881.*
7. *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. Epub 2012 Feb 13. PMID: 22329593.*
8. *Eschertzhuber S, Brimacombe J, Kaufmann M, Keller C, Tiefenthaler W. Directly measured mucosal pressures produced by the i-gel™ and Laryngeal Mask Airway Supreme™ in paralysed anaesthetised patients. Anaesthesia. 2012 Apr;67(4):407-10. doi: 10.1111/j.1365-2044.2011.07024.x. Epub 2012 Feb 11. PMID: 22324968.*
9. *Teoh WH, Lee KM, Suhitharan T, Yahaya Z, Teo MM, Sia AT. 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. Epub 2010 Oct 19. PMID: 20958278.*
10. *Chew EF, Hashim NH, Wang CY. Randomised comparison of the LMA Supreme™ with the I-Gel™ in spontaneously breathing anaesthetised adult patients. Anaesthesia and intensive care. 2010 Nov;38(6):1018-22.*
11. *Russo SG, Cremer S, Galli T, Eich C, Bräuer A, Crozier TA, Bauer M, Strack M. 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):1-9.*
12. *Van Zundert TC, Brimacombe JR. Similar oropharyngeal leak pressures during anaesthesia with i-gelTM, LMA-ProSealTM and LMA-SupremeTM Laryngeal Masks. Acta Anaesthesiol Belg 2012 Jan 1;63(1):35-41.*
13. *Fernández Díez A, Pérez Villafañe A, Bermejo González JC, Marcos Vidal JM. Estudio comparativo entre las mascarillas laríngeas Supreme e I-gel en pacientes con anestesia general sin bloqueo neuromuscular, con ventilación mecánica [Supreme laryngeal mask airway vs the I-gel supraglottic airway in patients under general anesthesia and mechanical ventilation with no neuromuscular block: a randomized clinical trial]. Rev Esp Anestesiol Reanim. 2009 Oct;56(8):474-8. Spanish. doi: 10.1016/s0034-9356(09)70437-2. PMID: 19994615.*
14. *Radhika KS, Sripriya R, Ravishankar M, Hemanth Kumar VR, Jaya V, Parthasarathy S. Assessment of suitability of i-gel and laryngeal mask airway-supreme for controlled ventilation in anesthetized paralyzed patients: A prospective randomized trial. Anesth Essays Res. 2016 Jan-Apr;10(1):88-93. doi: 10.4103/0259-1162.167849. PMID: 26957697; PMCID: PMC4767080.*
15. *Park SY, Rim JC, Kim H, Lee JH, Chung CJ. Comparison of i-gel® and LMA Supreme® during laparoscopic cholecystectomy. Korean J Anesthesiol. 2015 Oct;68(5):455-61. doi: 10.4097/kjae.2015.68.5.455. Epub 2015 Sep 30. PMID: 26495055; PMCID: PMC4610924.*
16. *Liew GH, Yu ED, Shah SS, Kothandan H. Comparison of the clinical performance of i-gel, LMA Supreme and LMA ProSeal in elective surgery. Singapore Med J. 2016 Aug;57(8):432-7. doi: 10.11622/smedj.2016133. PMID: 27549212; PMCID: PMC4993967.*
17. *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. PLoS One. 2013 Aug 12;8(8):e71910. doi: 10.1371/journal.pone.0071910. PMID: 23951266; PMCID: PMC3741209.*

Conflict of interest: Nil

Source of funding: Nil

Date received: Feb 02, 2022

Date accepted: May 12, 2022