

Assessment of Clinical Performance of Supraglottic Airway Devices in Adults for Short Surgical Procedures

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Abstract

Aim: In the present study we compared the clinical performance of the I-gel and LMA in terms of the effectiveness and safety administration in anesthetized patients. **Materials & Methods:** A total of 100 patients with requirement of different abdominal surgery were included in the study. Water soluble jelly was used to lubricate I-gel and LMA-Proseal. An experience anaesthesiologist inserted each of the devices. Both the devices were set by taping the tube over the chin and lubricated gastric tube was situated into the stomach through the gastric channel. **Results:** The average airway sealing pressure with LMA - ProSeal was 29.6 cm H₂O and with I-gel was 25.27 cm H₂O, the difference was set up to be statistically significant (p<0.05). There was no occurrence of bronchospasm/laryngospasm, aspiration/regurgitation and hoarseness in both the groups. **Conclusion:** I-gel is a straight forward tool which is uncomplicated to insert without much of manipulations quickly. It has a possible benefit of effectual seal force which is fewer as compared to LMA-Proseal, but is sufficient to avoid aspiration and preserve an effective ventilation and oxygenation.

Keywords: Adult; Abdominal Surgery; I-gel; LMA-Proseal.

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Introduction

Supraglottic airway devices with gastric access tubes are ever more being utilized in surgery needs general anaesthesia and positive pressure ventilation. The I-gel is a throwaway supraglottic airway tool with noninflatable cuff and is prepared from thermoplastic elastomer, which is different laryngeal masks [1].

The manufacturer states that I-gel is proper for hypopharyngeal anatomy, offers good perilaryngeal sealing, and diminish the jeopardy of airway obstacle by preventing intraoral trauma and folding of

epiglottis, owing to the device's soft and gel-like structure [2]. It is composed of a soft, gel-like, transparent, thermoplastic elastomer. It is intended to attain a mirrored impression of the pharyngeal and laryngeal arrangement and to give a perilaryngeal seal without cuff inflation [3].

The manufacturer states that I-gel is appropriate for hypopharyngeal anatomy, gives high-quality perilaryngeal sealing, and decreases the danger of airway obstruction by preventing intraoral trauma and folding of epiglottis, due to the device's soft and gel-like structure [2,4]. I-gel is a fresh supraglottic airway apparatus with anatomically planned, non-

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inflatable mask, which is soft gel like and translucent made of medical grade thermoplastic elastomer called styrene ethylene butadiene styrene [5].

The soft no inflatable cuff fits of laughter warmly onto the perilaryngeal framework and its incline slander in the proximal aperture of the esophagus, thus separating oropharyngeal opening from the laryngeal opening [6]. The device has a buccal cavity stabilizer which has a tendency to adjust its form to the oropharyngeal curvature of the patient. This buccal cavity stabilizer houses airway tubing and a disconnect gastric channel [7].

The LMA, on the other hand, is one more supraglottic device introduced in 2007, with many alike description to the I-gel: single use; existence of a drain tube to divide the gastrointestinal tract from the respiratory tract; and built-in bite block. It vary from the i-gel in that it is build of medical grade silicone, and has an inflatable cuff, a reinforced tip, and an elliptical, anatomically shaped, semi-rigid airway tube [8].

We evaluate the clinical recital of the I-gel and LMA in terms of the effectiveness and protection administration in anesthetized patients on controlled ventilation, undergo elective surgical actions with reverence to airway sealing pressure, simplicity of insertion, insertion efforts, alleviate of gastric tube assignment, and difficulties.

Materials & Methods

A total of 100 patients with requirement of different abdominal surgery were incorporated in the study. The patients with recognized difficulty of airway, mouth opening fewer than 2.5 cm, cervical spine illness and gastroesophageal reflux disease and those in necessity of crisis surgeries were expelled from the study.

Patients were given alprazolam 0.25 mg orally at 10 p.m. the night prior to surgery and yet again 2 hours earlier to surgery with 1-2 sips of water. Glycopyrrolate 0.2 mg, metoclopramide 10 mg, and ranitidine 50 mg were delivered intravenously (IV) to the patients 45 minutes earlier to the surgery. Baseline parameters were noted. Anaesthesia was induced with fentanyl 2 µg/kg and propofol 2-2.5 mg/kg IV.

Water soluble jelly was used to lubricate I-gel and LMA-Proseal. An experience anaesthesiologist inserted each of the devices. Both the devices were fixed by taping the tube over the chin and lubricated

gastric tube was placed into the stomach through the gastric channel. Preservation was accomplished by oxygen, nitrous oxide, isoflurane and intermittent doses of intravenous vecuronium. Intraoperative heart rate, noninvasive blood pressure, oxygen saturation and end tidal carbon dioxide were documented ahead of induction and at 1 and 5 minutes following placing of device and then at every 5 minutes interval till the end of surgery.

The ease of insertion of device was too recorded. Ease was defined as no confrontation to insertion in the pharynx in a single maneuver. In a tricky insertion there was opposition to insertion or additional than one maneuver was requisite for the accurate placement of the device.

The ease of placement of gastric tube was too recorded and its accurate position was established by injection of air and epigastric auscultation or aspiration of gastric contents. Breakdown of gastric tube assignment was also recorded.

The airway sealing pressure was resolute by concluding the expiratory valve of the circle system at a rigid gas flow of 3 L/minute and recording the airway pressure at which equilibrium was accomplished. Gas leakage was indomitable at the mouth by the perceptible escape or by uncovering of an audible noise using a stethoscope placed just lateral to thyroid cartilage. Blood discoloration of the device and tongue, lip and dental distress were recorded. Pharynaolaryngeal morbidity was measured as hoarseness of voice in the post-anaesthesia care unit and 24 hours consequently.

Statistical Analysis

Qualitative data will be expressed as percentages and proportions. Quantitative data will be expressed as mean and standard deviation. The differences between two groups with respect to continuous variables will be analysed using t-test while categorical variables will be analysed using chi-square test. All the statistical tests will be performed in SPSS version 15 software. P value <0.05 will be considered as statistically significant while P value < 0.01 will be considered as statistically highly significant. The between group comparison of compressive strength of samples in Group A and B was done using One-way ANOVA test. Within group comparison was done using Bonferroni correction test. In the tests, p value of ≤ 0.05 was considered as statistically significant.

Results

No statistical difference was obtained in respect to the demographic and surgical particulars between the two groups (Table 1). Only three attempts were allowed or made for the insertion of the I-gel or LMA-ProSeal.

The average airway sealing pressure with LMA-ProSeal was 29.6 cm H₂O and with I-gel was 25.27 cm H₂O, the difference was found to be statistically significant ($p < 0.05$) (Table 2). The ease of insertion was more with I-gel (48/50) than with LMA-ProSeal (43/50) which was statistically significant

($p < 0.05$) (Table 2). The success rate at initial effort of insertion was 50/50 (100%) for I-gel and 48/50 (93.3%) for LMA-ProSeal this relation was statistically not significant. (Table 2) The ease of insertion of gastric tube was further with I-gel (50/50) than with LMA-ProSeal (42/50) (Table 3). Tongue, lip & dental trauma was extra with LMA-ProSeal (10/50) than with I-gel (3/50) and blood staining of the device was additional with LMA-ProSeal (6/50) than with I-gel (2/50) but the findings were not statistically significant (Table 3). There was no occurrence of bronchospasm/laryngospasm, aspiration/ regurgitation and hoarseness in both the groups (Table 3).

Table 1: Demographic data comparison of two groups

Particulars	Group 1 (I-gel)	Group 2 (LMA - Pro Seal)
Age (yrs)	41.26 ± 14.54	40.45 ± 14.44
Weight (kg)	64.24 ± 9.93	63.56 ± 8.99
Hernioplasty	20	23
Lap. Cholecystectomy	10	12
Tibial plating	8	7
Humerus plating	8	4
Skin grafting	4	4

Table 2: Comparison of airway sealing pressure, ease of insertion and insertion attempts

Parameters	I-gel	LMA - ProSeal	P - value
Ease of insertion			
Easy	50	42	< 0.05
Difficult	0	8	
Airway sealing pressure	26.28	27.29	< 0.05
Insertion attempts			
1	50	48	>0.05
2	0	2	
3	0	0	
Failed	0	0	

Table 3: Comparison of other parameters

Parameter	I-gel	LMA-ProSeal	p-value
Ease of gastric tube insertion			
Easy	50	42	>0.05
Difficult	0	8	
Failed	0	0	
Blood staining of device			
Yes	2	6	>0.05
No	48	44	
Tongue - lip - dental trauma			
Yes	3	10	>0.05
No	47	40	
Bronchospasm	0	0	
Hoarseness	0	0	
Regurgitation	0	0	

Discussion

In our present study, the airway sealing pressure was calculated by concluding the expiratory valve of the circle system at a set fresh gas flow until airway pressure reached a steady value. From the findings of the study, we found that I-gel is as effectual as LMA-Proseal in given that airway throughout forced ventilation of lungs. The airway sealing pressure was elevated with LMA-Proseal as compare to I-gel, the dissimilarity was found to be statistically significant. Keller C. et al. and Lopez Gil et al. compared four kinds of dimensions of the airway sealing, pressure, at the end it was done that all four test were outstanding.

The ease of insertion was established to be additional with I-gel as contrast to LMA-ProSeal. The incidence staining of the device was further with LMA-ProSeal than with I-gel & tongue, lip & dental trauma was additional with LMA-ProSeal than with I-gel. on the other hand the difference between the two groups were not significant. Also the incidences with the ease of position of gastric tube assignment in reverence to I-gel & LMA-ProSeal were not significant. Both groups had no occurrence of bronchospasm/laryngospasm, aspiration and hoarseness. A small number of the authors did planned the complexity in using the LMA-ProSeal, Initially Levintan and Kinkle supposed that the dejected leading edge of the exaggerated mask present in the LMA can catch the edge of epiglottis and reason it to down fold or impede correct assignment under the tongue [9].

Conclusion

I-gel is a simple device which is easy to insert without much of manipulations rapidly. It has a potential advantage of effective seal pressure which is less as compared to LMA-ProSeal, but is enough to prevent aspiration and maintain an effective ventilation and oxygenation. Lack of inflatable cuff also resulted in lower incidence of

sore throat. Thus an I-gel can be a useful tool for maintaining airway and intermittent positive pressure ventilation.

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