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A Comparative Study of Lma Supreme with I-Gel in Spontaneously Breathing Anaesthetised Adult Patients

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Abstract

Objective: *To compare two different supraglottic airway devices, LMA Supreme and I-Gel, regarding easiness of insertion of device, gastric insufflations, leak pressure hemodynamic and postoperative complications in anesthetized, spontaneously ventilated adult patients performing elective surgical procedures in supine position.*

Materials and Methods: *60 adult patients scheduled for surgery under general anesthesia were randomly divided into two groups , group I-Gel and group LMA Supreme. Both the groups were compared regarding ease, number of attempts of insertion, incidence of gastric insufflations, leak pressure, hemodynamic changes after insertion and complication after removal of the device.*

Results: *No statistically significant difference was observed between the two groups regarding no of attempts of insertion and complications encountered in placement of I-Gel and SLMA. There was a statistically significant difference regarding change in heart rate and mean arterial blood pressure ($p<0.05$) between two groups. I-Gel is better compared to SLMA. Leak pressure is more in SLMA compared to I-Gel (25.62±4.9in SLMA and 21.2±7.7 in I-Gel. ($P=0.016$). Gastric insufflation is more with I-Gel compared to SLMA. I-Gel 9(22.5) and 2(5) in SLMA group).*

Conclusion: *Both SLMA and I-Gel cause significant alteration in the hemodynamic status of the patient. Insertion of I-Gel is significantly easier than SLMA. Leak pressure is significantly lower in I-Gel and gastric insufflation is significantly higher in I-Gel compared to SLMA. Post operative complications were not significantly different among both SLMA and I-Gel patients. There was a statistically significant difference with regard to heart rate and mean arterial blood pressure post intubation in both the groups. It is evident that I-Gel is better compared to Supreme LMA group.*

Key words: *I-Gel, Supraglottic airway devices, Supreme laryngeal mask airway.*

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I. Introduction

Airway management is one of the most important skill in the field of anaesthesiology and inability to secure airway can lead to catastrophic results. Before the advent of supraglottic airways, only the face mask and endotracheal tube were available devices to secure patients airway in routine surgery or emergency scenario.[1] Since then several supraglottic airway devices have been developed of which the laryngeal mask airway (LMA)was the pioneer.[2]

Supraglottic airway devices are helpful in difficult airway and in emergency life saving procedures. Two new supraglottic airway devices, The LMA Supreme and I-Gel offer potential benefits when inserted to secure airway and to provide ventilation.

I-Gel is a single use supraglottic airway from intersurgical, UK (Intersurgical Ltd. Wokingham, Berkshire, UK) with an anatomically designed mask made of a gel like thermoplastic elastomer. It has features designed to separate the gastrointestinal and respiratory tracts and allow a gastric tube to be passed into the stomach. The tensile properties of the I-Gel, along with its shape and the ridge at its proximal end contribute stability of the device upon insertion. Upon sliding beneath the pharyngoepiglottic folds, it becomes narrower and longer, creating an outward force against the tissues. The ridge at the proximal bowl catches the base of the tongue, also keeping the device from moving upward out of position.[3]

The LMA Supreme (Intavent Orthofix, Maidenhead,UK) was designed in 2007 to combine the desirable features of ILMA and LMA Proseal. It is made of latex-free medical grade polyvinyl chloride (PVC) for single use. Elliptical and anatomically shaped , it facilitates easy insertion, without placing fingers in patients

mouth or requiring an introducer tool. LMA Supreme is a single use inflatable device with an oesophageal drainage tube for suction of gastric contents.[4]

This study compared the insertion success rate, airway leak pressure, gastric insufflations, hemodynamic and adverse events between LMA Supreme and I-Gel when used in spontaneously breathing anaesthetized adult patients.

Aim: To study and compare two supraglottic airway devices I-Gel and Supreme LMA in anesthetized adult patients with spontaneous respiration with respect to ease of insertion and number of attempts of insertion, hemodynamic changes, airway leak pressure, gastric insufflations and complications after extubation.

II. Materials and methods

The study was conducted in Department of Anaesthesiology, Government Medical College, Srikakulam, during the period June 2018 to June 2019. After obtaining permission from institutional ethical committee and written and informed consent from the patients, 60 adult patients scheduled for elective surgery under general anaesthesia requiring endotracheal intubation were randomly divided into two groups. Patients aged between 15-60 years, ASA grade I& II PATIENTS, Malampatti grade I&II patients, Patients with BMI between 20-25kg/m^2 and scheduled for elective surgeries were included in study.

Patients having any abnormality of neck, anticipated difficult airway, upper respiratory tract infection, history of obstructive sleep apnea, Patients with increased risk f aspiration and duration of surgery more than one hour were excluded from study.

The patients were divided into 2 groups, of 30 each, in a random single blinded manner. A detailed medical history, complete medical examination and routine investigations are done for all the patients. IV line secured, the patients were premedicated with Inj Metachlopromide 10 mg. i.v, Inj. Glycopyrolate 0.2 mg, Inj. Fentanyl 2 mcg/kg and Inj Midazolam 0.05mg/kg i.v just before induction. Monitoring of pulse, NIBP, ECG was done. After preoxygenation for 3 minutes, anaesthesia was induced with propofol 2mg/kg i.v. Induction of anaesthesia was confirmed by loss of eye lash reflex, loss of verbal contact with the patient and relaxation of the jaw.

T he size of the devices both I-Gel and S-LMA is decided based on patients body weight and manufacturers recommendation, size 3 for patients weighing between 30-50 kgs, size 4 for patients between 50-90 kgs. The following parameters were recorded 1)number of insertion attempts,2) heart rate and mean arterial pressure at baseline, after insertion of device, during surgery and at the end of surgery after removal of device.

At the end of the operation, anaesthetic agents will be discontinued, allowing smooth recovery of consciousness. The device will be removed after the patient regains consciousness spontaneously and responds to verbal command to open the eyes. If placement of device has failed after three attempts the case will be excluded from study. After securing the device , spontaneous ventilation will be maintained using O2 (33%) +N2O (66%)+ Intermittent Inj. Propofol. Ventilation will be judged to be optimal if there is adequate chest expansion and stable oxygenation, SPO2 not less than 95%. The results were analyzed with the aid of statistician and a sample size of 60 was decided to ensure a level of significance of 5% and a suitable power. Analysis of the statistical data obtained from the study was carried out by a statistical programming software. Statistical package for the SPSS version 10 is the statistical tool used to analyze and correlate social data. The statistical tests applied to the data obtained from the study were Chi- square test. $P< 0.05$ was considered statistically significant.

III. Results

Table-1 Demographic data

S.NO	I-GEL Mean	S.D	SUPREME LMA Mean	S.D	P value
Age in years	37.90	12.32	38.47	11.60	0.541
BMI kg/m^2	22.47	6.49	23.12	6.12	0.354

With a p value of >0.05, both the groups are statistically insignificant with regard to age in years and BMI.

Table-2 NUMBER OF ATTEMPTS, LEAK PRESSURE AND GASTRIC INSUFFLATION

No of attempts	I-Gel	Supreme LMA	P.value
1st attempt	21 (70%)	23 (77%)	0.601
2nd attempt	9	7	
Leak pressure	21.2+7.7 cm of H_2O	25.625+4.9 cm of H_2O	0.016
Gastric insufflation	9(22.5 %)	2(5 %)	0.016

In the present study, i-gel was placed in the first attempt 70% cases and S-LMA in 77% cases which was statistically insignificant. Leak pressure is more in LMA Supreme and gastric insufflation is more in I-gel.

Table -3 HEART RATE POST INTUBATION

Heart rate	I-Gel	%	LMA Supreme	%	p-value
70-80	8	27	7	23	0.021
81-90	14	46	15	50	
91-100	8	27	8	27	
Total	30	100	30	100	
Mean	86.27		84.15		
S.D	3.47		3.16		

With the p valve being less than 0.05, there was a statistical significance in change in heart rate post intubation between the groups.

TABLE 4: MEAN ARTERIAL BLOOD PRESSURE

MAP	I-Gel	%	LMA Supreme	%	P value
71-80	11	37	10	33	0.014
81-90	12	40	12	40	
91-100	7	23	8	27	
TOTAL	30	100	30	100	
MEAN	84.12		82.52		
S.D	10.25		9.67		

It is evident that majority of patients had MAP between 81-90 in both the groups. I-Gel group is better compared to SLMA group in change in mean arterial pressure.($p<0.05$)

TABLE 5: COMPLICATIONS

COMPLICATIONS	I-Gel	%	LMA SUPREME	%	P VALUE
Sore throat	8	27	7	23	0.699
Blood stain	7	23	9	30	
Laryngospasam	6	20	5	17	
Pharyngospasam	3	10	3	10	
Mucosal injury	6	20	6	20	
Total	30	100	30	100	

There is no statistical significance with regard to complications encountered in the placement of I-Gel and LMA Supreme.

IV. Discussion

Supraglottic airway devices LMA Supreme and I-GEL were used for minor surgical procedures in spontaneously breathing anaesthetized adult patients. The majority of the patients included in this study were in the age group of 31 to 45 years.

In this study, it was found that the i-Gel was slightly easier to insert compared to Supreme LMA but the clinical relevance of the difference is not known. Moreover, time to achieve an effective airway was similar between the two devices.

The first attempt and overall insertion success rates were similar between groups. Richez et al[5] carried out one of the earliest studies to evaluate the I-Gel. They found that insertion success rate was 97%. Insertion was easy and was performed at the first attempt in every patient. I-Gel is easily and rapidly inserted, providing a reliable airway in over 90% of cases. This disagrees with other studies that have shown a high success rate with both devices. No complete failure occurred in the I-Gel group. Acott[6] assessed I-Gel as an airway device during general anaesthesia. In accordance with our results, they reported that the single insertion attempt was required in the majority of patients and all the insertion times recorded were less than 10 seconds. Similar results were obtained in study done by Gatward et al,[7] who evaluated size 4, I-Gel airway in 100 non paralyzed patients and found that first insertion attempt was successful in 86% of patients, the second in 11% of patients and the third attempt in 3% of patients. This study has limitations .First, it was conducted in non paralyzed patients, hence our findings may be less applicable to paralyzed patients. However, there is indirect evidence from mucosal pressure studies that pharyngeal muscle tone is similar in paralyzed and non paralyzed patients. Second, both the devices were inserted by anaesthesiologist. Therefore our results may not be applicable for inexperienced users.

Jindal et al[8] reported hemodynamic stability with both LMA and I-Gel devices, with no statistically significant difference between both the devices, which is inconsistent with our findings. In our study, there is change in heart rate, mean arterial pressure while inserting the supreme LMA as compared to I Gel.

One of the most important parameters to be compared between both the groups was postoperative complications. It was estimated that difference between Supreme LMA and I-Gel regarding postoperative complications was not statistically significant. Consistent with our results, no major complications associated with I-Gel have been described to date. Protection against aspiration is probably comparable with LMA family. Minor complications like sore throat, sore tongue were reported.

During maintenance of anaesthesia the airway was clear throughout the operation for most of the cases. One patient developed mild laryngospasm and the other patient had sore throat. No conclusions can be drawn about the incidence of these complications due to the small numbers involved. There was minimal blood staining with both the devices. Postoperative sore throat was also similar to both the devices.

V. Conclusion

Both Supreme LMA and I-Gel caused significant alteration in the hemodynamic status of the patients. The postoperative complications are not significant among both S LMA and I-Gel patients.

Insertion of I-Gel is significantly easier and more rapid than insertion of SLMA. Leak pressure is significantly lower with I-Gel than with SLMA and incidence of gastric insufflations is significantly higher with I-Gel.

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