

COMPARISON OF I-GEL AND LMA SUPREME IN PATIENTS UNDERGOING ELECTIVE SURGERIES UNDER GENERAL ANAESTHESIA

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ABSTRACT

BACKGROUND

I-gel and LMA supreme are single use second generation supraglottic airway devices. The objectives of this study are to compare the number of attempts of insertion, ease and time taken for insertion, airway leak pressure and complications during usage of these devices.

MATERIALS AND METHODS

Randomised single-blinded prospective study was conducted with sixty patients of ASA physical status I and II assigned into two groups undergoing elective procedures under general anaesthesia. The device was chosen according to weight of patient. We assessed the mean time of insertion in seconds, ease of insertion, number of attempts of insertion, oropharyngeal seal pressure, ease of insertion of gastric tube, complications postoperatively.

RESULTS

There was no difference between the demographic data in our study. Mean time for placement of i-gel was greater than LMA supreme ($p=0.0001$). LMA supreme was easily inserted in 93% compared to 57% in i-gel group ($p=0.002$). LMA supreme is superior to i-gel in comparison of number of attempts for supraglottic device placement ($p=0.026$). There was no statistically significant difference between two groups in oropharyngeal seal pressure ($p=0.398$). There was no incidence of desaturation, dental trauma or laryngospasm in both the groups. Blood staining of i-gel was noted in 3 cases and 2 cases of LMA supreme had complaints of postoperative sore throat.

CONCLUSION

Both i-gel and LMA supreme provided a satisfactory and secure airway during elective procedures under general anaesthesia. LMA supreme has a slight edge over i-gel in being superior to i-gel in terms of shorter time taken for insertion, number of attempts for insertion during anaesthesia. Both devices are similar in other aspects.

KEYWORDS

Laryngeal Masks, Airway Management, Anaesthesia.

HOW TO CITE THIS ARTICLE: Katika SG, Madhuri SS, Sistla GKM, et al. Comparison of i-gel and LMA supreme in patients undergoing elective surgeries under general anaesthesia. J. Evid. Based Med. Healthc. 2017; 4(4), 159-162. DOI: 10.18410/jebmh/2017/31

BACKGROUND

Laryngoscopy and endotracheal intubation is the conventional and standard method for patent airway

Financial or Other, Competing Interest: None.

Submission 21-12-2016, Peer Review 30-12-2016,

Acceptance 10-01-2017, Published 11-01-2017.

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DOI: 10.18410/jebmh/2017/31



maintenance in anaesthesia. But, laryngoscopy and intubation stimulate the sympathetic system reflexly and may provoke laryngospasm and bronchospasm in a person having a reactive airway. An alternative device needed for managing airway smoothly without much sympathetic stimulation and airway handling and without complications. Supraglottic airway devices were introduced in 1981 and came into routine use from September 1990.^{1,2}

I-gel is a new supraglottic airway device and comes under uncuffed perilaryngeal sealer group of airway devices as per Miller's classification. It also has a gastric channel for drainage of gastric contents. The gel like cuff avoids trauma that can occur with other inflatable supraglottic devices.^{2,3}

We compare i-gel supraglottic device with LMA supreme because both these devices attain a good seal over pharyngeal and laryngeal structures and both have a gastric channel for drainage of gastric contents. The objectives of study is to compare i-gel and LMA supreme with number of attempts needed for insertion, airway leak pressure, time taken for proper placement of device, complications during usage of both devices.

MATERIALS AND METHODS

Study Design- This study was a randomised single-blinded prospective study comparing the two supraglottic devices. After obtaining institutional ethical committee approval and written informed consent, sixty patients under ASA physical status I and II of either sex undergoing elective surgical procedures under general anaesthesia were enrolled in study.

Inclusion Criteria

- ASA I and II.
- 18-45 years.
- Both sexes.
- MPG I and II.
- Elective surgeries with duration less than two hours.

Exclusion Criteria

- BMI >30 kg/m².
- Patients with difficult airway.
- Presence of acute or chronic airway disease.
- Patients with comorbid illness like diabetes mellitus, hypertension, cardiac or pulmonary, GERD disease, obstructive sleep apnoea disease.
- Patients with history of allergic reactions to drugs used in the study.
- Patients undergoing ENT procedures.
- Patients undergoing major abdominal, thoracic, vascular and orthopaedic procedures lasting more than two hours.

Patients were randomised into two groups group I (i-gel) and group L (LMA supreme) using a closed envelope method. Patients were advised overnight fasting and aspiration prophylaxis with tab. ranitidine 150 mg and tab. metoclopramide 10 mg were given night before surgery. Monitors were connected and intravenous cannulation done with 18G cannula. Premedication given with Inj. Glycopyrrolate 0.2 mg IV, Inj. Midazolam 0.02 mg/kg IV and Inj. Fentanyl 2 mcg/kg IV induced with Inj. Propofol 2 mg/kg IV and atracurium 0.5 mg/kg IV. Patients were ventilated with bag and mask with 2% sevoflurane and oxygen for 3 mins. and an appropriate supraglottic airway device based on patient weight was inserted.

Depending on the group, patients were inserted either i-gel or LMA supreme as per the standard technique. Proper insertion and correct placement was assessed by adequate chest expansion bilaterally, presence of CO₂ waveform with a plateau, absence of audible leak and ability to achieve an expiratory tidal volume of 6 mL/kg. In case of LMA, after

fixing the device, the cuff pressure was checked with the help of Portex cuff pressure monitor to maintain cuff pressure of 60 cm H₂O.

Ease of insertion of device was graded as-

- Easy.
- Difficult.
- Failure even with adjustment of device.

Attempt of insertion was considered difficult because of an audible leak or inadequate chest expansion or absence of square wave on capnography. Three insertion attempts allowed. Insertion failed after three attempts was followed by intubation. Insertion time was measured from picking of supraglottic device in hand until first upstroke in capnography. A 12-French gastric tube was then passed through gastric channel of both devices. Anaesthesia was maintained with nitrous oxide-oxygen mixture with sevoflurane and atracurium intermittent doses. Ease of insertion of device, number of insertion attempts, time taken for insertion of device, oropharyngeal leak pressure (APL valve of circle system was completely closed and gas flow were set at minimum fixed rate 3 lit/min. airway pressure is recorded by manometer stability test), ease of insertion of gastric tube were noted. 1- Easy, 2- Difficult, >2- Failure. Heart rate, noninvasive blood pressure were noted at insertion 1, 3, 5 mins. post insertion. At the end of surgery, patient was reversed with neostigmine and glycopyrrolate. Incidence of blood staining of the device, laryngospasm, dental trauma, saturation <95%, gastric insufflations, sore throat were noted. Each patient was questioned in the immediate postoperative period and 24 hours after the procedure.

RESULTS

Sixty patients of either sexes in ASA I and II status undergoing elective procedures under general anaesthesia were studied. Data was analysed with SPSS version 15. P value less than 0.05 were considered statistically significant. Demographic data, time taken for placement of device, oropharyngeal leak pressure and haemodynamic variables among the groups were analysed with unpaired Student's t-test. Chi-square analysis was used to compare the gender and number of attempts for insertion.

There is no statistically significant difference between demographic variables like age, sex, height, weight, BMI, ASA distribution, MPC.

Patient Characteristics	i-gel	LMA Supreme	P value
Sex M/F	16/14	17/13	P=1.000
Age	34.47±7.104	35.23±6.611	0.667
Height	160.10±6.855	161.57±8.016	0.449
Weight	62.47±6.872	61.60±6.750	0.624
BMI	24.298±2.7816	23.582±2.0253	0.259
ASAI/II	20/10	23/7	0.567
MPC1/2	24/6	26/4	0.729

Table 1. Demographic Variables

The parameters observed during anaesthesia are LMA insertion time in seconds, mean time for placement of i-gel was 24.3 seconds and for LMA supreme was 16.57 seconds ($p=0.0001$). LMA supreme was easily inserted in 93% compared to 57%. LMA supreme is superior to i-gel in comparison of number of attempts for supraglottic device

placement. There was no statistical difference between two groups in oropharyngeal seal pressure. Gastric drainage tube could be easily inserted in 28 cases of i-gel group, only 2 were difficult. Drainage tube was easily inserted in 29 cases of LMA supreme group while one case need a second attempt. There was no failure in either groups

Parameter	i-gel	LMA Supreme	P value
Insertion time (secs.)	24.3±2.961	16.57±3.329	0.0001
Ease of insertion of supraglottic device 1/2	17/13	28/2	0.002
Number of attempts for placement 1/2	22/8	29/1	0.026
Oropharyngeal seal pressure	24.20±3.925	25.00±3.322	0.398
Ease of insertion of gastric tube E/D	28/2	29/1	1.000

Table 2. Parameters Observed

There was no incidence of desaturation, dental trauma or laryngospasm in both the groups. Blood staining of i-gel was noted in 3 cases and 2 cases of LMA supreme had complaints of postoperative sore throat.

Complications	i-gel	LMA Supreme
Blood staining of device	3	0
Dental trauma	0	0
Gastric insufflations	0	0
Desaturation <95%	0	0
Postoperative sore throat	0	2
Laryngospasm	0	0

Table 3. Complications Due to Each Device

Mean heart rate of two groups were compared at preinduction, induction, 1st, 3rd and 5th minute and was found to be statistically insignificant. There was no significant statistical difference between i-gel and LMA supreme group when the systolic, diastolic and mean blood pressure were compared at preinduction, induction, 1st, 3rd and 5th minute.

	Heart Rate i-gel LMA P Supreme			Systolic BP i-gel LMA P Supreme			Diastolic BP i-gel LMA P Supreme			Mean BP i-gel LMA P Supreme		
Preinduction	74.7±10.991	77.03±14.33	0.495	123.13±10.67	119.47±12.686	0.231	74.13±9.57	72.83±9.66	0.603	90.78±9.96	88.3±10	0.35
Induction	72.07±10.91	81.3±15.177	0.009	97.50±8.641	99.50±10.75	0.43	64.73±8.509	61.80±8.07	0.176	75.64±7.61	74.14±8	0.466
1 st min.	84.27±13.383	87.43±14.766	0.388	105.60±8.645	104.63±10.516	0.699	69.5±8.17	66.8±8.38	0.212	81.493±7.45	79.44±8.4	0.324
3 rd min.	87.93±13.988	88.50±16.328	0.886	112.0±8.03	112.37±11.248	0.885	71.5±8.11	71.83±7.87	0.885	85.14±7.30	85.33±8.0	0.923
5 th min.	75.07±10.875	80.47±13.475	0.093	110.83±8.346	112.37±10.905	0.543	72.03±8.11	71.57±8.05	0.824	85.13±7.49	85.14±8.0	0.997

Table 4. Vitals Observed

DISCUSSION

The demographic data was comparable between the two groups and hence the bias against sex, age, weight, height and BMI distribution were ruled out. The bias against ASA physical status and MPC grading were also ruled out as both these groups were comparable.

The overall success rate for supraglottic device insertion was similar in these two groups as we were able to insert successfully in all patients with no statistical significance in our study. Our results were comparable with that of Richez et al where overall success rate for i-gel was 97% and that of Jay Duckett and P. Fell et al where success rate of i-gel insertion was more than 93%.^{1,2}

In our study, the size of supraglottic device was chosen based on weight of patient and recommendation of manufacturers. The sizing guidelines for size 3 and size 4 i-gel was overlapping. The mean insertion time for i-gel insertion in our study was 24 seconds, which is inconsistent with the study by Cook et al and Gatward et al.³ The first

attempt success rate of LMA supreme was 96.7% in our study, which was comparable with that of Lopez Gil et al and Cremar S et al where the success rate was 95 and 94%, respectively.⁴ The mean insertion time for LMA supreme insertion in our study was 16 secs. comparable to the study conducted by Cremar S et al where mean insertion time was 12 seconds and Ramasamy et al where mean insertion time was 15 seconds.⁵

The oropharyngeal seal pressure was measured by four methods-

a) Audible noise detection over mouth; b) Exhaled CO₂ detection by capnography sampling line at mouth; c) Audible noise detection at neck; d) Dial stability of aneroid manometer where circle gas flows of 4 lit./mins. and the APL valves closed. All above are equally excellent for measuring seal pressure.

In our study, the oropharyngeal seal pressure for i-gel was 24.2 cm H₂O, which is well within normal limits of controlled ventilation. I-gel is capable of achieving a good perilaryngeal seal without the need for an inflatable cuff. I-gel is made of thermoplastic elastomer, which fits snugly in perilaryngeal structures. Seal seems to be improving with time due to thermoplastic cuff warming to body temperature.^{6,7} The oropharyngeal seal pressure in LMA supreme group was 25 cm H₂O comparable to studies of Rajeev et al where mean was 25 cm H₂O. The oropharyngeal seal pressure was almost similar in both i-gel and LMA supreme groups.⁸

Gastric tube insertion was done in all cases and there was no statistically significant difference between the two groups. The haemodynamic response to insertion of devices was noted at first, third, fifth mins. and there was no statistical significant difference.

In both groups, there was no incidence of desaturation or laryngospasm. Blood staining was noted in 3 cases in i-gel group. Amr M Helmy et al reported 2 cases of blood staining consistent with our study.⁸ Postoperative sore throat was noted in 2 cases in LMA supreme group, which can be due to inflatable cuff as per Ragazzi et al.⁹

CONCLUSION

Both i-gel and LMA supreme provided a satisfactory and secure airway during elective procedures under general anaesthesia. LMA supreme has a slight edge over i-gel in being superior to i-gel in terms of ease of insertion with same oropharyngeal seal pressure as that of the other.

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