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COMPARISON OF CLINICAL PERFORMANCE OF LMA SUPREME VERSUS I-GEL

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ABSTRACT

Background: Supraglottic airway devices have revolutionized airway management and are an excellent alternative to mask ventilation and tracheal intubation. Newer supraglottic airway devices have been designed to improve efficacy in terms of airway seal, and safety in terms of protection from gastric aspiration but with conflicting results concerning the attempts at successful insertion, ease of insertion, and adverse effects. **Methods:** 134 patients were randomly allocated to use either I-gel or LMA Supreme for airway management following intravenous induction. Number of attempts for successful placement of the device, the ease of insertion and incidence of postoperative sore throat were observed. **Results:** In I-gel group; 92.5% patient's airway was secured within the first two attempts (considered "easy") and in 7.5%, more than two attempts were needed (considered "difficult"), where as in LMA Supreme group, 89.6% insertions were "easy" and 10.4% were "difficult" although the difference is statistically insignificant (p value =0.54). LMA Supreme needed lesser manipulations for effective ventilation (3% versus 16.4%, p value 0.009). 11.9% patients in Group I developed sore throat within the first 24 hours compared to 28.4% in Group S (p value 0.017). **Conclusion:** From our observations, we conclude that, I-gel was better than LMA Supreme in first time insertion success rate and ease of insertion and the incidence of postoperative sore throat was more with LMA Supreme.

KEYWORDS: Supraglottic airway devices, I-gel, LMA Supreme, ease of insertion, post operative sore throat.

INTRODUCTION

Management of the airway has come a long way since the development of endotracheal intubation by Macewen in 1880 to the present day sophisticated devices.[1] The tracheal intubation is the gold standard to maintain a patent airway during anaesthesia.[2] However, it requires the use of laryngoscope for insertion which causes trauma to laryngopharyngeal structures[3] and also needs neuromuscular paralysis. Laryngoscopy and endotracheal intubation produce reflex sympathetic stimulation and profound pressor response[4] which includes hypertension, tachycardia, myocardial ischemia, depression of myocardial contractility, ventricular arrhythmias and intracranial hypertension. In the last couple of decades a plethora of supraglottic airway devices have come into the anesthetic practice and these devices circumvent many of the problems associated with laryngoscopy and intubation. Supraglottic airways have revolutionized airway management since the invention of LMA Classic by Archie Brain in 1988 and are excellent alternatives to mask ventilation and tracheal intubation. Supraglottic airway devices can be easily inserted with minimal hemodynamic perturbations, without any neuromuscular paralysis and are well tolerated even under light plain of anesthesia.[5] The incidence of post-operative sore throat and hoarseness is also lower with supraglottic devices.[6] Since its introduction, several other laryngeal masks have been introduced which differ in shape, stiffness, cuff properties and constituent materials. These devices have been used successfully in resuscitation and emergency scenarios [7][8][9] and 'cannot intubate, cannot ventilate' situations.[10] The laryngeal mask airway (LMA) has been well established for more than a decade and is used when endotracheal intubation is not necessarily required.[11]

Nevertheless, handling of the LMA is limited by the potential risk of aspiration.[12] The fiberoptic studies have found the visualization of the esophagus via the LMA[13] and low pulmonary compliance requiring peak inspiratory pressures greater than 20cm of water.[14] Newer supraglottic airway devices have been designed to improve efficacy in terms of airway seal and safety in terms of protection from gastric aspiration which is not seen in Classic LMA. They include LMA Supreme and I-gel. The LMA Supreme is a single-use inflatable device with an esophageal drainage tube for suctioning gastric contents[15] and the I-gel is a single-use supraglottic device featuring an additional tube for fitting a gastric

suction catheter, but no inflatable cuff as its constituent thermoplastic elastomer provides an airway seal.[16] There have been conflicting results concerning the attempts at successful insertion, ease of insertion, and adverse effects of these two devices during anesthesia. We compared I-gel and LMA Supreme in terms of number of attempts for successful placement of the device, ease of insertion and incidence postoperative sore throat within 24 hours.

Approval of Institutional scientific and Ethics committees were obtained prior to commencement of the study. Patients posted for elective surgeries lasting for less than 4hrs, ASA PS I & II and age between 18 – 65 yrs were included in this study. Anticipated difficult airway, pregnancy, pathology of the neck and upper respiratory tract or upper alimentary tract, patients with risk of aspiration and pre-operative sore throat were excluded.

MATERIALS AND METHODS

An informed written consent for anesthesia was taken from all patients in local language. Using computerized random number generator, patients were randomly allocated prospectively to receive the LMA Supreme or I-gel. Tablet Alprazolam 0.5mg was given 8 hours prior to surgery and patients were kept nil per oral for 8 hours. All the patients were premedicated with IV Glycopyrrolate 0.2 mg, IV Midazolam 1mg, IV Ondansetron 4mg and IV Morphine 0.1mg/kg 30min prior to the surgery. On arrival in the operating room standard monitors were attached and baseline parameters were noted. Pre-oxygenation was carried out with high flow oxygen for 3 minutes before induction of anaesthesia.

After induction with Propofol 2 mg/kg IV confirmation of successful bag & mask ventilation was done. Neuromuscular blocker Vecuronium 0.1mg/kg IV was given and ventilated using bag &mask with nitrous oxide and oxygen in 2:1 ratio and 0.4% isoflurane for 180 seconds & the chosen airway device was inserted when the jaw was sufficiently slack.

An effective airway was confirmed by bilateral symmetrical chest movements on manual ventilation, square waveform on capnography, no audible leak of gases and lack of gastric insufflation. Once the correct placement of the device was confirmed, the tube was fixed by taping over the patient's cheek. A suprasternal notch test was done to confirm placement (gently tapping the suprasternal notch causes the gel to pulsate, confirming the location behind the cricoid cartilage). A gastric tube pre-lubricated with a water-soluble lubricant was inserted through the gastric drain outlet. Correct placement of the gastric catheter was confirmed by detection of injected air by auscultation of the epigastrium and aspiration of gastric contents. Gastric decompression was performed and the amount of gastric fluid aspirated noted. The oropharyngeal leak pressure is confirmed by an audible air leak from the throat. Maintenance of anesthesia was achieved with nitrous oxide oxygen mixture[2:1], 0.4% isoflurane and intermittent boluses of intra venous vecuronium for muscle relaxation.

During anaesthesia hemodynamic parameters were recorded prior to insertion of the device and at 1, 5, 10 and 15 minutes after the insertion of device and then at 15 minute intervals till the end of surgery. The appearance of the first square end-tidal carbon dioxide trace confirmed successful establishment of effective ventilation. Otherwise, the device was completely removed for another insertion attempt. Three insertion attempts were allowed before failure of insertion was recorded. When three attempts were unsuccessful or if the entire process of insertion exceeded 120 seconds which included the time the airway device is removed from the mouth and any bag-mask ventilation in between. The airway was secured with appropriate size cuffed endotracheal tube.

The number of attempts for the correct positioning of the device was noted on a four point scale (1, 2, 3, 4) and ease of insertion as Easy/ Difficult (easy =1 and 2 attempts, Difficult= 3 and 4 attempts)

At the end of the surgical procedure anesthesia was discontinued, neuromuscular blockade was reversed with IV Neostigmine 0.05 mg/kg and IV Glycopyrrolate 0.01 mg/kg and the device removed. Blood staining of the device, tongue, lip, and dental trauma was recorded. Patients were questioned within 24 hours to assess sore throat.

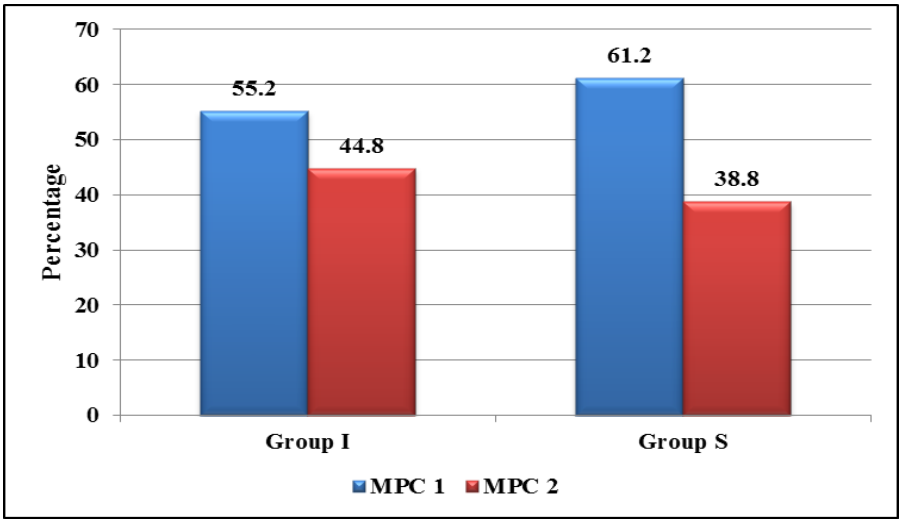
RESULTS AND OBSERVATIONS

One hundred and thirty four patients undergoing elective surgeries were randomly assigned to be ventilated using one of the two supraglottic devices (I-gel or LMA Supreme). The results obtained from these patients were coded and entered in Excel and analyzed using standard statistical principles and techniques.

Table 1: demographic data.

Parameter	Group I (Mean ± SD)	Group S (Mean ± SD)	P value
Age	41.51 ± 14.51	40.84 ±14.25	0.954
Weight(kg)	55.21 ± 4.82	55.79 ± 5.61	0.521
Gender	Male 44.8 Female 55.2	47.8 52.2	0.729

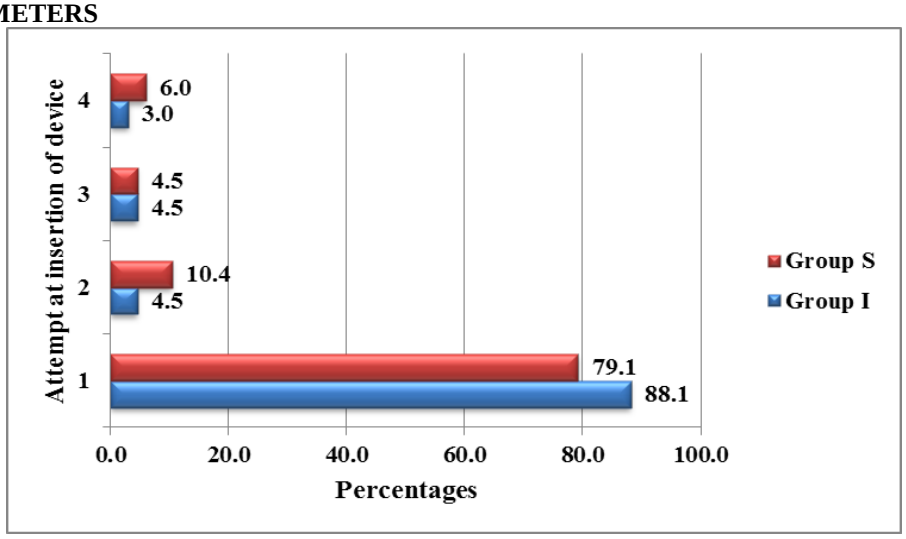
Non-significant at 0.05 level.



Non significant at 0.05 level.

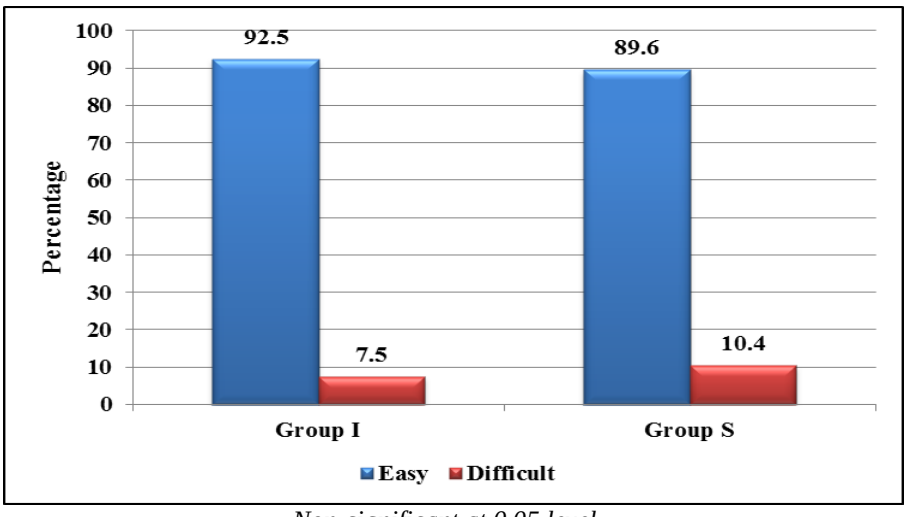
Figure 1: malampatti classification.

DEVICE PARAMETERS



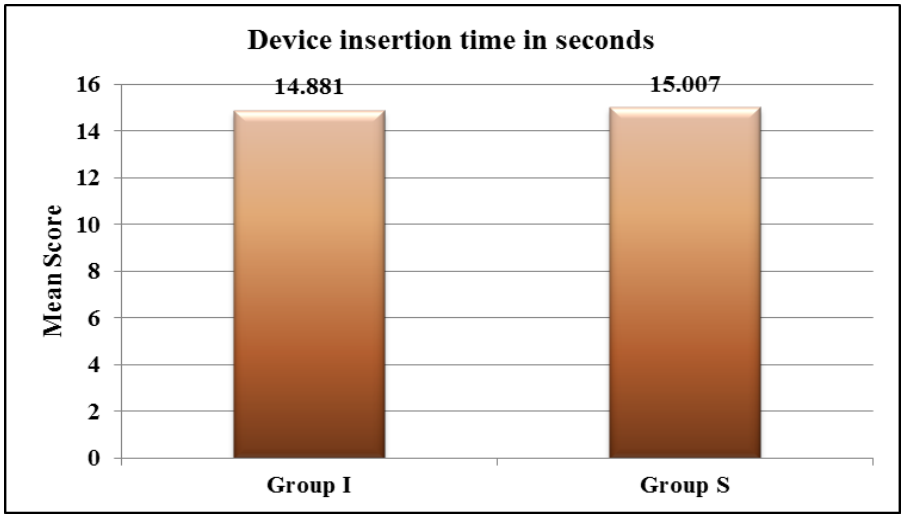
No statistical significance (p value 0.46) between both groups.

Figure 2: attempts at insertion of device.



Non-significant at 0.05 level.

Figure 3: ease of insertion of the device.



Non-significant at 0.05 level.

Figure 4: Device insertion time.

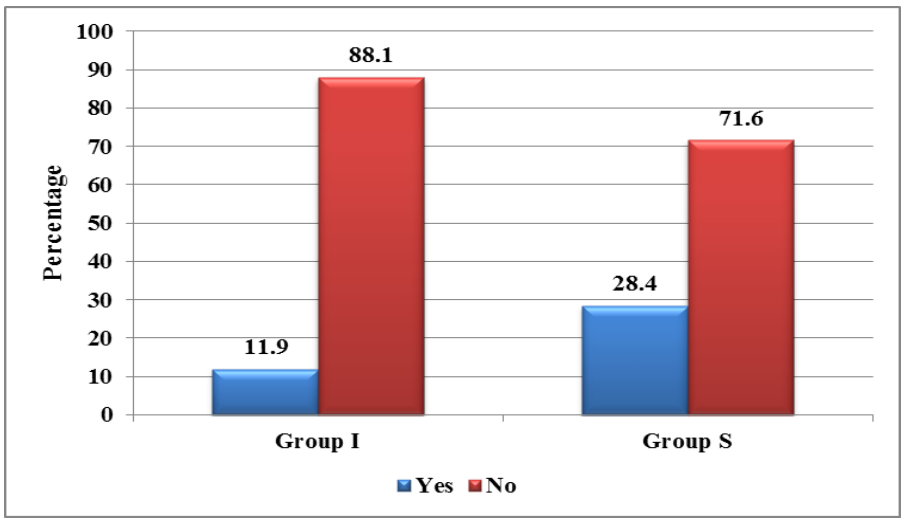


Figure 5: postoperative sore throat within 24 hours.

DISCUSSION

Supraglottic airway devices have revolutionized anaesthesia practice and are now increasingly being used as an excellent alternative to mask ventilation and tracheal intubation with least complications. The ASA algorithm for difficult airways was published in 1993 and has emphasized the importance of early insertion of LMA if face mask ventilation was inadequate or not possible.

Two groups were comparable in terms of age, sex, gender, weight, ASA status and duration of surgery. We analyzed 134 patients scheduled to undergo elective surgeries using a laryngeal mask for maintaining airway intra-operatively. The patients were randomized to use one of the two supraglottic airways during anesthesia. The airway characteristic, Mallampati Classification of all patients studied was also comparable.

After induction of anesthesia, the randomly chosen device of appropriate size was inserted and number of attempts of insertion, time of insertion and ease of insertion of device was noted.

In our study I-gel could be positioned successfully within single attempt in 88% (59/67) of patients and LMA Supreme in79% (53/67) of patients. I-gel was positioned successfully at second attempt in 4.5% (3/67) of patients and LMA Supreme in 10.4% (7/67) of patients. I-gel and LMA Supreme were successfully inserted at third attempt in 4.5% of patients in both groups (3/67). In 3% of patients in I-gel group and 6% of patients in LMA Supreme group insertion failed and airway was secured with endotracheal tube. Thus first attempt success rate was more for I-gel when compared with LMA Supreme. This result was not statistically significant (p value =0.46).

Out of 67 patients in I-gel group 92.5% (62/67) of insertion were easy and airway secured in first or second attempts and 7.5% (5/67) were difficult. In LMA Supreme group 89.6% (60/67) were easy and 10.4% (7/67) were difficult. Thus I-gel was easier to insert than

LMA Supreme but statistically this difference came to be insignificant (p value =0.54).

In a study conducted by Teoh WHL[17] et al comparing I-gel with LMA Supreme in 100 patients, 96% of I-gel and 94% of LMA Supreme were successfully inserted at first attempt and with similar ease.

J. J. Gatward et al[18] studied the I-gel in 100 elective, anesthetized patients (median age 53 yrs) assessing ease of use, airway quality, positioning, seal and complications. First insertion attempt was successful in 86 patients, second attempt in 11 patients and third attempt in 3 patients. 53 manipulations were required in 26 patients (median 1) to achieve a clear airway. Median insertion time was 15 seconds. During maintenance 6 patients (6%) required 12 airway manipulations. They concluded that I-gel was easily and rapidly inserted, providing reliable airway in over 90% cases.

Fenner LB, Handel J.[19] conducted a randomized comparative study of the Supreme Laryngeal Mask Airway with the I-gel during anaesthesia. They compared insertion success at first attempt, oropharyngeal leak pressure, fiberoptic view via both airway and drain tube, adequacy of controlled ventilation, clinicians' subjective assessments of airway performance and complications at each stage from insertion to the first post-operative day. Data from 97 patients were analyzed. The primary outcome was insertion success on first attempt, which was 78% for I-gel and 87% with Supreme LMA (p=0.4). There were no statistically significant differences between the two devices' performances, and low rates of postoperative sequelae, >90% of which were mild. Both devices performed safely, with no episodes of aspiration or long term sequelae.

We studied the incidence of sore throat within 24 hours and found that sore throat developed in 11.9% (8/67)patients in Group I and 28.4%(19/67) in Group S. This result is statistically significant (p value =0.017). Devices with inflatable mask have the potential to cause tissue distortion, nerve injury and venous compression which may be responsible for sore throat.

Mukadder *et al* in their study observed that I-gel has lower airway morbidity when compared to LMA supreme. [20]

Chen X *et al* conducted a meta-analysis comparing LMA Supreme and I-gel. He found that sore throat was more in LMA Supreme when compared to I-gel.[21]

Both of the above studies show findings similar to our finding.

CONCLUSIONS

In our study we compared I-gel and LMA Supreme in terms of number of attempts for insertion of device, ease of insertion of the device and incidence of postoperative sore throat. From our study we conclude that, I-gel was better than LMA Supreme in first time insertion success rate and ease of insertion, and the incidence of postoperative sore throat was more with LMA Supreme.

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