Open Access

Original Article

Comparison of I-gel Supraglottic Airway with ProSeal-Laryngeal Mask Airway in Anaesthetized paralyzed patients for Insertion Time and Ease of Insertion

Usman Ahmed, Amjad Ali*, Saeed Bin Ayaz, Sajjad Qureshi*, Hina Iftikhar***, Habib Ur Rehman*****

Department of Anesthesia, Combined Military Hospital, Khairan/National University of Medical Sciences (NUMS) Pakistan, *Department of Anesthesia, Combined Military Hospital, Quetta/National University of Medical Sciences (NUMS) Pakistan, **Department of Medicine, Combined Military Hospital, Muzaffarabad/National University of Medical Sciences (NUMS) Pakistan, ***Department of Anesthesia, Combined Military Hospital, Multan/National University of Medical Sciences (NUMS) Pakistan, ***Department of Surgery, Combined Military Hospital, Multan/ National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To compare I-gel Supraglottic Airway with ProSeal-Laryngeal Mask Airway in anaesthetized paralyzed patients regarding mean insertion time and frequency of ease of insertion.

Study design: Quasi-experimental study.

Place and Duration of Study: Department of Anesthesiology, Combined Military Hospital, Multan Pakistan, from Jun to Dec 2018.

Methodology: Ninety-two patients aged 20-50 years, of either gender undergoing procedures in supine and lithotomy positions under general anaesthesia were included. In Group-A, ProSeal-Laryngeal Mask Airway was inserted, and in Group-B, the anaesthetists inserted I-gel Supraglottic Airway. Insertion time and ease of insertion in terms of successful insertion on the first attempt were noted.

Results: Out of these 92 patients, 54(58.7%) were male, and 38(41.3%) were female. The median insertion time was 22 seconds with an interquartile range (Q3-Q1) of 17.53 in Group-A patients and 14 seconds in Group-B patients with an interquartile range of 3(p<0.001). The first attempt for placement was successful in 35(76.1%) patients in Group-A and 43(93.5%) patients in Group-B (p=0.039).

Conclusion: I-gel Supraglottic Airway has a shorter insertion time and a higher frequency of ease of insertion as compared to the ProSeal-Laryngeal Mask Airway in patients undergoing surgery under general anaesthesia.

Keywords: Ease of insertion, General anaesthesia, I-gel Supraglottic airway, ProSeal-laryngeal mask airway.

How to Cite This Article: *Ahmed U, Ali A, Ayaz SB, Qureshi S, Iftikhar H, Rehman HU. Comparison of I-gel Supraglottic Airway with ProSeal-Laryngeal Mask Airway in Anaesthetized paralyzed patients for Insertion Time and Ease of Insertion. Pak Armed Forces Med J 2023; 73(4) 1083-1086. DOI: https://doi.org/10.51253/pafmj.v73i4.8558*

INTRODUCTION

The preservation of the airway is an indispensable requirement of general anaesthesia. An anaesthetist's primary obligation is to supply satisfactory ventilation to the patient.[1] Ventilation amid anaesthesia can be kept up by a wide assortment of supraglottic airway gadgets that preclude the hemodynamic reaction related to endotracheal intubation.[2] The laryngeal mask airway (LMA) is a medical apparatus that holds a patient's airway open while he/she is unconscious or under anaesthesia.[3] Anaesthetists use LMAs to deliver oxygen or anaesthetic gas to a patient's lungs during surgery. The ProSeal LMA (P-LMA) is a modified, improved version of classic LMA.[4] It permits ventilation at much higher airway pressures and allows easy passage of gastric tubes and monitoring devices into the oesophagus.[5]

The I-gel Supraglottic Airway (Intersurgical Ltd, Wokingham, UK) (ISA) is a non-inflatable supraglottic airway gadget with a transparent, soft, gel-like mask designed according to the human anatomy.[6] The non-inflatable soft cuff mounts securely around the peri laryngeal structures, with its tip in the proximal aperture of the oesophagus, separating the oropharyngeal and laryngeal openings.[7] The device includes a buccal cavity stabilizer that can alter its shape according to the patient's oropharyngeal bend. Airway tubes and an independent stomach conduit are housed in this buccal cavity stabilizer.[8,9]

Airway management is the prime step in emergency, trauma, and elective surgery. Maintenance of the airway at the appropriate time will prevent hypoxia and result in a better outcome for the patient. Several investigations comparing the safety and effectiveness of ISA and the P-LMA have yielded mixed findings.[10] This study was aimed at the differences between P-LMA and ISA in terms of insertion time and the number of attempts in operation theatre so that an appropriate device may be recommended for use in our settings.

Correspondence: Dr Hina Iftikhar, Department of Anesthesia, Combined Military Hospital, Multan Pakistan

Received: 14 Apr 2022; revision received: 17 Feb 2022; accepted: 27 Dec 2022

METHODOLOGY

The quasi-experimental study was conducted at the Department of Anaesthesia, Combined Military Hospital, Multan Pakistan, from June to December 2018 after receiving approval from the Hospital Ethical Committee (IERB Approval Certificate Number: 13/ Trg/2022). The sample size was calculated by the WHO sample size calculator while taking the percentage of first successful attempt for ISA as 96.6%, and percentage of first successful attempt for classic LMA as 80%.[4]

Inclusion Criteria: Patients having normal teeth, aged 20-50 years, of either gender, ASA classes I and II, Malampatti categories I and II, hemodynamic stability and undergoing surgical procedures in supine and lithotomy positions, were included.

Exclusion Criteria: Patients with history of upper respiratory tract infection, limited neck extension, oropharyngeal, laparoscopic, and head and neck surgeries, BMI greater than 30, and inability to intubate in less than one minute, were exclude from the study.

Ninety-two patients who reported to the CMH Multan operation theatre were chosen after informed consent through non-probability consecutive sampling for the study. The patients were randomly distributed into two equal groups using the lottery method. LMA was introduced by the anaesthetists in Group-A and ISA in Group-B. The insertion time was demarcated as the time it took from holding the device to connecting it to the airway circuit and getting a typical square wave capnogram reading on the monitor, measured in seconds. The successful insertion of P-LMA or ISA on the first try was characterized as ease of insertion.

Before the anaesthesia, a detailed pre-anaesthesia assessment was done on all patients. All the investigations were checked. All patients were kept nil per oral for at least 6 hours. The patients were properly positioned on the operating table, and a rapid pre-anaesthesia assessment was repeated. Nothing per oral status was checked, an intravenous (IV) cannula of 18 gauge was inserted, and IV fluids were attached. Routine monitoring apparatus was attached to monitor cardiac activity, oxygen saturation, temperature, and non-invasive blood pressure. A Foley catheter was inserted to measure urine output.

The patients were then placed in a sniffing position by a pillow. They were premedicated with IV Dexamethasone 0.08 mg/kg, IV Metoclopramide 0.1 mg/kg, IV Nalbuphine 0.1mg/kg, and IV Midazolam 0.08 mg/kg. The patients were induced by IV Propofol 0.2 mg/kg with IV Atracurium 0.5 mg/kg as a neuromuscular blocking agent for muscle paralysis. A hundred per cent oxygen was given for three minutes before the procedure. In Group-A, P-LMA was inserted; and in Group-B, ISA was inserted by the anaesthetists. Both devices were fixed using tape. A normal Capnogram trace on the monitor confirmed the proper insertion of P-LMA/ISA. When ventilation was found inadequate, manipulation was done until successful insertion was achieved confirmed by normal Capnogram reading on the monitor. Insertion time and ease of insertion were noted. All this information was recorded on a written proforma.

Statistical Package for Social Sciences (SPSS) version-20 was used to enter the data. For the quantifiable variables the normality statistics were evaluated through the Shapiro-Wilk test. After normality testing, descriptive statistics were employed to compute medians and interquartile ranges (IQR). Qualitative variables were measured as frequencies and percentages. A comparison of both groups in terms of age and the median time required for the insertion of the airway was made by Mann-Whitney U Test. The ease of insertion was compared by the Chi-square test. Significant was defined as a *p*-value of ≤0.05.

RESULTS

There were 92 participants in this study with a median age of 36 years (IQR:9). Patients in Group-A had a median age of 36 years (IQR:11), whereas those in Group-B also had a median age of 36 years (IQR:9) (Table-I). Fifty (54.3%) patients were in Group-1 of ASA, while 42(45.7%) were in Group-2 of ASA. The median time required for airway insertion for the whole sample was 16 seconds (range: 11-27 seconds). It was 22 seconds (range: 13-27 seconds) in Group-A (P-LMA) and 14 seconds (range: 11-18 seconds) in Group-B (ISA) (p<0.001). The ease of insertion was observed in 35(76.1%) patients in Group-A (P-LMA) and 43(93.5%) patients in Group-B (ISA) (p=0.039) (Table-II).

Table-I: Comparison of age and Median Time required for Airway Insertion between the Groups (n=92)

Characteristics	Group-A (n=46) Median (IQR)	Group-B (n=46) Median(IQR)	*p*-value
Age (years)	36(11)	36(9)	0.863
Median time for insertion of airway (seconds)	22(17.53)	14(3)	<0.001

Table-II: Comparison of Ease of Insertion between the Groups (n=92)

Ease of Insertion	Group-A (n=46) n (%)	Group-B (n=46) n (%)	*p*-value
Yes	35(76.1)	43(93.5)	0.039
No	11(23.9)	3(6.5)	

DISCUSSION

This study compared anaesthetised paralysed individuals for results while subjected to P-LMA and ISA in a fifty-fifty distribution. The ISA was found to be better in terms of successful insertion rate on the very first insertion (ease of insertion) (p=0.039) and the time consumed during insertion. In a previous Pakistani study, Butt et al.[11] observed a significantly less number of subsequent insertion attempts after the failure of the first one in the ISA-Group of patients (10% for ISA and 23% for LMA; p=0.01). The mean insertion time was also significantly longer for LMA than ISA (10.67±1.6 seconds versus 9.5±0.7 seconds; p= 0.02). In another study,[6] the difference in insertion time between the two groups (14.9±4.6 seconds in ISA versus 27.1±16.7 seconds in classic LMA) was statistically significant (p=0.05). The frequency of trials was 1.3±0.6 attempts for ISA and 1.6±1.3 attempts for classic LMA, respectively (p=0.265). Furthermore, there was no significant difference in the number of displacements required for optimal ventilation between the classic LMA and ISA groups (1.4±1.1 versus 1.2±1.4; p=0.27). Helmy *et al*.[12] and Chauhan *et al*.[13] reported much shorter insertion times with ISA. Because ISA does not require cuff inflation, it takes lesser time to produce a good airway and does not require an introducer. The device could be pushed into position with ease.[4,14] Durrani *et al*.[15] found that the average insertion time was statistically negligible. In a randomized, crossover study, Theiler *et al*.[16] compared the Supreme-LMA and the ISA in simulated difficult airways and noticed that ISA gave a better fiberoptic view and produced lesser epiglottic down folding; however, it consumed a longer time for insertion.

In contrast to our findings, one study looked at the ease of insertion of the Supreme-LMA and the ISA in 85 patients who needed mechanical ventilation and compared the groups in terms of the successful placement at the first attempt, time spent for placement, ease of subsequent nasogastric tube insertion, and rates of complications during surgery.[17] Another stduy discovered that the ISA had lower successful first-time placement rates (86% versus 95.2%), extended time consumptions for insertion (32.5 seconds versus 27.1 seconds), tougher nasogastric tube insertion (first-time success frequency being 85.7% versus 97.6% for Supreme-LMA), and longer insertion times (9.5 seconds versus 22.1 seconds, respectively). The complication rates during and after surgery were comparable.[18]

LIMITATIONS OF STUDY

First, the anaesthetists performing the procedure were not blinded by the device, as blinding was impossible due to the different shapes and textures of both devices. Second, the procedures were performed by three anaesthetists who, though they had more than five years of experience in the field, could have different skill levels. Third, we studied only low-risk patients who had normal airways (Malampatti I and II) and thus could not give a verdict for high-risk cases or patients with difficult airways.

CONCLUSION

This study concluded that ISA has less insertion time and higher ease of insertion frequency than P-LMA in our sampled patients under general anaesthesia. Consequently, we suggest that ISA be used routinely in every patient undergoing surgery under general anaesthesia to reduce insertion time and the number of attempts in the operation theatre.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

UA & AA: Conception, study design, drafting the manuscript, approval of the final version to be published.

SBA & SQ: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

HI & HUR: Critical review, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Siddiqui BA, Kim PY. Anesthesia Stages. In: StatPearls. Treasure Island (FL): StatPearls Publishing, 2023.
2. Farid DM, Ahmed MEN, Emadedden NA, Yasser M. Supraglottic airway devices: an overview. Med J Cairo Uni 2020: 327-333. https://doi.org/10.21608/mjcu.2020.93994
3. Singh K. Second Generation Supraglottic Airway (SGA) Devices. In: Shallik NA, editor. Special considerations in human airway management. London: IntechOpen; 2020.
4. Pratheeba N, Ramya GS, Ranjan RV, Remadevi R. Comparison of i-gel™ and laryngeal mask airway Classic™ in terms of ease of insertion and hemodynamic response: A randomized observational study. Anesth Essays Res 2016; 10(3): 521-525. https://doi.org/10.4103/0259-1162.180780
5. Avva U, Lata JM, Kiel J. Airway Management. In: StatPearls Treasure Island (FL): StatPearls Publishing; 2022.

6. Reza Hashemian SM, Nouraei N, Razavi SS, Zaker E, Jafari A, Eftekhari P, et al. Comparison of i-gel™ and laryngeal mask airway in anesthetized paralyzed patients. Int J Crit Illn Inj Sci 2014; 4(4): 288-292. https://doi.org/10.4103/2229-5151.147520
7. Cook T. Strategies for the prevention of airway complications–a narrative review. Anaesthesia 2018; 73(1): 93-111. https://doi.org/10.1111/anae.14123
8. McNarry A, Patel A. The evolution of airway management–new concepts and conflicts with traditional practice. Br J Anaesth 2017; 119(suppl_1): i154-i66. https://doi.org/10.1093/bja/aex385
9. Sezen Ö. A comparison of two supraglottic airway devices in general anaesthesia: baska mask® vs. I-gel®: The comparison of Baska mask® and I-gel® during general anesthesia. Med Sci Discov 2019; 6(12): 333-339.
10. Acott CJ. Extraglottic airway devices for use in diving medicine-part 3: The i-gel. Diving Hyperb Med 2008; 38: 124–127.
11. Butt MS, Noor un Nisa, Mustafa G, Khan H. Comparison of efficacy of laryngeal mask airway and intersurgical-gel supraglottic airway device during general anesthesia in a tertiary care hospital. J Islamabad Med Dental Coll 2019; 8(3): 151-155. https://doi: 10.35787/jimdc. v8i3.331
12. Helmy AM, Atef HM, EI-Taher EM, Henidak AM. Comparative study between I-gel, a new supraglottic airway device and classical laryngeal mask airway in anaesthetized spontaneously ventilated patients. Saudi J Anaesth 2010; 4(3):131–136. https://doi.org/10.4103/1658-354x.71250
13. Chauhan G, Nayar P, Seth A, Gupta K, Panwar M, Agrawal N, et al. Comparison of clinical performance of the I-gel with LMA ProSeal. J Anaesthesiol Clin Pharmacol 2013; 29(1): 56–60. https://doi.org/10.4103/0970-9185.105798
14. Sharda M, Kapoor MC, Atray R, Garg S. Insertion of i-gel™ by the reversed technique improves the success rate and reduces the time taken for its placement: A prospective, randomized, controlled, interventional trial. J Anaesthesiol Clin Pharmacol 2017; 33(2): 226-230. https://doi.org/10.4103/joacp.joacp_395_16
15. Durrani HD, Butt KJ, Sadaf S, Rehan A, Khan AM, Umar A, et al. Comparison of LMA classic and I-gel in anesthetized, spontaneously breathing patients during elective surgical procedures. Anaesth Pain Intensive Care 2013; 17(3): 274–278.
16. Theiler LG, Kleine-Brueggeney M, Kaiser D, Urwyler N, Luyet C, Vogt A, et al. Crossover comparison of the laryngeal mask supreme and the i-gel in simulated difficult airway scenario in anesthetized patients. Anesthesiology 2009; 111(1): 55–62.
17. Shiveshi P, Anandaswamy TC. Comparison of Proseal LMA with i-Gel in children under controlled ventilation: a prospective randomised clinical study. Braz J Anesthesiol 2022; 72(2): 247-252. https://doi.org/10.1016/j.bjane.2021.02.042
18. Fernandez Diez A, Perez Villafane A, Bermejo Gonzalez JC, Marcos Vidal JM. [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; 56(8): 474-478. https://doi.org/10.1016/S0034-9356(09)70437-2