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A Study to Evaluate I-Gel as Conduit for Endotracheal Intubation

KEYWORDS: Supraglottic airway device, i-gel, Blind intubation.

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ABSTRACT ***Background:*** *The i-gel is a new supraglottic airway device with a non-inflatable, soft gel like cuff. It has been shown to be an effective ventilatory device. The present study evaluates i-gel as conduit for endotracheal intubation.* ***Methods:*** *After informed consent, 50 ASA I-II adults with normal airways undergoing elective surgery under general anaesthesia requiring intubation were allocated to undergo blind tracheal intubation using i-gel.* ***Results:*** *i-gel insertion was successful in all 50 (100%) patients [46 (92%) in 1st, 3 (6%) in 2nd and 1(2%) in 3rd attempt]. The mean time of insertion of i-gel was 18.20 ±2.32 seconds. The mean airway seal pressure was 26.78 ± 4.10 cm H2O. Overall success rate of intubation through i-gel was 78% [34(68%) in 1st, 3(6%) in 2nd and 2(4%) in 3rd attempt]. The mean time for intubation using i-gel was 23.28 ± 8.22 seconds.* ***Conclusion:*** *i-gel provides effective ventilation with acceptable airway seal pressures and can serve as alternative conduit for blind endotracheal intubation*

Introduction:

The i-gel (Intersurgical Ltd, Berkshire, UK) is a new single use supraglottic airway device made of a medical grade thermoplastic elastomer, which is soft, gel-like and transparent. It has a non-inflatable cuff which forms anatomical seal with pharyngeal, laryngeal and perilaryngeal structures, thus avoiding the compression trauma that can occur with inflatable supraglottic airway devices. Several randomized controlled trials have shown higher airway leak pressures[1-3] and less side effects[3] in comparison to other laryngeal mask airways. The wider diameter of airway tube and absence of grille in the mask bowl allows passage of tracheal tube. Several case reports in literature have described successful fibreoptic guided intubation through i-gel.[4,5] Blind intubation through i-gel has also been described.[6-8] The aim of the present study was to evaluate the success rate of i-gel as conduit for blind tracheal intubation.

Methods:

After institutional review board approval and written informed consent, 50 ASA I-II adult patients of either sex, between the age of 18-60 years, scheduled for elective surgery requiring general anaesthesia with endotracheal intubation were recruited in the study. Exclusion criteria were patients with mouth opening < 2 cm, known or anticipated difficult tracheal intubation or face mask ventilation, upper respiratory tract pathology, morbid obesity and risk of aspiration. All the patients were examined during preoperative visit and were kept fasting for 6 hours prior to scheduled time of surgery. They were premedicated with oral ranitidine 150 mg and alprazolam 0.25 mg on the previous night and 2 hours preoperatively along with tab metoclopramide 10 mg in the morning at the same time.

In the operation theater, intravenous line was started with ringer lactate and standard monitoring [HR, ECG, NIBP, $EtCO_2$, SpO_2] was established. All patients were induced with intravenous glycopyrrolate 0.2 mg, propofol 2 mg kg^{-1} and fentanyl 2 µg kg^{-1}. After confirming adequate mask ventilation, injection vecuronium 0.1 mg kg^{-1} was given for neuromuscular blockade. Appropriate size i-gel was inserted as per manufacturer's instructions[9] once the jaw relaxation was achieved. Correct placement of device was confirmed by auscultation of breath sounds and square wave capnography. Accepted maneuvers, as recommended by manufacturer[9], were used if successful ventilation was not achieved. A maximum of three insertion attempts were allowed before placement of device was considered as failure, in which case, patient was intubated using direct laryngoscopy. The number of attempts, insertion time and oropharyngeal seal pressure was noted. Time required for insertion of i-gel was taken from the time of removal of face mask to the time of its correct placement as judged by capnographic confirmation.

Appropriate size, well lubricated polyvinyl chloride (PVC) endotracheal tube (ETT), 6.0 mm ID for patients <50 kg and 7.0 mm ID for patients >50 kg, was used for blind tracheal intubation through i-gel. The ETT was rotated 90° anti-clockwise during insertion. If resistance was felt during insertion, readjustment and stabilisation of i-gel at point of maximum chest expansion, twisting of tracheal tube to align the bevel and/or cricoid pressure were allowed. Correct placement of ETT was confirmed by auscultation of breath sounds and obtaining square wave capnography. A maximum of three attempts were allowed for tracheal intubation before it was deemed as failure and surgery was continued with i-gel in situ. Time taken for tracheal tube insertion was defined as the time from passing the ETT through i-gel to confirmation of its successful placement by square wave capnography. The i-gel was then removed using one size smaller tracheal tube. After intubation, anaesthesia was maintained with end tidal isoflurane 0.5-1% and 66% N_2O in oxygen. Any evidence of trauma as detected by blood on device was noted. Patients were assessed for sore throat, hoarseness and pain on swallowing in the post-operative period. The recorded data was analysed using appropriate statistical tests.

Results:

The demographic profile of the study group is presented in table 1. i-gel insertion was successful in all 50 (100%) patients [46 (92%) in 1st, 3 (6%) in 2nd and 1(2%) in 3rd attempt].(Table 2) The mean time of insertion of i-gel was 18.20 ±2.32 seconds.(Table 2) The mean airway seal pressure was 26.78 ± 4.10 cm H_2O.(Table 2) Overall success rate of intubation through i-gel was 78% [34(68%) in 1st, 3(6%) in 2nd and 2(4%) in 3rd attempt]. (Table 3) The mean time for intubation using i-gel was 23.28 ± 8.22 seconds. (Table 3) Mucosal trauma as detected by blood on i-gel was found in 5(10%) patients. The most common postop-

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erative complications were sore throat (8%), hoarseness (12%) and pain on swallowing (18%). All these complications were mild and subsided within 24 hours without any active treatment.

Discussion:

In this study, the overall success rate of i-gel insertion was 100% with first time success rate of 92 %. In the study conducted by Halwagi et al, the first time i-gel insertion success rate was 84% and overall success rate was 92%.[6] Kapoor et al in their study achieved 96% first time and 100% overall success rate of i-gel insertion.[7] Bhandari et al in their study reported 95% first time and 100% overall success rate.[8] Halwagi et al reported first attempt igel insertion time of 19 ± 8 sec and overall insertion time of 26 ± 24 sec.[6] Kapoor et al demonstrated first attempt i-gel insertion time of 19.25 ± 3.26 sec and overall insertion time of 19.40 ± 3.32 sec.[7] These results are similar to our mean i-gel insertion time of 18.20 ± 2.32 sec. The mean airway seal pressure in our study was 26.78 ± 4.10 cm H_2O which is similar to that reported by Keijzer et al (26.8 ± 9.5 cm H_2O)[3] and Uppal et al (28 cm H_2O)[10].

In our study, the first time success rate of tracheal intubation through i-gel was 68% with overall success rate of 78%. These findings are in concurrence with the results of Kapoor et al who reported first attempt success rate of 66% with overall success rate of 82%.[7] Halwagi et al in their study reported first attempt success rate of tracheal intubation through i-gel as 69% with overall success rate of 73%.[6] The mean intubation time using i-gel in our study was 23.28 ± 8.22 sec which is similar to the mean intubation time found by Kapoor et al (24.04 ± 9.42 sec)[7] and Halwagi et al (22 ± 13 sec)[6].

There are some limitations in our study. Firstly the study was conducted in patients with normal airways. The results may differ in patients with difficult airways. Secondly, we did not compare i-gel with other intubating airways like intubating laryngeal mask airway (ILMA) and Air-Q.

Conclusion:

We conclude that i-gel provides effective ventilation with acceptable airway seal pressures and can serve as alternative conduit for blind endotracheal intubation.

Table 1:
Demographic data of the study group

Variable	Measured Value n = 50
Age, yr	36.54 ± 9.69
Sex, M/F, n (%)	21/29 (42/58)
Weight, kg	57.26 ± 7.12
Height, cm	162.34 ± 9.54
BMI, kg m^{-2}	21.72 ± 1.92
ASA, I/II, n (%)	41/9 (82/18)

Table 2:
Success rate and time taken for i-gel insertion and oropharyngeal seal pressure

Variable		Measured Value n=50
Number of Attempts, n (%)	One	46 (92%)
	Two	3 (6%)
	Three	1 (2%)
	Failure	0 (0%)
Time of insertion, sec		18.20 ± 2.32
Oropharyngeal leak pressure, (cm H_2O)		26.78 ± 4.10

Table 3:
Success rate and time taken for tracheal intubation using i-gel.

Variable		Measured Value n=50
Number of Attempts, n (%)	One	34 (68%)
	Two	3 (6%)
	Three	2 (4%)
	Failure	11 (22%)
Time of insertion, sec		23.28 ± 8.22

REFERENCE

1. Francksen H, Renner J, Hanss R, Scholz J, Doerges V, Bein B. A comparison of the i-gel with the LMA-Unique in non-paralysed anaesthetised adult patients. Anaesthesia 2009;64:1118-24. | 2. Janakiraman C, Chethan DB, Wilkes AR, Stacey MR, Goodwin N. A randomised crossover trial comparing the i-gel supraglottic airway and classic laryngeal mask airway. Anaesthesia 2009;64:674-8. | 3. Keijzer C, Buitelaar DR, Efthymiou KM, Srámek M, ten Cate J, Ronday M et al. A comparison of postoperative throat and neck complaints after the use of the i-gel and the La Premiere disposable laryngeal mask: a double-blinded, randomized, controlled trial. Anesth Analg 2009;109:1092-5. | 4. Sharma S, Scott S, Rogers R, Popat M. The i-gel airway for ventilation and rescue intubation. Anaesthesia 2007;62:419-20. | 5. Campbell J, Michalek P, Deighan M. I-gel supraglottic airway for rescue airway management and as a conduit for tracheal intubation in a patient with acute respiratory failure. Resuscitation 2009;80:963. | 6. Halwagi AE, Massicotte N, Lallo A, Gauthier A, Boudreault D, Ruel M et al. Tracheal intubation through the I-gel™ supraglottic airway versus the LMA Fastrach™: a randomized controlled trial. Anesth Analg 2012;114:152-6. | 7. Kapoor S, Jethava DD, Gupta P, Jethava D, Kumar A. Comparison of supraglottic devices i-gel(®) and LMA Fastrach(®) as conduit for endotracheal intubation. Indian J Anaesth 2014;58:397-402. | 8. Bhandari G, Shahi KS, Asad M, Parmar NK, Bhakuni R. To assess the efficacy of i-gel for ventilation, blind tracheal intubation and nasogastric tube insertion. Anesth Essays Res 2013;7:94-9. | 9. i-gel user guide. 7th ed. Wokingham, UK: Intersurgical Ltd; 2009 | 10. Uppal V, Fletcher G, Kinsella J. Comparison of the i-gel with the cuffed tracheal tube during pressure-controlled ventilation. Br J Anaesth 2009;102:264-8. |