ORIGINAL ARTICLE

A comparative study of tracheal intubation using i-gel™ and air-Q™ intubating LMA

Amna Raza, MBBS* Tariq Hayat Khan, MBBS, MCPS, FCPS**

*Registrar; **Consultant Anesthesiologist & Pain Specialist*
Department of Anesthesiology & Pain Management, KRL General Hospital, Islamabad (Pakistan)

Correspondence: Dr. Amna Raza, MBBS, House No. 1, Street 11-A, Sector-G, DHA Phase-II, Islamabad (Pakistan); E-mail: aamna.raza@gmail.com

ABSTRACT

Objective: Various supraglottic devices (SGD's) have been used as a conduit for tracheal intubation particularly in difficult airway situations when an endotracheal tube is a must. Various SGD's tried for this purpose include Intubating Laryngeal Mask Airway also called the C-Trach™ laryngeal mask, LMA Fastrach™, air-Q™ intubating LMA and the i-gel™ supraglottic airway. In this study we used air-Q™ LMA and i-gel™ for blind tracheal intubation in patients with normal airways and compared the rates of successful intubation.

Methodology: 100 patients were randomly divided into two groups. For Group A, air-Q™ was used for blind tracheal intubation while for Group B i-gel™ LMA was used. Correct placement of ETT was confirmed by capnography.

Results: Success rate for blind tracheal intubation through air-Q™ was 82% while that for i-gel it was 54% (p-value 0.003).

Conclusion: The success rate for blind tracheal intubation through air-Q™ intubating laryngeal mask airway is higher as compared to that for blind tracheal intubation through i-gel™.

Key words: Tracheal intubation; Air-Q™; i-gel™; Supraglottic device; Airway

Citation: Raza A, Khan TH. A comparative study of tracheal intubation using i-gel™ and air-Q™ intubating LMA. Anaesth Pain & intensive Care 2014;18(4):367-370

INTRODCUTION

Various supraglottic devices (SGD's) have been used as a conduit for tracheal intubation especially in difficult airway situations when an endotracheal tube is desired.

Air-Q™ ILMA is a newly developed supraglottic airway device, which in addition to its normal usage is also intended to use as a reliable tool for intubation.[1] Since it is designed for endo-tracheal intubation, standard ETTs can be easily passed through the air-Q™ into the trachea, following the successful intubation, the device can be easily removed with the aid of the patented air-Q™ remove stylet.[2]

I-gel™ is a SGD with non-inflatable cuff, designed to provide a more effective seal than conventional LMA, but it has also been used for intubation as its design allows for unobstructed passage of larger diameter tracheal tubes and a favorable alignment with the glottic inlet.[3]

ILMA is proven as effective intubation guide for blind intubation through difficult airways.[1] It exhibits higher success rate for 1st as well as subsequent intubation attempts,[3] and hence its use is always suggested.[2,5]

In similar scenarios i-gel™ usually found slightly faster and successful for 1st intubation attempts while for subsequent attempts, its success rate is very low,[3] but still equally recommended to use for the procedure.[5] On the other hand, some studies indicate significantly lower success rates for i-gel™ and do not recommend using it as intubating guide.[2] However Further studies are required to confirm the use of i-gel™ as conduit for tracheal intubation.[3]

Intubating laryngeal mask airway (LMA Fastrach™) was originally developed to be used for tracheal intubation especially in difficult cases, but this device is not available in Pakistan. Both LMA Classic™ and i-gel™ have been used for this purpose with variable success.[3] Recently, air-Q™ intubating LMA was marketed and our hospital was one of the hospitals to acquire it. It is also claimed to be especially designed for intubation through it.[6] Although both i-gel™ and air-Q™ intubating LMA are available in all sizes but are not routinely used for blind tracheal intubation. As part of the proposed study both devices will be used for blind tracheal intubation with normal airways.[6] The rationale of this study is to compare tracheal intubation through i-gel and air-Q™ intubating LMA so that suggestion can be formulated for the use of either SGD for intubation.

METHEDOLOGY

After approval from hospital ethical committee, informed written consent was taken from 100 patients fulfilling the criteria. Fasting patients with ages 20-50 years undergoing elective procedures under general anesthesia with ASA physical status 1 and 2 and Mallampatti class I and II were included in the study. Whereas patients with ASA physical status 3 or 4, and having contraindications to insertion of air-Q™ LMA or i-gel™ such as; mouth opening less than 2 cm, increased risk of aspiration, anticipated difficult intubation and facemask ventilation, with Mallampatti class III to IV were excluded.

Patients were divided into two groups by random allocation based on computer generated table of random numbers. After collection of demographic and anthropometric data patients were brought to the operating room and clinically indicated monitoring was installed. After adequate oxygen administration both groups received inj. midazolam 0.5 mg/kg, inj. nalbuphine 0.1 mg/kg and inj. ondansetron 0.1 mg/kg before induction of anesthesia with inj. propofol 1-2 mg/kg and inj. atracurium 0.5 mg/kg IV. Patient were mechanically ventilated with 3-5% sevoflurane vapors in 100% oxygen for three minutes through face mask.

Group A was inserted with air-Q™. After confirmation of adequate seal and ventilation through capnography and anesthesia machine, appropriate sized ETT was inserted through it according to the recommendations by the manufacturer. After inflation of the cuff of ETT, correct placement and adequate ventilation was checked through capnography.

Group B was inserted with i-gel™. After confirmation of adequate seal and ventilation, appropriate sized ETT was inserted through it. After inflation of cuff of the ETT, correct placement and adequate ventilation was checked through capnography.

For both groups, only single attempt was allowed. Once the correct placement of ETT was confirmed, the supraglottic device was removed over the ETT with the help of removal stylet and the procedure was marked as successful. The ventilation was continued through the SGD if intubation was failed.

Anesthesia was maintained on 2-3% sevoflurane in a mixture of 50% air and 50% O2. Boluses of inj. atracurium were used for muscle relaxation on as required basis. Patients were monitored for blood pressure, heart rate, oxygen saturation and electrocardiogram. At the end of the surgery, on return of muscle power, residual neuromuscular blockade was reversed by inj. neostigmine 30 μg/kg plus glycopyrrolate IV. On complete recovery, SGD or the ETT was removed and the patient was given oxygen by a face mask.

Statistical analysis:

The success rate of tracheal intubaion on the first attempt with S-ILMA as reported in previous RCT was 63% compared with 15% of i-gel. Considering this study sample size of 50 patients per group would have a power of 80% at 5% level of significance with confidence interval of 95% were choosen. SPSS version 17 was used for data analysis. Mean and standard deviations were calculated for quantitative variables like age and weight. For categorical data like, gender, ASA & mallampatti classification and successful intubation percentages were calculated after stratification.

Table 1: Patient Characteristics

Parameter	Group A (air-Q™) n=50	Group B (i-Gel™) n=50
Male:Female	3:2	11:14
Age mean ± SD (yrs)	31.14 ± 7.62	32.20 ± 6.88
Weight mean ± SD (Kg)	69.78 ± 9.84	67.92 ± 10.20
ASA PS [n(%)]		
1	48(96)	41(82)
2	2(4)	9(18)
Mallampatti grade [n(%)]		
1	47(94)	47(94)
2	3(6)	3(6)

Chi square test was used to analyze difference of successful intubations between groups, P-value < 0.05 was considered significant.

Table 2: Summary of results

	Group A (Air-Q™) n=50	Group B (i-gel™) n=50	P-value
Successful intubations	41	27	0.003
Success Rate	82%	54%	

RESULTS

A total of 100 patients were evaluated who were randomly allocated to 1 of 2 study groups. Demographic data such as age, weight, ASA physical status and mallampatti grade were similar, and statistically no significant differences in the two groups were found as shown in Table 1. The ratio of male to female patients was 3:2 for Group A and 11:14 for Group B.

Blind tracheal intubation was statistically more successful at 1st attempt in 41(82%) patients of Group A using air-Q™, whereas it was 27(54%) in Group B (p=0.003) (Table 2).

DISCUSSION

The present study was done to study the success rate of tracheal intubation using i-gel™ and air-Q™ intubating LMA. For this purpose total of 100 patients were randomly allocated for tracheal intubation either by air-Q™ ILMA or by i-gel™. The purpose of this study was to see success rate of tracheal intubation during 1st attempt by i-gel™ and air-Q™.

In the current study, patient characteristics such as age, height, gender were comparable between two groups. Therefore, bias if any due to variability of these three factors was eliminated. This study revealed that success rate of tracheal intubation using air-Q™ ILMA is 82% in contrast to 54% that for i-gel™.

No study was found that directly compared the success rate of air-Q™ and i-gel™ for blind tracheal intubation. Instead various studies are found that performed the comparison between other SGDs, such air-Q™ and ILMA or i-gel™ and ILMA. Furthermore results shown by these studies are often controversial.

In a previous study Karim YM and Swanson DE carried out a comparison of blind tracheal intubation through the intubating laryngeal mask airway (LMA Fastrach™ and the air-Q™), in which success rate of blind intubation was 99% with LMA and 77% with air-Q™, suggesting LMA Fastrach™ to be superior in comparison to air-Q™ for blind intubation.[1] Another study conducted by Neoh EU, comparing air-Q™ and LMA Fastrach™ for airway management during general anesthesia, showed success rate of 97% (for blind tracheal intubation) for LMA Fastrach™ and 75% for air-Q™, concluding that tracheal intubation was more successful by LMA Fastrach™ than air-Q.[6]

Tallat M, Abdul Halim and Mostafa carried out a comparative study between air-Q™ and ILMA when used as conduit for fiberoptic bronchoscope. They claimed air-Q™ as an excellent conduit (as compared to ILMA) based on various parameters such as duration of insertion, peak airway pressures, full view of vocal chords and time of insertion of ETT but they could not find significant difference between success rates for the two devices.[7]

Another study conducted at University Hospital of Salamanca in Spain which compared blind tracheal intubation through air-Q™ and ILMA. The authors found no difference in the percentage of successful blind intubation between the two devices as it was 78% for ILMA vs 75% for air-Q™.[8]

When it comes to comparison of i-gel with other supraglottic devices, Michalek P. et al. carried out a comparison of i-gel™ with ILMA as a conduit for tracheal intubation on manikins. I-gel™ showed a low success rate than ILMA and concluded that i-gel should not be used for this purpose.[2] In another study that compared i-gel™ and LMA Fastrach™ conducted by Halwagi et al. in Canada, compared the 1st attempt success rates for blind intubation. Results showed success rate of 69% for i-gel™ and 74% for LMA Fastrach™. However, the difference between the two increased as subsequent attempts were made (in cases when 1st attempt failed).[3]

A randomized clinical trial of the i-gel™ and ILMA for blind tracheal intubation in anesthetized patients with predicted difficult airway was done by Theiler and Kleine Brueggeney concluding that success rate for blind tracheal intubation through ILMA was significantly higher than for i-gel™ (69% vs. 15% respectively). They recommended not to use i-gel™ for this purpose.[5] In June 2013, a study conducted by G. Bhandri et al in Uttrakhand, India compared the success rate of tracheal intubation through i-gel™ and ILMA. Results showed 65% success rate

for i-gel and 52.5% for ILMA concluding i-gel™ to be a better option as compare to ILMA.[9] However, these results are quite contradictory to the above mentioned studies.[5]

As is evident from the literature review and above discussion, none of these studies compared i-gel™ vs air-Q™ for the purpose of blind tracheal intubation. Moreover, the studies were limited to particular scenarios such as emergency, difficult airways, ASA III/IV patients with risk of gastric aspiration, morbidly obese patients etc.

Furthermore the studies were based on complex variable such as ease of insertion, time for insertion, peak airway pressures, intubation time and complications such as sore throat, blood on device, effect on hemodynamics (blood pressure, heart rate etc.) and number of subsequent attempts. None of the above-mentioned studies discussed blind tracheal intubation through SGDs for normal elective procedures in normal healthy adults (ASA PS I/II) having normal airways (Mallampatti I/II). Thus do not provide adequate evidence to use intubation through SGDs in place of conventional intubation techniques. Which was the main motive to conduct this study.

In previous studies success rates for air-Q™ were 77% and 75%, while for i-gel™ were 69%, 65% and 15%. In our study the success rate for air-Q™ is much higher (82%) as compared to that for i-gel™ (54%). Thus air-Q™ is more successful when it comes to blind tracheal intubation through it as compared to i-gel™. Major reason behind it could be the fact that air-Q™ has been originally designed with a purpose to facilitate intubation through it, while i-gel™ was not designed for the purpose but adopted the approach. A limitation of this study was that the patient population was selected from healthy patients without difficult airways and the risk of aspiration, and who underwent elective general anesthesia. This comparative study between the air-Q™ ILMA and the i-gel™ did not have significant power to establish the less common complications that are associated with the use of supraglottic devices. Hence, we intend to conduct more studies in different clinical scenarios comparing air-Q™ with other SGD's in future.

CONCLUSION

We conclude that the success rate for blind tracheal intubation through air-Q™ intubating laryngeal mask airway is significantly higher as compared to that for blind tracheal intubation through i-gel™.

Conflict of interest: Nil declared by the authors.

REFERENCES

1. M., Karim Y.; E., Swanson D. Comparison of blind tracheal intubation through the intubating laryngeal mask airway (LMA Fastrach™) and the Air-Q™. Anaesthesia. 2011 March;66(3):185-190. [PubMed]

2. Michalek P, Donaldson W, Graham C, Hinds JD. A comparison of the I-gel supraglottic airway as a conduit for tracheal intubation with the intubating laryngeal mask airway: a manikin study. Resuscitation. 2010 January;81(1):74-77. [PubMed] doi: 10.1016/j.resuscitation.2009.10.009

3. Halwagi AE, Massicotte N, Lallo A, Gauthier A, Boudreault D, Ruel M, et al. Tracheal Intubation Through the I-gelTM Supraglottic Airway Versus the LMA FastrachTM: A Randomized Controlled Trial. Anesth Analg. 2012 January;114(1):152-156. [PubMed] doi: 10.1213/ANE.0b013e318236f438

4. Garg R, Sharma S, Rathee S, Pawar M. Use of intubating laryngeal mask airway for intubation in patient with massive goitrous thyroid. Indian J Anaesth. 2011 May-June;55(3):314–315. [PubMed] [Free full text]

5. Theiler LG, Kleine-Brueggeny M, Kaiser D, Urwyler N, Luyet C, Vogt A, et al. Crossover Comparison of the Laryngeal Mask Supreme(TM) and the i-gel(TM) in Simulated Difficult Airway Scenario in Anesthetized Patients. Anesthesiology. 2009 July;111(1):55-62. [PubMed] doi: 10.1097/ALN.0b013e3181a4c6b9.

6. Neoh EU CY. Comparison of the air-Q ILA™ and the LMA-Fastrach™ in airway management during general anaesthesia. South Afr J Anaesth Analg. 2012;18(3):150-155. [Online]

7. Abdel-Halim TM, Enin MAAE, Elgoushi MM, Afifi MG, Atwa HS. Comparative study between Air-Q and Intubating Laryngeal Mask Airway when used as conduit for fiber optic. Egyptian Journal of Anaesthesia. 2014 April;30(2):107-113. [Online] [Free full text]

8. Sastre JA, Lopez T, Garzon JC. Blind tracheal intubation through air-q supralaryngleal device: comparison with intubatingn laryngeal mask airway (ILMA). Rev Esp Anestesiol Reanim. 2012 Feb;59(2):71-6. doi: 10.1016/j.redar.2012.02.016. [PubMed]

★ ★ ★ ★ ★