

A study to compare Air-Q intubating laryngeal airway with Ambu Auragain laryngeal mask for blind tracheal intubation using Parker flex tip tube

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Abstract

Background and Aims: A number of supraglottic airways have been developed to facilitate the passage of tracheal tubes. Various studies have been conducted using air-Q ILA as a conduit for endotracheal intubation. Ambu AuraGain is a newer 3rd generation supraglottic airway device. There are limited studies available in literature on blind tracheal intubation through the Ambu AuraGain. This study was designed to compare air-Q ILA and Ambu AuraGain as conduit for blind tracheal intubation using Parker flex tip tube.

Material and Methods: One hundred twenty patients of either sex, aged 18-60 years, belonging to ASA physical status I or II scheduled for elective surgery under general anesthesia requiring endotracheal intubation were included in the study. Patients were randomly allocated to one of the two groups. Group A ($n = 60$) included blind intubation through air-Q ILA using Parker flex tip tube and group B ($n = 60$) included blind intubation through Ambu AuraGain using Parker flex tip tube.

Results: The first attempt success rate was significantly more in group A ($P < 0.001$). Intubation was significantly easy in group A as compared to group B ($P < 0.001$). The mean time for insertion of endotracheal tube through air-Q ILA in group A was 17.85 ± 6.25 sec while in group B it was 30.19 ± 10.97 sec ($P < 0.001$).

Conclusion: Air-Q ILA resulted in significantly more success rate and ease of intubation as compared to Ambu AuraGain.

Keywords: Air Q ILA, Ambu AuraGain, intubation, Parker flex tip tube

Introduction

Airway management is a crucial skill for aesthesiologists. Significant morbidity and mortality in anesthesia have been shown to result from inadequate knowledge and experience in airway management. Hence, good practice and familiarity with variety of airway devices and techniques is essential for aesthesiologists. Recently, supraglottic airway devices (SGADs) have gained wide popularity as alternative airway management and potential lifesaving tools integrated into various difficult airway management algorithms.^[1]

Air-Q intubating laryngeal airway (ILA) was invented by Dr. Daniel Cook and introduced in clinical practice in 2004 for use as SGAD or as a conduit for endotracheal intubation. The airway tube of air-Q ILA is pre-shaped and hypercurved which better approximates the anatomy for easy insertion. Ambu AuraGain is a recently introduced anatomically curved 3rd generation laryngeal mask. The anatomical curve of device is preformed to follow the anatomy of the human airway and soft rounded curve ensures rapid placement and improves its fit.^[2]

Parker flex tip tube was invented by Dr. JD Parker in 2001. In contrast to the polyvinylchloride endotracheal

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How to cite this article: Lal J, Bansal T, Somesh S, Jain M. A study to compare Air-Q intubating laryngeal airway with Ambu Auragain laryngeal mask for blind tracheal intubation using Parker flex tip tube. *J Anaesthesiol Clin Pharmacol* 2021;37:641-7.

Submitted: 12-Feb-2020

Revised: 30-Aug-2020

Accepted: 18-Oct-2020

Published: 06-Jan-2022

Access this article online	
Quick Response Code:	Website: www.joacp.org
	DOI: 10.4103/joacp.JOACP_387_19

tube (PVC ETT), the Parker flex tip tube has a centrally placed, soft, flexible, curved, centered, distal tip with double murphy eyes having an anterior curvature and a posterior opening bevel. The distal tip is designed to prevent trauma to the delicate structure of the airway as it flexes and yields on coming into contact with them. The centered tip tends to move along the midline of the airway and the glottic opening. The posterior bevel will decrease the incidence of the tube catching at the anterior or the lateral laryngeal structures during tracheal intubation. The favorable characteristics of the Parker tube suggest that it may be beneficial for blind intubation through the air-Q ILA and Ambu AuraGain.^[3]

Air-Q ILA has been used as a conduit for endotracheal intubation.^[2,4] Ambu AuraGain is a newer 3rd generation supraglottic airway device with intubation capability but with limited studies.^[2,5] The favorable characteristics of the Parker tube suggest that it may be beneficial for blind intubation through the air-Q ILA and Ambu AuraGain.^[3] So the present study was designed to compare air-Q ILA and Ambu AuraGain as conduit for blind tracheal intubation using Parker flex tip tube. The specific/primary objective was to evaluate and compare overall success rate of blind tracheal intubation through air- Q ILA and Ambu AuraGain using Parker flex tip tube.

Material and Methods

Present prospective, randomized, single blinded study included 120 patients of either sex, aged 18-60 years, belonging to American Society of Anesthesiologists (ASA) physical status I or II scheduled for elective surgery under general anesthesia requiring endotracheal intubation. The ethical clearance was taken from institutional ethical committee and trial was registered (CTRI/2018/12/016682). Patients having respiratory or pharyngeal pathology, difficult airway, body mass index ($>35 \text{ kg/m}^2$), gastroesophageal reflux disease, upper GIT surgery or pathology or surgery in position other than supine were excluded from the study.

All the patients were examined during preoperative visit a day prior to surgery. Detailed clinical history along with physical examination was done. Routine investigations like hemoglobin, bleeding time, clotting time, and urine examination were carried out in all the patients. Other investigations were done as per requirements.

The purpose and protocol of the study was explained to the patients and informed written consent was obtained for the same. Patient were kept fasting for 6 hours prior to scheduled time of surgery. They were premedicated with tablet

alprazolam 0.25 mg and tablet ranitidine 150 mg night before and in the morning 2 hours before surgery. Upon arrival in operating room, all routine monitoring including heart rate, ECG, non-invasive blood pressure, end tidal CO_2 (EtCO_2) and pulse oximetry (SpO_2) were established and baseline readings were recorded. Patients were randomly allocated to one of the two groups using computer generated sequence of random numbers. Group A ($n = 60$) included blind intubation through air-Q ILA using Parker flex tip tube and group B ($n = 60$) included blind intubation through Ambu AuraGain using Parker flex tip tube.

Standardized anesthesia protocol was followed. Peripheral intravenous line was secured with 18-gauge cannula. After preoxygenation with 100% oxygen for 3 minutes anesthesia was induced with glycopyrolate 0.005 mg kg^{-1} , fentanyl $2 \mu\text{g kg}^{-1}$, and propofol 2 mg kg^{-1} . Additional increments of propofol if required were given till loss of consciousness and loss of response to verbal command was achieved. Ability to mask ventilate the patient was judged before giving neuromuscular blocking agent. Muscle relaxation was achieved with intravenous atracurium 0.5 mgkg^{-1} . Patient was ventilated for 3 minutes via facemask and anesthesia breathing system with 2% sevoflurane in 100% oxygen. An appropriate size air-Q ILA or Ambu AuraGain was selected as per manufacturer's recommendation according to weight. Airway device was checked before use as recommended and was lubricated with water-based gel. Mandibular lift was applied by assistant and airway device introduced using the standard technique for insertion as described by the manufacturer and cuff was inflated up to 60 cm of H_2O . Correct placement of the device was confirmed by chest auscultation, adequate chest rise with manual positive pressure ventilation and capnography. If ventilation was found difficult airway device was repositioned, removed, and reinserted. A maximum of three attempts was allowed failing which an alternative method to secure patient's airway was used and patient was excluded from the analysis. After successful placement of the device a fiberscope was inserted and placed at the end of airway tube. Grading of glottic aperture was done.^[6] After that an appropriate-sized Parker flex tip tube was passed through the airway tube of the device in both the groups. Gentle advancement of tube was done in trachea without undue force. The cuff of ETT was inflated and connected to breathing circuit. Correct tube placement was confirmed by adequate chest rise, capnography, and chest auscultation. After that ETT connector was removed and the airway device taken out using the removal stylet in air-Q ILA group and tube in tube method in Ambu AuraGain group, to keep the ETT in place. Then ETT connector was replaced and tube connected to the breathing circuit. Tracheal position was

again confirmed by capnography and bilateral equal breath sounds and tube was secured in place. A total of 3 attempts was allowed for blind intubation. Appropriate adjustment maneuvers were attempted in sequence to facilitate intubation during subsequent attempts. Head extension was used during second attempt and extension of head and cricoid pressure was used for third attempt. In case of failed intubation, fiberoptic guided tracheal intubation was done through the airway device.

The primary outcome measure was to evaluate and compare overall success rate of blind tracheal intubation through air-Q ILA and Ambu AuraGain using Parker flex tip tube. Secondary outcome measures were number of attempts for airway device, insertion time of airway device, oropharyngeal leak pressure, fiberoptic grading, ease of placement of device, number of attempts for tube placement, maneuvers for intubation, ease of intubation, insertion time of tracheal tube, time for removal of airway device and total time taken for intubation.

Insertion time of airway device was taken as time from the moment of picking up the device till appearance of capnograph waveform. If not successful, the time of second and third attempt was similarly recorded from the moment of picking up the device till appearance of capnograph waveform. Insertion time was sum of all the attempts of device insertion. It did not include the time gap between attempts. Oropharyngeal leak pressure was taken as airway pressure at which leak was audible after switching off ventilator at fixed gas flow of 3 l min^{-1} with expiratory valve completely closed. Ease of placement was graded as easy if placement of device was in single attempt and difficult if more than one attempt was required to place the device (1-3). >3 failed attempts were taken as failure.

An attempt for intubation was considered if definite resistance was felt during tube insertion or esophageal intubation occurred. Maximum of three attempts were allowed. Ease of placement of tracheal tube was graded as easy if placement of ETT was in single attempt and difficult if more than one attempt was required to place the tube (1-3). If ETT was placed in first, second or 3rd attempt, it was considered as success. >3 attempts were taken as failure. Insertion time of tracheal tube was taken as time from the moment of picking up the tracheal tube till confirmation of correct placement by capnography. If no capnograph was detected, tracheal tube was removed and reinserted using manoeuvre. The time of second and third attempt was similarly recorded from the moment of picking up the tracheal tube till confirmation of correct placement by capnography. This did not include the time gap between attempts. Total time taken for intubation was

taken as time from picking up the device to confirmation of ETT placement after removal of device from oral cavity. This did not include the time for OLP measurement, fiberoptic grading and time gap between attempts. Blood on airway device after removal of device was noted. Complications such as sore throat and hoarseness of voice were noted in both the groups at one hour and 24 hours, postoperatively.

Sample size was based on a study by Sethi *et al.* Overall success rate of intubation was taken as primary objective. Sethi *et al.* reported overall intubation success rate with air-Q ILA as 80% and with Ambu AuraGain as 53%.^[2] Assuming α as 5% and power as 80%, we enrolled 54 cases in each group into the study. Further assuming 10% drop rate, it was decided to enroll 120 cases i.e., 60 cases in each group.

Statistical analysis was performed by the SPSS program for Windows, version 17.0 (SPSS, Chicago, Illinois). Continuous variables are presented as mean \pm SD, and categorical variables are presented as absolute numbers and percentage. Data were checked for normality before statistical analysis. Normally distributed continuous variables were compared using the unpaired t test (student t test). For all statistical tests, a *P* value less than 0.05 was taken to indicate a significant difference. Chi square test was used for primary objective (overall success rate). Chi square test was used for number of attempts for airway device, fiberoptic grading, ease of placement of device, manoeuvres for intubation and ease of intubation. Student t test was used for insertion time of airway device, oropharyngeal leak pressure, insertion time for removal of airway device and total time taken for insertion of tracheal tube.

Results

Consort diagram of the study has been shown in Figure 1. The two groups were comparable with respect to age, weight, and sex distribution. The mean age of patients in group A was 42.17 ± 13.54 years, and in group B was 39.37 ± 11.82 years ($P = 0.230$). There were 19 males and 41 females in group A while group B consisted of 13 males and 47 females ($P = 0.215$). The mean weight of patients in group A was 57.27 ± 10.19 kg and in group B was 56.57 ± 9.87 kg ($P = 0.326$).

The two groups were comparable with respect to the number of attempts for airway device insertion ($P = 0.375$), insertion time of airway device ($P = 0.111$) and oropharyngeal seal pressure ($P = 0.053$). Fiberoptic view in group A was found to be grade I in 30 (50.8%) cases, grade II in 18 (30.5%) cases, grade III in 9 (15.3%) cases and grade IV in 2 (3.4%)

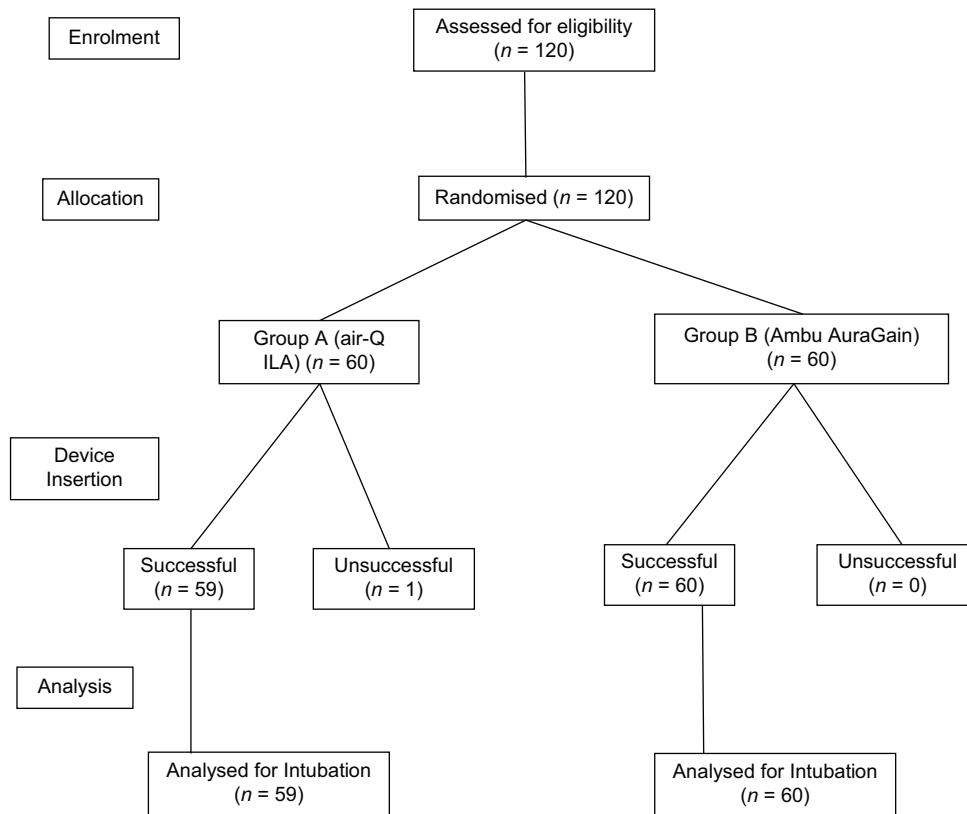


Figure 1: CONSORT Diagram

as compared to 19 (31.7%) cases in grade I, 27 (45.0%) cases in grade II, 13 (21.7%) cases in grade III and 1 (1.7%) case in grade IV in group B. Thus, maximum number of patients were present in grade I in air Q ILA group and in grade II in Ambu AuraGain group ($P = 0.001$). The difference was statistically significant in grade I ($P = 0.034$) when individual grade was compared. In rest of grades the difference between two groups was found to be statistically insignificant. In group A air-Q ILA could not be successfully placed in 1 (1.7%) patient. Hence, 59 patients were analyzed statistically for intubation in group A.

The first attempt success rate of intubation was significantly more in group A as compared to group B ($P < 0.001$) [Table 1]. Maneuvers were used in more number of patients in group A as compared to group B ($P < 0.001$) [Table 2]. Thus, the intubation was significantly easy in group A as compared to group B ($P < 0.001$) [Table 3]. The mean time for insertion of ETT through air-Q ILA in group A was 17.85 ± 6.25 sec while in group B it was 30.19 ± 10.97 sec ($P < 0.001$) [Table 4].

The two groups were comparable with respect to the removal time of airway device ($P = 0.160$). The mean total time taken for blind intubation in group A was 63.41 ± 16.60 sec while it was 71.33 ± 15.23 sec in group

B ($P = 0.026$) [Table 5]. No case of esophageal intubation was observed in air Q ILA group in any attempt of blind tracheal intubation. In Ambu AuraGain group 20 (33.33%) patients have esophageal intubation during blind tracheal intubation ($P < 0.001$) [Table 6].

Discussion

Results of present study regarding the number of attempts for air-Q ILA insertion are similar to various studies.^[7-10] However regarding Ambu AuraGain insertion attempts, the present study is in accordance as well as in contrast to various studies.^[5,11-15] First attempt success rate was observed as 60% using Ambu Auragain as compared to 90% in present study.^[15] These authors inserted device in sniffing position while in present study neutral position was used. Insertion of Ambu AuraGain was observed to be successful in 98 (98%) patients in first attempt.^[14] In this study Ambu AuraGain was inserted by an anesthesiologist with an experience of inserting 30 Ambu AuraGain which might be the reason for more first attempt success rate (98% vs 90%). Success rate of 97% in first attempt in another study might be due to the reason that these authors inserted the Ambu AuraGain in sniffing position in addition to the fact that these authors used size 3 for females and size 4 for males which was not based on body weight as per manufacturer guidelines.^[12]

Table 1: Number of Attempts for Intubation

Number of attempts for intubation	Groups				P*	
	Group A (air-Q ILA)		Group B (Ambu AuraGain)			
	Frequency	%	Frequency	%		
1	45	76.3%	6	10.0%	0.002	<0.001
2	7	11.9%	10	16.7%		0.454
3	0	0.0%	21	35.0%		<0.001
Failure	7	11.9%	23	38.3%		<0.001
Total	59	100%	60	100.0%		

*Chi-square test

Table 2: Manoeuvres used for intubation

Manoeuvres used	Groups				P*	
	Group A (air-Q ILA)		Group B (Ambu AuraGain)			
	Frequency	%	Frequency	%		
Head extension	7	11.9%	10	16.7%	<0.001	0.454
Head extension and cricoid pressure	7	11.9%	44	73.3%		<0.001
No	45	76.3%	6	10.0%		<0.001
Total	59	100%	60	100.0%		

*Chi-square test

Table 3: Ease of intubation through devices

Ease of placement of ETT	Groups				P*	
	Group A (air-Q ILA)		Group B (Ambu AuraGain)			
	Frequency	%	Frequency	%		
Easy	45	76.3%	6	10.0%	<0.001	<0.001
Difficult	7	11.9%	31	51.66%		<0.001
Failure	7	11.9%	23	38.33%		<0.001
Total	59	100%	60	100%		

*Chi-square test

Table 4: Time taken for ETT insertion through devices

Group	Group A (air-Q ILA)		Group B (Ambu AuraGain)		P*
	Range	Mean±SD	Range	Mean±SD	
Time (sec)	11-36	17.85±6.25	10-46	30.19±10.97	<0.001

*Student t test

Table 5: Total time of intubation

Group	Group A (air-Q ILA)		Group B (Ambu AuraGain)		P*
	Range	Mean±SD	Range	Mean±SD	
Time (sec)	44-137	63.41±16.60	41-98	71.33±15.23	0.026

*Student-t test

The mean insertion time of air-Q ILA in present study is similar to various studies.^[9,10,16,17] In contrast insertion time of air-Q ILA was observed as 13.30 ± 4.17 sec in one study which is less as compared to present study (20.03 ± 7.98 sec).^[7] This might be because the authors didn't use the manufacturer recommendations for selection of size of air-Q ILA. They used size 3.5 for females and size 4.5 for males Also the air-Q ILA was inserted with aid of wooden tongue depressor. Insertion time of Ambu AuraGain in present study is similar

to different studies.^[12,14] However, mean insertion time was observed as 28.71 ± 4.82 sec in a study which is higher than that in the present study.^[15] These authors inserted the device in sniffing position while in the present study neutral position was used for insertion.

First attempt success rate of blind intubation through air-Q ILA was observed to be (78.6%) as in present study 76.3%.^[18] Contrary to present study various authors observed low first attempt success rate using air-Q ILA. It was found to be 67.2% and 42.9% because these authors used wire-reinforced ETT and normal PVC ETT tubes, respectively, while in present study Parker flex tip tube was used.^[4,9] First attempt success rate using Ambu AuraGain was observed as 10% as compared to 47%.^[12] Their higher success rate may be because they allowed adjustment such as jaw thrust, cricoid pressure and twisting the ETT if resistance was observed during insertion of ETT while in present study no such adjustment was allowed. In addition, these authors used ETT of size 6 mm for females and 7 mm for males while in present study ETT size was chosen as per standard size allowed in device. Similar to present study, statistically significant difference was

Table 6: Esophageal intubation

Oesophageal intubation	Groups				P*
	Group A (air-Q ILA)		Group B (Ambu AuraGain)		
	Frequency	%	Frequency	%	
Yes	0	0.0%	20	33.33%	<0.001
No	60	0.0%	40	66.66%	<0.001

*Chi-square test

observed in success rate of blind intubation through air-Q ILA and Ambu AuraGain,^[2] Failure rate of blind intubation through Ambu AuraGain was found to be 50% which is in contrast to present study.^[12] These authors considered failure after two attempts for intubation while in present study failure was taken after three attempts, which might be the reason for higher failure rate as compared to present study.

Easy intubation through air-Q ILA was observed in 87.9% patients which is higher than the present study (76.3%).^[4] These authors used wire reinforced ETT for first, second attempt and for the third attempt standard ETT was used. However, ease of placement of ETT through air-Q ILA was found to be easy in 42.2% patients.^[2] This is because these authors categorized ease of intubation as easy, moderate and difficult or impossible while in present study ease was defined as easy or difficult.

Insertion time of ETT through air-Q ILA was observed as 22 sec and in Ambu AuraGain it was 26 sec ($P < 0.001$) which similar to the present study.^[2] However higher insertion time for ETT was observed in a study because these authors used fiberscope for insertion of ETT via air-Q ILA.^[7] Insertion time of ETT through Ambu AuraGain was found to be 33 sec which is similar to present study.^[12] Contrary to present study, it was 38.48 ± 15.17 sec and 69 sec respectively.^[5,14] These authors used fiberscope for ETT insertion which might be the reason for this difference in ETT insertion time.

Total time for intubation through air-Q ILA was observed as 55.37 ± 19.22 sec which is in accordance to the present study.^[18] In contrast it was 219 sec as compared to 63.41 sec in present study.^[19] The difference may be due to the use of fiberscope-guided intubation in third attempt in case of failure of two attempts. Lesser total time of intubation was observed because the authors took total time of intubation as sum of time of device insertion and time of tracheal intubation, they did not include time of removal of device in total time of intubation while in present study time of removal of device was included in total time of intubation.^[20] Regarding Ambu Auragain higher time was observed than in present study.^[14] This might be because the authors took more time for Ambu

AuraGain insertion and they used fiberoptic bronchoscope to guide the ETT into the trachea through Ambu AuraGain.

Blood on device was present in 9 (15.33%) cases in air-Q ILA group and 12 (20%) cases in Ambu AuraGain group ($P = 0.497$) which similar to a study. Sore throat was present at one hour after extubation in 2 (3.4%) patients in group A and 7 (11.7%) patients in group B. These patients are relieved completely from sore throat within 24 hours of extubation ($P = 0.163$). No case of hoarseness of voice was reported in our study.

However, the present study has limitation. All the cases included had normal airways with no anticipated difficult intubation so the results may differ in patients with difficult airway situations.

Conclusion

Air-Q ILA resulted in significantly more success rate and ease of intubation as compared to Ambu AuraGain.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Practice guidelines for management of the difficult airway: An updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Anesthesiology* 2013;118:251-70.
2. Sethi S, Maitra S, Saini V, Samara T. Comparison of Ambu AuraGain laryngeal mask and Air-Q intubating laryngeal airway for blind tracheal intubation in adults. *Egypt J Anaesth* 2017;33:137-40.
3. Kanazi GE, El-Khatib M, Nasr VG, Kaddoum R, Al-Alami A, Baraka AS, et al. A comparison of a silicon wire reinforced tube with the Parker and polyvinyl chloride tubes for tracheal intubation through an intubating laryngeal mask airway in patients with normal airways undergoing general anaesthesia. *Anaesth Analg* 2008;107:994-7.
4. Malhotra SK, Bharath KV, Saini V. Comparison of success rate of intubation through air-Q with ILMA using two different endotracheal tubes. *Indian J Anaesth* 2016;60:242-7.
5. Preece G, Ng I, Lee K, Mezzavia P, Krieser R, Williams DL, et al. A randomised controlled trial comparing fibreoptic-guided tracheal intubation through two supraglottic devices: Ambu® AuraGain™ laryngeal mask and LMA® Fastrach™. *Anaesth Intensive Care* 2018;46:474-9.
6. Kapila A, Addy EV, Verghese C, Brain AI. The intubating laryngeal mask airway: An initial assessment of performance. *Br J Anaesth* 1997;79:710-3.
7. Halim TM, El Enin MA, Elgoushi MM, Afifi MG, Atwa HS. Comparative study between air-Q and intubating laryngeal mask airway when used as conduit for fiberoptic. *Egypt J Anaesth*

- 2014;30:107-13.
8. Attarde VB, Kotekar N, Shetty SM. Air-Q intubating laryngeal airway: A study of the second generation supraglottic airway devices. *Indian J Anaesth* 2016;60:343-8.
 9. Ebied RS, Ali MZ, Khafagy HF, Samhan YM. Bougie assisted endotracheal intubation using the air-Q™ intubating laryngeal airway: A prospective randomized clinical study. *Egypt J Anaesth* 2017;33:107-12.
 10. Siamdoust S, Rokhtabnak F, Djalali Motlagh S, Rahimzadeh P. Comparison of the success rate of intubation between the LMA Fastrach and Air-Q ILA methods in patients undergoing elective surgery during general anaesthesia. *Anesth Pain Med* 2018;8:e63424.
 11. Shariffuddin LL, Teoh WH, Tang E, Hashim N, Loh PS. Ambu Aura Gain versus LMA supreme second seal: A randomised controlled trial comparing oropharyngeal leak pressure and gastric drain functionality in spontaneously breathing patients. *Anaesth Intensive Care* 2017;45:244-50.
 12. Yoo S, Park SK, Kim WH, Hur M, Bahk JH, Lim YJ, *et al.* The effect of neck extension on success rate of blind intubation through Ambu AuraGain laryngeal mask: A randomized clinical trial. *Can J Anesth* 2019;66:639-47.
 13. Lopez AM, Agusti M, Gambus P, Pons M, Anglada T, Valero R. A randomized comparison of the Ambu AuraGain versus the LMA supreme in patients undergoing gynaecologic laparoscopic surgery. *J Clin Monit Comput* 2016;30:1-8.
 14. Parikh DA, Jain RA, Lele SS, Tendolkar BA. A cohort evaluation of clinical use and performance characteristics of Ambu® AuraGain™: A prospective observational study. *Indian J Anaesth* 2017;61:636-42.
 15. Singh K, Gurha P. Comparative evaluation of Ambu AuraGain™ with ProSeal™ laryngeal mask airway in patients undergoing laparoscopic cholecystectomy. *Indian J Anaesth* 2017;61:469-74.
 16. Bakker EJ, Valkenburg M, Galvin EM. Pilot study of the air-Q intubating laryngeal airway in clinical use. *Anaesth Intensive Care* 2010;38:346-8.
 17. Badawi R, Mohamed NN, Abd Al-Haq MM. Tips and tricks to increase the success rate of blind tracheal intubation through the air-Q ILA vs intubating laryngeal mask airway. *Egypt J Anaesth* 2014;30:59-65.
 18. El-Ganzouri AR, Marzouk S, Abdelalem N, Yousef M. Blind versus fiberoptic laryngoscopic intubation through air-Q laryngeal mask airway. *Egypt J Anaesth* 2011;27:213-8.
 19. Karim YM, Swanson DE. Comparison of blind tracheal intubation through the intubating laryngeal mask airway (LMA Fastrach™) and the Air-Q™. *Anaesthesia* 2011;66:185-90.
 20. Bashandy GM, Boules NS. Air-Q the intubating laryngeal airway: Comparative study of hemodynamic stress responses to tracheal intubation via air-Q and direct laryngoscopy. *Egypt J Anaesth* 2012;28:95-100.