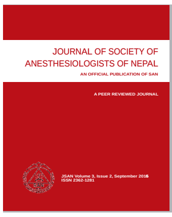

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Original Article

Comparison of Berman and Ovassapian intubating airways for fiberoptic orotracheal intubation in anaesthetized patients

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Abstract

Background: Intubating oral airways are widely used during fibreoptic orotracheal intubation in order to improve the bronchoscopic visualisation of the glottis and facilitate the procedure. This study compares the visualisation of the glottic opening with bronchoscope using Berman or Ovassapian intubating airway.

Methods: We conducted a randomised comparative prospective study one hundred twenty patients with no clinical indicators of the difficult airway. The two oral intubating Berman and Ovassapian airways were compared during fibreoptic endotracheal intubation in anaesthetized patients. The bronchoscopic view, bronchoscopic time, and the total time for intubation were compared.

Result: The bronchoscopic view was significantly better with Berman intubating airway (unobstructed view 74%) as compared to the Ovassapian airway (unobstructed 38.4%) (p-value 0.002). The Berman airway provided a significantly shorter duration for visualisation of the vocal cord and intubation of trachea in comparison to the Ovassapian airway.

Conclusion: Berman airway provided a better bronchoscopic view as well as shorter bronchoscopic and intubation time as compared to the Ovassapian airway.

Keywords: airway management; bronchoscopy; difficult airway; intubating oral airways

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Introduction

Endotracheal intubation using fibreoptic bronchoscope is nowadays widely used procedure and can be life-saving in difficult airway scenario.[1] Even with the technique of fibreoptic bronchoscopy, the visualisation of glottis sometimes become difficult. Upper airway structures can provide major obstruction for the advancement of the bronchoscope and hence poor visualisation of the glottis.[2] So in an effort to reduce the failure of fibreoptic intubation and improve the bronchoscopic visualisation, various intubating oral airways (IOA) have been designed and they are widely used during fibreoptic orotracheal intubation.[3] The use of these specific airways can be very much helpful during the procedure as they can provide a clear unobstructed path for the advancement of the bronchoscope and the endotracheal tube. There are, at present, a number of such airways available, including the Berman, Williams and Ovassapian intubating airway.[4] Berman and Ovassapian intubating airways are the most commonly used intubating airways during fibreoptic orotracheal intubation. These airways help to remove visual obstruction due to the tongue and posterior pharyngeal structures and hence making a clear path, provide a firm hold of the bronchoscope in the midline, prevent the patient from biting the insertion cord and provide a patent airway for spontaneously or mask ventilated patient. [5,6]

This study compared Berman intubating airway with Ovassapian intubating airway during fibreoptic intubation. We chose to investigate the time taken to view the glottis, total time required to intubate the trachea and the bronchoscopic view.

Methods

Ethical clearance was obtained from the institutional review board. Our study was a randomised prospective study comparing Berman and Ovassapian intubating airways during fibreoptic orotracheal intubation.

We calculated sample size based on a pilot study done on a total of 20 patients with 10 patients in each group with the time taken for intubation as the primary outcome measure. The pilot study showed mean time taken was 32 seconds in the Berman airway group and 39 seconds in the Ovassapian airway group with a standard deviation of 16. With calculation based on these figures, 56 patients per group were required to have an 80% chance of detecting, as significant at the 5% level, a difference in primary outcome measure of 10 seconds between the groups. To compensate for possible dropouts, we took 60 patients in each group.

We included patients of ASA I and II of age between 18 to 60 years with the normal airway. Those patients with ASA III onwards, morbidly obese patient, emergency surgery requiring rapid sequence induction, patient with anticipated difficult airway, patients undergoing maxillofacial surgery were excluded from the study.

Patients were divided into two groups each group comprising 60 patients. For randomisation, two envelopes with Group A and Group B written inside in each were used. One of the envelopes was selected randomly for a patient. The patient was unaware of this group allocation and intervention.

Group A: Berman intubating airway was used (n=60)

Group B: Ovassapian intubating airway was used (n=60).

In the operation theatre, routine noninvasive haemodynamic monitoring was done for all the patients. The patient was preoxygenated for 3 minutes with 100% oxygen and induction of anaesthesia was done with injection propofol 2mg/kg, pethidine 1mg/kg and muscle relaxant vecuronium bromide 0.1mg/kg intravenously. Lungs were ventilated with positive pressure ventilation by a mask with oxygen for 3 minutes to achieve the effect of neuromuscular blockade. Once the patient was anaesthetized, the head was positioned in classic sniffing position and one of the intubating airways was selected as per randomization and placed inside the mouth.The appropriate size endotracheal tube was mounted on the bronchoscope which was then inserted into the channel of the intubating airway advancing towards the glottis. Once the bronchoscope was out of distal end of the airway the glottic view was formally assessed and graded accordingly using previously proposed classification.[4] Any difficulty in the visualisation of the glottis was tried to relieve by manipulation of the airway and chin lift manoeuvre. The bronchoscope was advanced into the trachea to a level just above the carina and the tracheal tube was railroaded over it, through the airway and into the trachea. The tracheal cuff was inflated and its appropriate position was confirmed with capnograph. Then the bronchoscope was removed and the patient's lungs were ventilated via the tracheal tube.

The bronchoscopic time and the total intubation time were compared. We defined bronchoscopic time as the time required for the insertion of the bronchoscope until the tip of the bronchoscope reached the vocal cord. Similarly, total intubation time was defined as the time taken from the insertion of the bronchoscope and its removal of the mouth after the successful tracheal intubation confirmed by ETCO2. Throughout the procedure, O2 insufflation was provided and suction was done whenever secretion obstructed the view.

We used the escape safe criteria in both the groups. When, in any case, saturation of oxygen fell below 90% and mean arterial pressure (MAP) varied more than 20% from the baseline, the attempt was abandoned and ventilation was done using a mask. A maximum of three attempts was done, after which the case was dealt by the difficult airway algorithm.

Classification of bronchoscopic views through intubating airways:[4]

Grade 1: Split airway provides an unobstructed path for bronchoscope from mouth to glottis

Grade 2: Tongue rests against posterior pharyngeal wall causing partial obstruction to bronchoscope

Grade 3: Epiglottis rests against posterior pharyngeal wall causing partial obstruction to bronchoscope

Grade 4: Tongue and epiglottis rest against posterior pharyngeal wall, both causing partial obstruction to bronchoscope

Grade 5: Tongue rests against posterior pharyngeal wall causing total obstruction to bronchoscope (failure)

Grade 6: Epiglottis rests against posterior pharyngeal wall causing total obstruction to bronchoscope (failure)

For our comparison, we had labelled grade 1 as unobstructed view, grade 2, 3 and 4 as partially obstructed view and grade 5, 6 as the completely unobstructed view. After successful intubation of the trachea, the intubating airway was also removed. The ease of removal of the IOA was also noted which was a subjective finding and graded as easy or difficult.

Statistical analysis

After completing the data collection, data were entered in MS Excel 2007 and converted to SPSS version 15.0 for statistical analysis. Descriptive statistics were presented in percentages, means and their standard deviation etc. Chi- square test was used for the grouped variables while mean of the ungrouped variables were compared by using independent sample T test. The comparison was considered significant when the p-value was less than 0.05.

Results

Figure 1 shows the flow of participants through each stage of the randomised trial.

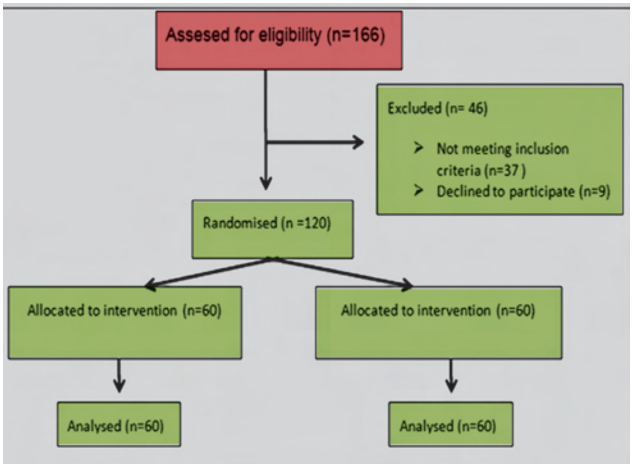

Figure 1: Consort flow diagram of the participants

Demographic profile and pre-anaesthetic assessment of the patients are comparable in both the groups (table 1).

Table1: Demographic and pre-anaesthetic assessment

Variables	Category	Group A	Group B	p-value
Age	Mean age	35.47± 11.68	37.65±11.82	0.311
Sex	Male	33(55%)	30(50%)	o.583
	Female	27(45%)	30(50%)	
Weight		55.05± 5.90	57.12±8.88	0.136
ASA-PS	I	42(70%)	45(75%)	0.540
	II	18(30%)	15(25%)	
TM distance (mm)		68.18±5.54	67.77±4.84	0.662
MO (mm)		42.35±5.44	40.52±4.7	0.057
Mallampati	I	39(65%)	37(61.6%)	0.160
	II	21(35%)	23(38.4%)	
Neck movement	N	60	60	1.0
	R	0	0	

TM- Thyromental distance, MO- Mouth opening, N-Normal, R-Restricted

We used a previously proposed classification for the evaluation of bronchoscopic view. We found that 74% and 38.4% of the patients had an unobstructed view in group A and group B respectively with the P value of <0.001. The patients in Group B had more partial obstruction than Group A patients. None of the patients in Group A had complete obstruction while 5% of the patients in Group B had complete obstruction but it was not statistically significant (Figure 2).

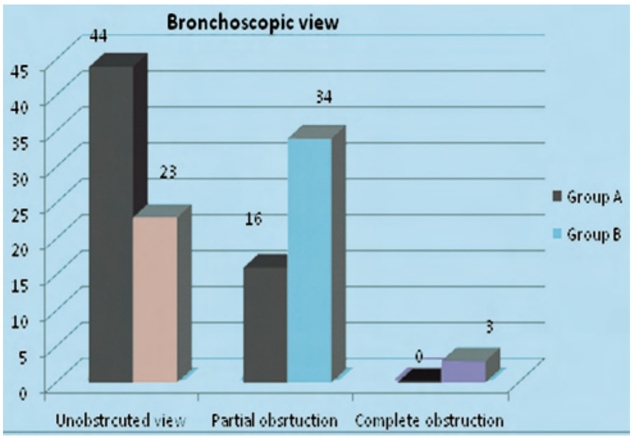

Figure 2: Comparison of bronchoscopic view

Significantly larger number of patients had an unobstructed bronchoscopic view in Group A as compared to group B (p-value =0.002).

The bronchoscpic time and the total time required for intubating trachea were significantly shorter for the patients in Group A (P < 0.001)(Tbale 2).

Table 2: Comparison of time taken to visualise the glottis and intubate the trachea

Variable	Group A	Group B	p-value
Tb (second)	10.67 ± 3.26	16.65 ± 5.94	<0.001
Tt (second)	33.27 ± 9.58	46.77 ± 15.01	<0.001

Tb- time taken to visualise the glottis, Tt- time taken to intubate the trachea

The chin lift manoeuvre facilitated and improved the glottic visualisation with both the intubating airways. At the end of intubation, both the intubating airways were successfully removed without any difficulty except in three cases with Berman airway required external manipulation for removal.

Discussion

Endotracheal intubation using fibreoptic bronchoscope can be a useful tool for securing the airway in patients with difficult airway.[7] The use of oral intubating airways has always been beneficial during the procedure. In our study, we have found that the Berman and the Ovassapian airway both had facilitated the intubation procedure by providing a better glottic view. However, the Berman intubating airway was more likely to provide an unobstructed path whereas obstructed view with Ovassapian airway was significantly more. Out of 16 patients with partial obstruction, in 14 patients the obstruction was due to the epiglottis alone resting on the posterior pharyngeal wall while tongue was the cause of partial obstruction only in 2 patients. Similarly with Ovassapian airway, 34 (56%) patients had partial obstruction and tongue was the major cause of partial obstruction in 22 patients and in 9 patients obstruction was due to epiglottis and tongue both and in 3 patients obstruction was caused by epiglottis alone. In 3 cases, total obstruction to the bronchoscopic view was found with the use of Ovasspaian airway and was due to the tongue resting on the posterior pharyngeal wall. So out of 53 patients with partial and complete obstruction to the bronchoscopic view, 50.9% was due to the tongue alone while 43.5% was due to the epiglottis and 5.6% of obstruction was due to tongue and epiglottis both.

The difference in the manufacturing design could be the probable explanation for the difference in the bronchoscopic view we obtained from the comparison.[3] The longer curvature of the Berman airway directs the fibrescope close to the vocal cord and this may be one of the main reason for obtaining a better bronchoscopic view with the use of this airway.[8] However, Berman intubating airway with its long lingual curvature ends in a distal flange called the laryngoscope tip which extends 1-2 cm beyond the main body.[9] This distal end was found to lodge in the vallecula causing large epiglottis to fall posteriorly and obstruct the view.[4] This may be the probable reason for the epiglottis being the major cause of obstruction with the use of Berman airway.

The design of Ovassapian airway includes two pairs of curved guide walls between the side walls and its distal half has no posterior wall.[10] In our study, we found that because of the free posterior wall of the Ovasspaian airway, the tongue frequently used to push it against the posterior pharyngeal wall and hence obstructing the glottic view.

We found that the time required visualising the glottis and total time required to intubate the trachea was significantly shorter with the use of Berman airway than the Ovassapian airway. We had used 10 cm size Berman Airway and adult size Ovassapian airway for both male and female. The Berman airway, owing to its tube-like structure and greater length provided an unobstructed path in most of the patients in our study hence the intubation became easier. Since Ovassapian airway is open at the distal end and has spatula like structure, the tongue was frequently found to obstruct the bronchoscopic view. Probably, the posteriorly opening channel of Ovassapian airway had also contributed for the prolonging bronchoscopic time as there was a poor visualisation of the anteriorly placed glottis.[8] With the use of Ovassapian Airway, frequent impingement of the intubation tube on the vocal cord was found and was considered to be one of the important cause for prolonging bronchoscopy.[11]

After the trachea had been intubated, the airway device was removed from the oral cavity without any difficulties. We did not find any significant difference in the removal of the airway device between the two airways. Since the Berman airway has longitudinal split along its length it was removed while the bronchoscope was in situ. The Ovassapian airway was removed only after the bronchoscope had been extracted.

The longer lingual curvature of the Berman intubating airway may have contributed to clear bronchoscopic view of the glottis and hence its higher success rate compared to the Ovassapain airway.

We had used single size airways for all adults of both sexes. This might be the main limitation of the study.

In conclusion, the Berman intubating airway provides a better conduit for the bronchoscopic view than the Ovassapian intubating airway during fibreoptic orotracheal intubation in anaesthetized patients. It also has a significantly shorter time requirement for visualisation of the vocal cord and intubation of trachea without any clinically significant complications. The chin lift is an important manoeuvre which facilitates and improves the glottic visualisation irrespective of the type of intubating airways.

Informed consent: Informed consent was obtained from all the participants included in the study.

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Conflict of interest: No conflict of interests to declare.

References

1. Fasting S, Gisvald SE. Serious intraoperative problems-a five year review of 83844 anesthetics. Can J Anaesth 2002;49:545-53. http://dx.doi.org/10.1007/BF03017379 [PMid:12067864]

2. Jackson AH, Orr B, Yeo C, Parker C, Craven R, Greenberg SL. Multiple sites of impingement of a tracheal tube as it is advanced over a fibreoptic bronchoscope or tracheal tube introducer in anaesthetized, paralysed patients. Anaesth Intensive Care 2006;34:444-9. [PMid:16913339]

3. Greenland KB, Lam MC, Irwin MG. Comparison of the Williams Airway Intubator and Ovassapian Fibreoptic Intubating Airway for fibreoptic orotracheal intubation. Anaesthesia 2004;59:173-6. http://dx.doi.org/10.1111/j.1365-2044.2004.03527.x [PMid:14725520]

4. Greenland KB, Ha ID, Irwin MG. Comparison of the Berman Intubating Airway and the Williams Airway Intubator for fibreoptic orotracheal intubation in anaesthetised patients. Anaesthesia 2006;61:678-84. http://dx.doi.org/10.1111/j.1365-2044.2006.04704.x [PMid:16792614]

5. Patil V, Stehling LC, Zauder HL, Koch JP. Mechanical aids for fiberoptic endoscopy. Anesthesiology 1982;57:69-70. http://dx.doi.org/10.1097/00000542-198207000-00028 [PMid:7091730]

6. Ovassapian A. Fiberoptic tracheal intubation in adults. In: Ovassapian A (ed): Fiberoptic Endoscopy and the Difficult Airway, 2nd ed. Philadelphia: Lippincott-Raven Publishers, 1996:71-103.

7. Johnson DM, From AM, Smith RB, From RP, Maktabi MA. Endoscopic study of mechanisms of failure of endotracheal tube advancement into the trachea during awake fiberoptic orotracheal intubation. Anesthesiology 2005;102:910-4. http://dx.doi.org/10.1097/00000542-200505000-00008 [PMid:15851876]

8. Atlas GM. A Comparison of Fiberoptic-Compatible Oral Airways. J Clin Anesth 2004;16:66-73. http://dx.doi.org/10.1016/j.jclinane.2003.04.003 [PMid:14984864]

9. Murrin KR. Intubation procedure and causes of difficult intubation. In: Latto IP, Rosen M, eds. Intubation. London: Bailie` re Tindall, 1985:75-89.

10. Ovassapian A. A new fiberoptic intubating airway. Anesth Analg 1987;66:S132 http://dx.doi.org/10.1213/00000539-198702001-00132

11. Randell T, Valli H, Hakala P. Comparison between the Ovassapian intubating airway and the Berman intubating airway in fibreoptic intubations. Eur J Anaesthesiol 1997;14:380-4. http://dx.doi.org/10.1097/00003643-199707000-00007 [PMid:9253565]