Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Oral Fibreoptic Intubation – A Comparison of Simple Pre-Determined Length Insertion Technique (Split) With Conventional Method: A Randomized Cross-Over Study

M Balasubramani

Associate Professor, Department of Anaesthesiology, Government Theni Medical College, Theni, Tamil Nadu, India

Abstract

Introduction: The flexible fiber-optic bronchoscopy (FOB) guided tracheal intubation remains the gold standard in difficult airway management in spite of many newer airway gadgets. FOB-guided intubation can be performed through nasal or oral route either in awake or anaesthetised patients.

Aim: To evaluate the simple pre-determined length insertion technique (SPLIT) during oral fibreoptic intubation.

Methods: In this randomized cross-over study 18 - 65 years, ASA 1 and 2, Patients undergoing general anaesthesia patients were included. Video-assisted flexible fiber-optic laryngoscopy was performed using SPLIT (Group-A) (n-30) and by using conventional method (Group-B) (n-30). Introduction of fiberscope from the incisors to the visualization of glottis (T1), Time taken from the visualization of glottis to the passage of fiber-optic tip just beyond glottis (T2), Time from the incisors to pass it beyond the glottis (T3), were noted.

Results: T1 is reduced in SPLIT (12 ± 1.58 sec) when compared to conventional method (43 ± 1.68 sec) and is statistically significant ($p< 0.0001$).T2 is equal in SPLIT (11 ± 1.23 sec) and conventional method (12 ± 1.47 sec) which is statistically insignificant ($p>0.05$). T3 is reduced while using SPLIT (13 ± 2.03 sec) when compared to conventional method (55 ± 1.57 sec) and is statistically significant ($p< 0.0001$).

Conclusion: SPLIT significantly lessened the time to visualize the glottis than the conventional technique. The SPLIT can be used as a preferred technique to secure the airway at the earliest and also as an alternative to conventional technique.

Key words: Conventional technique, Oral fiberoptic intubation, SPLIT

INTRODUCTION

The flexible fiber-optic bronchoscopy (FOB) usage remains the gold standard in difficult airway management in spite of many newer advancements. FOB guided intubation can be performed either in awake or anaesthetised patients through nasal or oral route. The visualisation of the glottis with fiberscope, visualising the carina by passing the fiberscope beyond the glottis and railroading the endotracheal tube over the fiberscope into the trachea are the usual steps in fiber-optic intubation. Jaw thrust, lingual traction, fiberoptic assisting airway devices and laryngoscopy assisted fiber-optic intubation have been employed for easy way of fiber-optic intubation.[1,2] None of them has been found to be individually effective to improve the glottic visualisation while the combination offers a better outcome on most occasion. Usually, FOB is performed by negotiating the fiberscope from the incisors and identifying the airway structures until the glottis.[3] On the contrary, the FOB could also be advanced to a fixed distance to facilitate the glottic visualisation. This alternative technique had successfully reduced the time

Access this article online

www.ijss-sn.com

Month of Submission : 11-2019
Month of Peer Review : 12-2019
Month of Acceptance : 12-2019
Month of Publishing : 01-2020

Corresponding Author: Dr. M Balasubramani, Associate Professor, Department of Anaesthesiology, Government Theni Medical College, Theni, Tamil Nadu, India.

needed for glottic visualisation through the nasal route.[4] However, this technique has not been evaluated in the oral flexible fiber-optic intubation. Hence this study is done by inserting the fixed length of FOB during oral flexible fiber-optic intubation. The predetermined length was calculated from the angle of mouth to tragus of the ear.[5] The primary aim of this randomised crossover trial was to compare the time to visualise the glottis and time to pass beyond the glottis in conventional versus the simple predetermined length insertion technique (SPLIT).

METHODS

This randomised crossover trial was conducted in Govt Theni medical College after obtaining approval from the institutional research and ethics committee. Those patients with age between 18 and 65 years belonging to the American Society of Anesthesiologists physical status 1 and 2 undergoing general anaesthesia was included in the study. Patients with gastro-oesophageal reflux disease anticipated difficult airway, pregnancy, abdominal distension, maxillofacial trauma and known allergy to anaesthetic drugs were excluded from the study. A total of 74 patients were selected for the study and after applying the exclusion criteria 60 patients were randomised. Written informed consent was obtained from all patients included in the study. After preanesthetic evaluation on the previous day, the patient was explained about the procedure. In the preanesthetic room, Inj. glycopyrrolate (0.2 mg) was administered. The patient was nebulised with Inj. 4% Lignocaine 3ml 10 min before the procedure. The randomisation was done using the computer-generated random number list and lot method. They were grouped into two groups. Video-assisted flexible fiber-optic laryngoscopy was performed using SPLIT (Group-A) (n-30) and by using conventional method (Group-B) (n-30).

In the operation room, standard monitors were established, and baseline parameters were noted. After adequate preoxygenation, all were administered fentanyl (2 μg/kg) and midazolam (1 mg) intravenously. Then the patient remained breathing spontaneously with oxygen and sevoflurane. Video-assisted flexible fiber-optic laryngoscopy was performed. In Group A, Predetermined length - calculated from the angle of mouth to tragus of the ear. The measured length is marked in the fiberscope using a marker. The fiberscope was inserted in the midline initially to the marked length of the fiberscope and anteflexion of the tip was done. After glottic visualisation, the scope was negotiated and passed beyond the glottis to visualise the carina. After visualising the glottis the endotracheal tube was railroaded and intubation completed. The further anaesthetic management is carried out as per the institutional protocol. In Group B, the video-assisted flexible fiber-optic laryngoscope was introduced through the oral cavity. The fiberscope was negotiated from the carina step by step by identifying the airway structures and then the glottis. After glottic visualisation and passing the fiberscope beyond the glottis to visualise the carina and intubation performed. The observed parameters include the time taken from the introduction of fiberscope from the incisors to the visualisation of glottis (T1), time taken from the visualisation of glottis to the passage of fiber-optic tip just beyond glottis (T2), time from the incisors to pass it beyond the glottis (T3), pre-determined length, The timings were noted by a resident who was not directly involved in the study. Desaturation or laryngospasm during the fiber-optic procedure was treated with 100% O2 and positive pressure ventilation.

The sample size was calculated from the previous study using an alpha level of 0.05 and a power of 80% using two samples mean test in Open Epi software.

RESULTS

The statistical methods used in this study are mean, standard deviation and unpaired t test for comparing the time duration between SPLIT and conventional technique. The demographic parameters were shown in the Figures 1 and 2 which showed no significant difference between male and female sexes and in the age groups which were almost equally distributed. T1 - Time taken for introduction of fiberscope from the incisors to the visualization of glottis is reduced in SPLIT (12 ± 1.58 sec) when compared to conventional method (43 ± 1.68 sec) and is statistically significant ($p < 0.0001$). T2 - Time taken from the visualization of glottis to the passage of fiberoptic tip just beyond glottis is equal in SPLIT (11 ± 1.23 sec) and conventional method (12 ± 1.47 sec) which is statistically insignificant ($p > 0.05$). T3 - Time from the incisors to pass it beyond the glottis ie. the total time for fiber-optic intubation is reduced while using SPLIT (23 ± 2.03 sec) when compared to conventional method (55 ± 1.57 sec) and is statistically significant ($p < 0.0001$) [Table 1]. Thus the time for intubation with SPLIT was very much reduced when compared to conventional method. The most probable reason is that the cut short of time by introducing the fiberscope from the incisors to the glottis in a single step.

DISCUSSION

From this study, it is evident that, the time for intubation with SPLIT was very much reduced when compared to conventional method. The most probable reason is that the cut short of time by introducing the fiberscope from

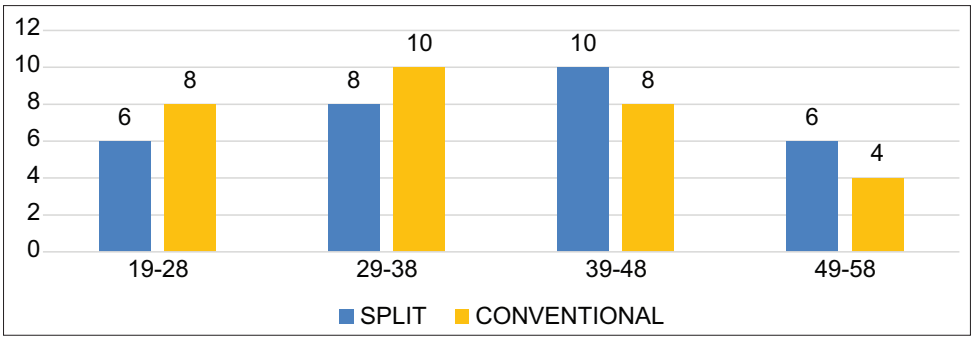

Figure 1: Age distribution

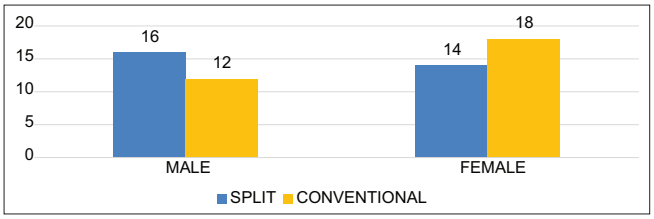

Figure 2: Sex distribution

Table 1: Time duration comparison between SPLIT and conventional technique and *P* value

Time duration (sec)	SPLIT	Conventional technique	*P* value
	Time (sec) (mean±SD)		
T1	12±1.58	43±1.68	<0.0001
T2	11±1.23	12±1.47	>0.05
T3	23±2.03	55±1.57	<0.0001

the incisors to the glottis in a single step. While in the conventional method as there was a delay in negotiating the fiberscope from the incisors to the glottis, the time is prolonged. Moreover after reaching the glottis, the time for fiberscope to pass beyond the glottis to visualize the carina is equally distributed between the SPLIT and conventional technique thus avoiding the observer bias. And finally the total time for fiberscope to start from the incisors to the passing beyond the glottis is very much reduced in SPLIT when compared to conventional technique.[6]

The SPLIT can be compared to Tele laryngoscopy, which is used to visualize the vocal cords by the Ear, Nose and Throat surgeon. The Tele laryngoscope, in which visualizing camera is at an angle of 70° to its axis, will be advanced for visualizing the vocal cords.[7,8] Similarly, in the SPLIT also, after inserting the pre-determined length and then anti-flexing the fiber-optic tip to an appropriate angle, the glottis was visualized. This technique bypassed the possible difficulties in the upper airway so that the glottis was visualized more rapidly. We planned this study as crossover design to eliminate the influence of one technique over another. Hence, we analysed the participants who performed the conventional technique followed by the SPLIT and vice versa. The SPLIT could be adapted as a learning tool for fiber-optic intubation for novice anaesthesia which would help them to improve the learning curve and confidence in fiber-optic intubation.

The advantage of the SPLIT are, lesser risk of airway trauma and easy to perform even in hands of novice anaesthesiologists. Although there was a concern of trauma during the blind fiberscope insertion, practically there was no such trauma as fiberscope was introduced while the airway was kept wide open by lingual traction. Since the pre-determined length was measured from the patient itself and easy to perform, it can be done by anesthesiologists with limited experience in FOB. The operator bias was eliminated as all the time measurements were noted from the recorded video by a single observer. The use of the SPLIT could also be extended to the preoperative endoscopic airway examination.[9,10] Thus, the SPLIT can be an alternative to conventional technique.

CONCLUSION

Thus from this study it can be concluded that the use of SPLIT has profoundly lessened the timeto visualize the glottis and thereby the oral fiberoptic intubation than the conventional technique. Thus the SPLIT can be suggested as a preferred technique for the consultants and residents to manage the airway at the earliestand also can replace the conventional technique.

REFERENCES

1. Elangovan Muthukumar, Lenin Babu Elakkumanan, Prasanna Udupi Bidkar, MVS Satyaprakash, Sandeep Kumar Mishra. Evaluation of simple pre-determined length insertion technique (SPLIT) with conventional method for oral fibreoptic intubation: A randomised cross-over study. Indian J Anaesth 2017 Jan;61(1):36-41.
2. Durga VK, Millns JP, Smith JE. Manoeuvres used to clear the airway during fiberoptic intubation. Br J Anaesth 2001;87:207-11.
3. Stacey MR, Rassam S, Sivasankar R, Hall JE, Latto IP. A comparison of direct laryngoscopy and jaw thrust to aid fiberoptic intubation. Anaesthesia

2005;60:44-58.
4. Erb T, Hampl KF, Schürch M, Kern CG, Marsch SC. Teaching the use of fiberoptic intubation in anesthetized, spontaneously breathing patients. AnesthAnalg 1999;89:1292-5.
5. Mohammadzadeh A, Haghighi M, Naderi B, Chaudhry A, Khan ZH, Rasouli MR, *et al*. Comparison of two different methods of fiberoptic nasal intubation: Conventional method versus facilitated method (NASAL18). Ups J Med Sci 2011;116:138-41.
6. Greenberg RS. Facemask, nasal, and oral airway devices. Anesthesiol Clin North America 2002;20:833-61.
7. Hozo SP, Djulbegovic B, Hozo I. Estimating the mean and variance from the median, range, and the size of a sample. BMC Med Res Methodol2005;5:13.
8. Mendes Neto JA, Pinna BR, Caporrino Neto J, Pedroso JE. Comparison between telelaryngoscopy and suspension laryngoscopy in the diagnosis of benign vocal fold lesions. Braz J Otorhinolaryngol 2008;74:869-75.
9. Ponka D, Baddar F. Indirect laryngoscopy. Can Fam Physician 2013;59:1201.
10. Erb T, Hampl KF, Schürch M, Kern CG, Marsch SC. Teaching the use of fiberoptic intubation in anesthetized, spontaneously breathing patients. AnesthAnalg1999;89:1292-5.

How to cite this article: Balasubramani M. Oral Fibreoptic Intubation – A Comparison of Simple Pre-Determined Length Insertion Technique (Split) With Conventional Method: A Randomized Cross-Over Study. Int J Sci Stud 2020;7(10):139-142.

Source of Support: Nil, **Conflicts of Interest:** None declared.