

ORIGINAL RESEARCH

Conventional versus simple pre-determined length insertion technique (SPLIT) of tracheal intubation¹Dr. Sanjay Kumar Gupta, ²Dr. Priya Sharma^{1,2}Associate Professor, Department of Anaesthesia, FH Medical College and Hospital, Etmadpur, Agra, U.P., India**Correspondence:****Dr. Priya Sharma**

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Abstract**Background:** Flexible fiber-optic bronchoscopy is very useful for the anesthesiologist in the management of difficult tracheal intubations. The present study compared conventional and the simple pre-determined length insertion technique (SPLIT) of tracheal intubation.**Materials & Methods:** 60 patients with age 18-60 years scheduled for an elective surgical procedure requiring general anaesthesia of both genders were divided into 2 groups of 30 each. In group I patients, conventional flexible fiberoptic laryngoscopy was done followed by SPLIT and vice versa in group II. The time taken from the 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), pre-determined length, vital parameters were recorded.**Results:** Group I had 18 males and 12 females and group II had 14 males and 16 females. T1 in group I was 14.6 seconds and in group II was 11.4 seconds, T2 in group I was 12.seconds and in group II was 8.8 seconds, T3 in group I was 22.0 seconds and in group II was 19.1 seconds. The difference was significant (P< 0.05).**Conclusion:** SPLIT technique was better as compared to conventional technique of tracheal intubation.**Key words:** SPLIT technique, Flexible fiber-optic bronchoscopy, tracheal intubation.**Introduction**Flexible fiber-optic bronchoscopy is very useful for the anesthesiologist in the management of difficult tracheal intubations, evaluation of the upper airway, verification of endotracheal tube placement, repositioning or checking patency of endotracheal tubes, changing endotracheal tubes, placement of double lumen tubes and placement of endobronchial blockers.^{1,2} The flexible fiber-optic intubation bronchoscope gives the competent practitioner the unparalleled opportunity to secure almost any difficult airway encountered. The oral fiber-optic intubation is further demanding than the nasal route because of the perpendicular alignment of oral and pharyngeal axis.³

The use of fiberoptic instruments to help in airway management is a relatively a recent event. In 1967, Dr. P. Murphy was the first to use a fiberoptic instrument for the control of airway when he performed a nasal intubation under general anaesthesia for a patient with advanced

still's disease using choledochoscope.⁴ For successful visualization of the glottis, different methods such as jaw thrust, lingual traction, fiber-optic assisting airway devices and laryngoscopy assisted fiber-optic intubation have been employed.⁵ The present study compared conventional and the simple pre-determined length insertion technique (SPLIT) of tracheal intubation.

Materials & methods

The present study was conducted on 60 patients with age 18-60 years scheduled for an elective surgical procedure requiring general anaesthesia of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 30 each. In group I patients, conventional flexible fiberoptic laryngoscopy was done followed by SPLIT and vice versa in group II. The time taken from the 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), pre-determined length, vital parameters were recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I Distribution of patients

Groups	Group I	Group II
M:F	18:12	14:16

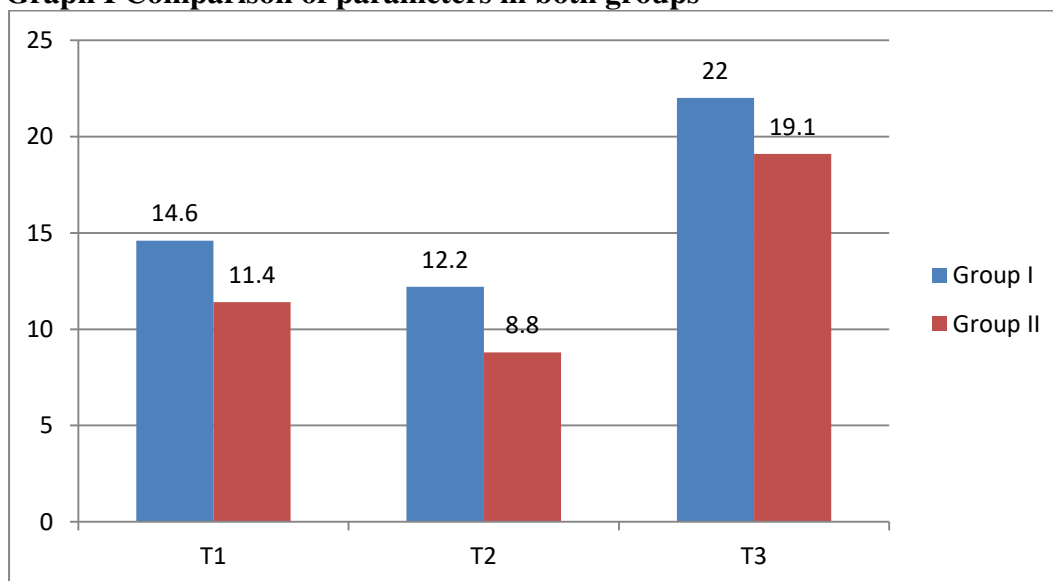
Table I shows that group I had 18 males and 12 females and group II had 14 males and 16 females.

Table II Comparison of parameters in both groups

Time (Seconds)	Group I	Group II	P value
T1	14.6	11.4	0.05
T2	12.2	8.8	0.02
T3	22.0	19.1	0.04

Table II, graph I shows that T1 in group I was 14.6 seconds and in group II was 11.4 seconds, T2 in group I was 12.2 seconds and in group II was 8.8 seconds, T3 in group I was 22.0 seconds and in group II was 19.1 seconds. The difference was significant ($P < 0.05$).

Graph I Comparison of parameters in both groups



Discussion

The most common cause of mortality and serious morbidity due to anaesthesia is from airway problems. It is estimated that about one-third of all anaesthetic deaths are due to failure to intubate and ventilate.⁶ The flexible fiberoptic endoscope is the most valuable single tool available for the anesthesiologist to manage the difficult airway.⁷ The flexible fiber-optic bronchoscopy (FOB) guided tracheal intubation remains the gold standard in difficult airway management in spite of many newer airway gadgets.⁸ FOB-guided intubation can be performed through nasal or oral route either in awake or anaesthetized patients.⁹ The actual fiber-optic intubation procedure could be divided into three steps which include the visualization of the glottis with fiberscope, passing the fiberscope through the glottis into trachea till carina and railroading the endotracheal tube over the fiberscope into the trachea.¹⁰ The present study compared conventional and the simple pre-determined length insertion technique (SPLIT) of tracheal intubation.

We found that group I had 18 males and 12 females and group II had 14 males and 16 females. Muthukumar et al¹¹ conducted a randomized controlled study designed to evaluate the simple pre-determined length insertion technique (SPLIT) during oral FOB. Fifty-eight patients were randomized into Group C and Group P. The T1 was significantly less in SPLIT as compared to conventional technique (13 [10, 20.25] vs. 33 [22, 48] s). The T3 was significantly less in SPLIT (24.5 [19.75, 30] vs. 44 [34, 61.25] s). The T1 by SPLIT was comparable between residents and consultants whereas it was significantly more among residents than the conventional technique. The SPLIT was preferred by 91.3% anesthesiologists.

We observed that T1 in group I was 14.6 seconds and in group II was 11.4 seconds, T2 in group I was 12.seconds and in group II was 8.8 seconds, T3 in group I was 22.0 seconds and in group II was 19.1 seconds. The fiberoptic scope is a flexible instrument, which is capable of transmitting an image from the distal tip to the proximal end.¹² The motion of the tip of the fiberscope can be controlled which enables the operator to direct the scope in any desired fashion. The combined characteristics of controllability, flexibility and image transmission permit anesthesiologists to employ the fiberscope as an aid to tracheal intubation and as a therapeutic instrument.¹³

Balasubramani et al¹⁴ evaluated the simple pre-determined length insertion technique (SPLIT) during oral fibreoptic intubation. 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. 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 ($p < 0.0001$). 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.

Conclusion

Authors found that SPLIT technique was better as compared to conventional technique of tracheal intubation.

References

1. Greenberg RS. Facemask, nasal, and oral airway devices. *Anesthesiol Clin North America* 2002;20:833-61.
2. Mendes Neto JA, Pinna BR, Caporrino Neto J, Pedroso JE. Comparison between telarlaryngoscopy and suspension laryngoscopy in the diagnosis of benign vocal fold lesions. *Braz J Otorhinolaryngol* 2008;74:869-75.
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;60:445-8.
4. Wheeler M, Roth AG, Dsida RM, Rae B, Seshadri R, Sullivan CL, et al. Teaching residents pediatric fiberoptic intubation of the trachea: Traditional fiberscope with an eyepiece versus a video-assisted technique using a fiberscope with an integrated camera. *Anesthesiology* 2004;101:842-6.
5. Mohammadzadeh A, Haghighi M, Naderi B, Chaudhry A, Khan ZH, Rasouli MR, et al. Comparison of two different methods of fiber-optic nasal intubation: Conventional method versus facilitated method (NASAL-18). *Ups J Med Sci* 2011;116:138-41.
6. Ponka D, Baddar F. Indirect laryngoscopy. *Can Fam Physician* 2013;59:1201.
7. Erb T, Hampl KF, Schürch M, Kern CG, Marsch SC. Teaching the use of fiberoptic intubation in anesthetized, spontaneously breathing patients. *Anesth Analg* 1999;89:1292-5.
8. Hozo SP, Djulbegovic B, Hozo I. Estimating the mean and variance from the median, range, and the size of a sample. *BMC Med Res Methodol* 2005;5:13.
9. Mendes Neto JA, Pinna BR, Caporrino Neto J, Pedroso JE. Comparison between telarlaryngoscopy and suspension laryngoscopy in the diagnosis of benign vocal fold lesions. *Braz J Otorhinolaryngol* 2008;74:869-75.
10. Ponka D, Baddar F. Indirect laryngoscopy. *Can Fam Physician* 2013;59:1201
11. Muthukumar E, Elakkumanan LB, Bidkar PU, Satyaprakash M, Mishra SK. 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;61:36-41.
12. Rosenblatt W, Ianus AI, Sukhupragarn W, Fickenscher A, Sasaki C. Preoperative endoscopic airway examination (PEAE) provides superior airway information and may reduce the use of unnecessary awake intubation. *Anesth Analg* 2011;112:602-7.
13. 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
14. Balasubramani M. Oral Fibreoptic Intubation–A Comparison of Simple Pre-Determined Length Insertion Technique (Split) With Conventional Method: A Randomized Cross-Over Study. *International journal of scientific study*. 2020;7(10):139-42.