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Comparison of Airtraq and Macintosh laryngoscope for Easy and Difficult Endotracheal Intubation in Adults

Adhaulia Nishtha[1], Verma Mahesh[2]

[1]Senior Resident, Department of Anaesthesia, ESI Hospital, Varanasi, [2]Assistant Professor, Department of Anaesthesia MLB Medical College, Jhansi

ABSTRACT

Introduction- Direct laryngoscopy and orotracheal intubation are essentially done using one of the curved or straight blade laryngoscopes. Most common curved blade laryngoscope is the Macintosh blade, which is the gold standard for tracheal intubation since 1940's. The Airtraq (Prodol, Meditec, Vizcaya, Spain) is a novel optical indirect laryngoscope designed to facilitate tracheal intubation in patients with both normal and difficult upper airway anatomy. This study is conducted to compare the conventional (Macintosh) laryngoscope with newer Airtraq laryngoscope to assess ease and time taken for intubation, complications encountered in the form of dental clicks and lip lacerations.

Materials and Methods- Patients were randomly allocated in two groups, comprising 60 patients each, group I (Macintosh).and group II (Airtraq). On the basis of airway assessment study groups was divided into easy and difficult airway categories. After induction of general anesthesia, tracheal intubation was attempted with the Airtraq or the Macintosh laryngoscope asper group. Primary end points were overall success rate of tracheal intubation and data was analysed in SPSS 19.0 using chi-square test , unpaired t test.

Results- In present study it was observed that time taken for successful intubation was significantly less (p=<0.001) in airtraq group (14.73 $\pm$2.50 sec) and (20.10$\pm$1.85sec) as compared to macintosh group in easy and difficult airway category. Intubation difficulty score was found to be significantly lower in airtraq group as compared to airtraq group in both airway categories. Cormack Lehane scale was found to significantly lower in airtraq group as compared to macintosh group in both airway categories.

Keywords – *Airtraq, Difficult airway, Easy airway, Laryngoscopy, Macintosh,*

INTRODUCTION

Intubating trachea and securing the airway remains a challenge although it is a routine practice for the anesthesiologist. Failure to successfully intubate the trachea remains a leading cause of morbidity and mortality in anesthetic and emergency setting[1-5]. Despite various innovations and numerous developments in the airway devices, the Macintosh laryngoscope (1943) remains the most frequently used device for orotracheal intubation since 1943. It is considered to be the "gold standard" for endotracheal intubation and it is against this device that the various airway devices are evaluated[6]. Difficult airway is not recognized until the induction of anesthesia as there is no single factor to predict the existence of a difficult airway[7] The Airtraq® laryngoscope (Prodol Meditec SA, Vizcaya, Spain) is a recently developed video laryngoscope for use in patients with normal or difficult airways. The curvature of the Airtraq blade and the special internal arrangement of the optical components allow visualization of the glottic plane without alignment of the oral, pharyngeal, and tracheal axis. The resultant indirect laryngeal exposure may require less movement of the cervical spine as compared to conventional Macintosh laryngoscopes. The blade of the Airtraq consists of two side channels, one for the insertion of the endotracheal tube (ETT) and the other

Corresponding author:
Verma Mahesh
Assistant Professor, Department of Anaesthesia MLB Medical College, Jhansi
E-mail: vermamaheshdoc1@gmail.com

containing a series of lenses, prisms, and mirrors that transfer the image from the illuminated tip to a proximal viewfinder, giving a high-quality wide-angle view of the glottis and surrounding structures, and the tip of the tracheal tube. The Airtraq is anatomically shaped and can be used with standard ETTs.

The blade of the Airtraq laryngoscope must be inserted in the center of the mouth along the longitudinal axis of the tongue, with the tip positioned in the left vallecula. If necessary, the epiglottis can be lifted by elevating the blade into the vallecula. The ETT does not obstruct the endoscopic view of the vocal cords during tracheal intubation. This study was conducted to compare the conventional (Macintosh) laryngoscope with newer Airtraq laryngoscope to assess ease and time taken for intubation, complications encountered in the form of dental clicks and lip lacerations.

MATERIALS AND METHOD

The present study was carried out on 120 patients who were scheduled to undergo elective surgery in general anaesthesia admitted in the SVBP Hospital, affiliated to LLRM Medical College, Meerut and out of 120 patients 60 had difficult airway. After getting the ethical approval from ethical committee and informed consent, Subjects were selected after detailed history, physical examination and PAC. Airway examination was conducted by using mouth opening, mallampatti grading, thyromental distance, neck mobility. Patient age group between 20- 70 years, weight between 40-90 kg. mouth opening 2 -5cm, ASA physical status I-II Elective surgery in supine position under GA, Thyro mental distance > < = 6 cm, Mallaampatti grading 1,2,3,4 were included in the study and subjects with age group <18 yrs, ASA physical status 3-4, moth opening <2cm, risk of gastric aspiration and history of oeshophageal reflux, require rapid intubation were excluded . Following scoring was used to classify easy and difficult airway—

Scoring	Easy Airway	Difficult Airway
MP Grade	I, II	III, IV
Thyromental distance	>6.5 cm	<6.5cm
Interincisor distnce	<4 cm	>4cm

Patients were randomly allocated by computer-generated random tables to one of two groups comprising 60 patients in each: group I (Airtraq) and group II (Macintosh).

Anaesthesia Technique-

All the patient received Ranitidine 50 mg and Metoclopromide 45 min before surgey. When the patient came to OT, the procedure was explained to him again. Multi-parameter monitor was attached and reading of all the vitals were recorded then 18 G IV canula was inserted into a peripheral vein and patient was hydrated with 15 ml/kg body weight Lactated ringer's solution. Patient was in supine position and head supported by firm pillow and pre oxygenated for 3 min with 100% oxygen ,then patient was induced with Fentanyl (1.5microgm/kg) i.v and propofol (3mg /kg body wt.).Neuromuscular blockade was achieved by Succinylcholine (1mg/kg) 90 sec after administration of Succinylcholine , patient was placed in head extended position supported by firm pillow and laryngoscopy was performed. Maintenance was achieved by 66% N2O in OXYGEN, intermittent doses of muscle relaxant (vecuronium 0.1 mg/kg) and inhalational agent(sevoflurane or isoflurane).At the end of surgical procedure, anaesthesia was discontinued, suction of oropharynx is done through suction catheter (14 no.) and patient was reversed with Neostigmine (50 microgm/kg) and glycopyrrolate (10 microgm/kg.) and later on the extubation was done**.**

Statistical Analysis-Data was entered in Microsoft excel sheet and analysed in SPSS 19.0 by using chi-square test, Unpaired t-test, Mann Whitney U test.

RESULTS

Demographic variables are shown in Table 1, maximum no. of subjects belong to the age group of 26-35 in group A and group B and no. of female subjects were more in group A than group B but it is not statistically significant. Table 2 depicts that the time taken in successful intubation was shorter in Group B in easy and difficult airway that is 14.73$\pm$2.50 and 20.10$\pm$2.50 seconds than the group A and it was found statistically significant(p=<0.001).Table 3 shows Intubation difficulty score was found to significantly lower in Group B as compared to Group A in both airway categories and combination of both the airway category. Table 4 describes Cormack Lehane scale was found to significantly lower in Group B as compared to Group A in both airway categories. Table 5 shows that side effects in Group A was higher in all the categories but this difference was statistically non-significant in easy airway category.

Table-1: Comparison of Demographic Variables

Demographic Variables	**Group A (MACINTOSH)**		**Group B (AIRTRAQ)**		**Statistical Significance**	
Age(yrs)	**No.**	**%**	**No.**	**%**	**Chi square value**	**P value**
Upto 25	9	15.00	6	10.00	3.302	0.347
26-35	26	43.33	25	41.67		
36-45	13	21.67	21	35.00		
>45	12	20.00	8	13.33		
Gender						
Female	35	58.33	32	53.33	0.304	0.581
Male	25	41.67	28	46.67		
Body wt.(kg)	**Mean**	**SD**	**Mean**	**SD**	**'t'**	**'p'**
	54.27	6.47	53.17	6.29	0.944	0.347

Table-2 Comparison of Time taken (seconds) in successful intubation in both the groups

Category	**Group A (MACINTOSH)**		**Group B (AIRTRAQ)**		**Statistical Significance**	
	Mean	SD	Mean	SD	t value	P value
Easy airway category	20.37	2.17	14.73	2.50	9.306	<0.001
Difficult airway category	41.70	7.83	20.10	1.85	14.713	<0.001

Table-3 Comparison of Intubation Difficulty Score between the Groups

	Easy Airway		**Difficult Airway**	
	Group A (MACINTOSH)	**Group B (AIRTRAQ)**	**Group A (MACINTOSH)**	**Group B (AIRTRAQ)**
No. of Subjects	30	30	30	30
Mean Score	5.10	1.03	6	1.50
SD	0.89	0.89	0.83	0.73
Mean Rank	45.50	15.50	45.50	15.50
Sum of rank	1365.00	465.00	1365.00	465.00
'z'Value(Mann-Whitney U test)	6.745		6.816	
'p' Value	<0.001		<0.001	

Table-4: Comparison of Cormack Lehane Scale between the Groups

	Easy Airway		Difficult Airway	
	Group A (MACINTOSH)	Group B (AIRTRAQ)	Group A (MACINTOSH)	Group B (AIRTRAQ)
No. of Subjects	30	30	30	30
Mean Score	2.50	1.30	3.60	1.20
SD	1.04	0.466	0.62	0.40
Mean Rank	40.25	20.75	45.30	15.70
Sum of rank	1207.50	622.50	1359	471
'z'Value(Mann-Whitney U test)	4.616		6.941	
'p' Value	**<0.001**		**<0.001**	

Table 5- Comparison of Side effects between the groups

Category	Group A (MACINTOSH)		Group B (AIRTRAQ)		Statistical Significance	
Easy Airway	11	36.57	6	20.0	0.049	0.82
Difficult Airway	17	56.57	8	26.67		

DISCUSSION

In due course of development of anaesthesia so many new techniques of endotracheal intubation and supraglottic devices have been developed from time to time but the gold standard has always been laryngoscopy and endotracheal intubation. After the invention of laryngoscope, anaesthesiologist are working for development of improved version of laryngoscopes. Lot of work has been done till date for study of laryngoscopic view, ease of intubation, and complications etc. The present study compared new airtraq with traditional macintosh laryngoscope in terms of ease of intubation, time taken for successful intubation**.**

The time taken in successful intubation was shorter in Group B in easy and difficult airway that is 14.73±2.50 and 20.10±2.50 seconds than the group A and it was found statistically ssignificant (p=<0.001). ***Yoshihiro Hirabayashi, Norimasa Seo***, conducted Airtraq tracheal intubation by novice laryngoscopists. nonanaesthesia physicians performed tracheal intubation susing either the Airtraq (n = 100) or the Macintosh laryngoscope (n = 100).The time to secure the airway was shorter with the Airtraq than with the Macintosh laryngoscope (p,0.001)[8]. ***S. K. Ndoko et Al.*** compared performance of Macintosh and Airtraq in tracheal intubation of morbidly obese patients. One hundred and six consecutive ASA I–III smorbidly obese patients undergoing surgery were randomized to intubation with the Macintosh laryngoscope or the AirtraqTM laryngoscope. The mean (SD) time taken for tracheal intubation was 24 (16) and 56 (23) s, respectively, with the AirtraqTM and Macintosh laryngoscopes, (P,0.001)[9]

In present study Intubation difficulty score was found to significantly lower in Group B as compared to Group A in both airway categories and combination of both the airway category. ***Aaron E. Bair***, compared The Macintosh Laryngoscope vs. the New Airtraq Device.

Sixty adults were enrolled. All patients in the Airtraq group and all but one in the Macintosh group were intubated on the first attempt, but the mean intubation

difficulty score was significantly lower in the Airtraq group (0.2 vs. 1.4, respectively[10]. A study conducted by J. MacElwain, found that Cormack and Lehane scores were lowest with the Airtraq®compared with both Macintosh which is similar to present study.[11]

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