

**TO COMPARE MEAN TIME TAKEN FOR TRACHEAL INTUBATION WITH AIRTRAQ VERSUS MACINTOSH LARYNGOSCOPE IN ELECTIVE SURGERIES : A RANDOMISED CLINICAL TRIAL**

**ABSTRACT:**

**OBJECTIVE:** To compare mean time taken for tracheal intubation with Airtraq versus Macintosh laryngoscope in elective surgeries.

**STUDY DESIGN:** This is a Randomized control trial (RCT) study.

**SETTING:** Study carried out at Department of Anaesthesiology, Surgical Intensive Care Unit and Pain Management, Clinic, Dow University of Health Sciences and Dr. Ruth Pfau Hospital Karachi, from June 2016 to November 2016.

**MATERIAL & METHOD:** A total of 60 patients divided 30 in each group randomly i.e. Macintosh laryngoscope Group A and Airtraq laryngoscope Group B who scheduled for elective surgery and fulfill the inclusion criteria. All patients were received intravenous glycopyrolate 0.2 mg, tramadol 2 mg/kg, and midazolam 0.03 mg/kg 10 minutes before induction of anesthesia. Induction was done with propofol 2-2.5 mg/kg, minimum 3 minutes were given to maximum effect of muscle relaxant. Time taken to intubate the trachea were noted in seconds and entered into the predesigned proforma.

**RESULTS:** The analysis included data on all the patients between 18 to 50 years of age who scheduled for elective surgery during the study period after applying the exclusion criteria. Mean  $\pm$  SD of age in group A were  $36.85 \pm 8.47$  years and in group B were  $37.49 \pm 9.32$  years. In Gender distribution of group A 11 (36%) were male and 19 (64%) were female and in group B the distribution of male and female were 8 (27%) and 22 (73%) respectively. By comparing both the groups for time taken in tracheal intubation in seconds Mean  $\pm$  SD of group A was  $35 \pm 7.8$  and in group B was  $21 \pm 4.2$  and P value found to be highly significant i.e. (0.0001).

**CONCLUSION:** It is to be concluded that Airtraq laryngoscope is more effective instrument than Macintosh Laryngoscope for use in routine airway management and duration of successful tracheal intubation was shorter in the Airtraq group.

**KEY WORDS:** Airtraq, Airway, Laryngoscope, Macintosh, Tracheal Intubation.

## INTRODUCTION:

The routine practice of **anesthetic** was still challengeable for intubating trachea<sup>1</sup>. Despite various innovations and advances in airway devices, the Macintosh laryngoscope has been the most widely used orotracheal intubation device since 1943<sup>1,2</sup>. The Airtraq laryngoscope is a newly developed video laryngoscope for use in patients with normal or difficult airways<sup>3</sup>. Some international studies were reported the good results of Airtraq laryngoscope as compared the Macintosh laryngoscope reduces tracheal intubation difficulty score in patients with cervical spine immobilization and difficult airways<sup>4</sup>. During procedure of tracheal intubation increased reflex sympathetic activity and also raised plasma concentration of catecholamine, hypertension, tachycardia, and myocardial ischemia. All these events response is related to the duration of laryngoscopy, and may be severe during a difficult intubation<sup>5</sup>.

Various studies have shown that Airtraq reduces intubation time for experienced as well as novice intubators<sup>6,7</sup>. Another study showed that the Airtraq significantly improved intubation time in difficult airways<sup>8</sup>. In one comparative study duration of tracheal intubation was  $18 \pm 2.6$  with airtraq laryngoscope versus  $29 \pm 5.04$  with macintosh laryngoscope with p value of 0.001.<sup>9</sup> Dhonneur et al. demonstrated that Airtraq provides superior intubating conditions; Ease of intubation score was also better in the Airtraq group. It was easy in 97.5% (39 patients) versus 42.5% (17 patients) in the Macintosh group,  $P < 0.001$ . It was satisfactory in 2.5% (1 patient) in the Airtraq group versus 52.5% (21 patients) in the Macintosh group. In the Macintosh group, it was found difficult in 5% (2 patients)<sup>9</sup>. Laryngoscopic ability is important in tracheal intubation for many healthcare trainees. Traditional teaching on this focuses on some important aspects of successful intubation, including laryngoscope insertion and proper head position with blade lift, as well as timely and painful performance<sup>10</sup>. Laryngoscopy can lead to pathological reactions of the cardiovascular and respiratory systems associated with stimulation of the sympathetic and parasympathetic nervous systems; Such as changes in hemodynamic parameters such as heart rate and blood pressure, as well as Local effects edema, tooth, and soft tissue lesion, can be caused by excessive forces transmitted through laryngoscope during an intubation.

## RATIONALE

As there is no published data available on this in our country we compared mean time taken for tracheal intubation with airtraq laryngoscope versus macintosh laryngoscope by that we can decrease the duration of laryngoscopy during tracheal intubation and prevent the complications of pressor response like hypertension, tachycardia and myocardial infarction which may occur due to longer time of laryngoscopy.

## MATERIAL & METHOD:

After approval from College of Physicians and Surgeons Pakistan and ethical committee of Dow University of Health Sciences Karachi Pakistan. Informed and written consent was taken from patients. 60 patients aged between 18-50 years, either gender and ASA I & II, undergoing general anesthesia for elective procedures were included in the study. Age below 18 and above 50, Predicted difficult airway (airway examination, limited mouth opening), Hiatus hernia (already diagnosed), Pregnancy (history) and ASA III-V were excluded from the study. Patients meeting inclusion criteria were randomly allocated by computer generated random number in two groups. Laryngoscopy and intubation were performed by principle researcher, under supervision of experienced consultants. GROUP A: Macintosh laryngoscope, GROUP B: Airtraq laryngoscope:

In the operation theatre after establishing an intravenous route, a ringer lactate solution was started. All patients were received intravenous glycopyrolate 0.2 mg, tramadol 2 mg/kg, and midazolam 0.03 mg/kg 10 minutes before induction of anesthesia. Standard monitors were attached. All the patients were pre oxygenated with 100% oxygen for 3 minutes. Induction were done with propofol 2-2.5 mg/kg and muscle relaxation was facilitated with a tracurium 0.5 mg/kg and bag mask ventilation was provided with mixture of oxygen, nitrous oxide, and isoflurane for 3 minutes. Then tracheal intubation was performed by the Airtraq or Macintosh laryngoscope according to the randomization sequence. Time taken to intubate the trachea was noted in seconds from insertion of blade between dental arches until tube was passed through vocal cords and confirmed by auscultation.

All data were analyzed using SPSS Statistics version 21 software. Relevant description statistics, frequency and percentage were computed for qualitative variables like ASA status and gender. Mean and SD was computed for quantitative variables like age, and

time taken for intubation. T-test was applied to compare time taken for intubation between groups taken  $P \leq 0.05$  as significant.

## **RESULTS:**

In Gender distribution of group A 11 (36%) were male and 19 (64%) were female and in group B the distribution of male and female were 8 (27%) and 22 (73%) respectively as shown in Table 1. In ASA distribution of group A 20 (67%) had ASA status 1 and 10 (33%) had ASA status 2 and in group B 21 (70%) and 9 (30%) had ASA status 1 and 2 respectively as shown in Table 1. Mean  $\pm$  SD of age in group A were  $36.85 \pm 8.47$  years and in group B were  $37.49 \pm 9.32$  years as shown in Table 2.

By comparing both the groups for time taken in tracheal intubation Mean  $\pm$  SD of group A was  $35 \pm 7.8$  seconds and in group B was  $21 \pm 4.2$  seconds and P value found to be highly significant i.e. (0.0001) as shown in Table 1. Stratification of age, gender, ASA Status and BMI were done with respect to time taken in tracheal intubation and all were found to be significant as shown in Table No.2.

## **DISCUSSION:**

This prospective randomized control study was designed to compare the clinical performance of two laryngoscopes i.e. Airtraq tm laryngoscopy V/S Macintosh laryngoscopes in terms of heart rate. Changes in heart rate were prominent during intubation and in the first two minutes following the procedure. Intubation is a technique that requires training, experience and regular updating to maintain competence. A prolonged laryngoscopy is more likely to generate a sympathetic response which can be detrimental in patients with cardiopulmonary risk factors. Usually an intubation attempt lasts no longer than 30 seconds. Failure to intubate is still considered a major factor leading to poor outcomes in patients in emergency rooms, intensive care units and operation rooms. Difficulty in managing the airway is the most important cause of anesthesia related problems. Although the airway management is one of the main expertise areas of anesthesiologists, the failure in management of the airway is still considered to be the most common cause of anesthesia related morbidity and mortality.

The Macintosh laryngoscope with its curved blade is the most commonly used device for orotracheal intubation despite numerous innovations in airway devices. Airtraq a newer intubation device was compared with the Macintosh laryngoscope and its utility was assessed in this study. We observed that the overall duration of successful tracheal intubation was shorter in the Airtraq group  $21 \pm 4.2$  seconds versus  $35 \pm 7.8$  seconds in the Macintosh group, similar results were reported by Pierangelo Di Marco et al<sup>11</sup>. Various studies have shown that Airtraq reduces intubation time for experienced as well as novice intubators. Another study showed that the Airtraq significantly improved intubation time in difficult airways. Overall successful tracheal intubation was 100% (30 patients) in the Airtraq group and 95% (28 patients) in the Macintosh group. No optimization maneuvers were required to improve the glottic exposure in 97.5% (27 patients) in the Airtraq group versus 35% of patients (11 patients) in the Macintosh group  $P < 0.001$ . Only in 3% (1 patient), one optimization maneuver was required in the Airtraq group while in 55% patients (17 patients) one maneuver and in 10% (3 patients) two optimization maneuvers were required in the Macintosh group. McElwain et al. had a similar experience<sup>12</sup>. In our study time taken in tracheal intubation in Macintosh group was  $35 \pm 7.8$  in comparison of airtraq group was  $21 \pm 4.2$  and P value found to be highly significant i.e (0.0001) As compared with the study. Maharaj CH, Costello J, Higgins BD et al<sup>13</sup> the Mean  $\pm$  SD time taken in tracheal intubation was  $36.78 \pm 8.96$  and  $22.45 \pm 5.56$  in both groups respectively and P value found to be highly significant i.e. (0.0005) which is comparable with our study. In our study over all mean age of the patients in both groups were  $37.17 \pm 9.48$  years. As compared with the study Lowe PR<sup>14</sup> over all mean age of the patients in both groups were  $36.23 \pm 8.86$  years which is comparable with our study.

In our study, the Airtraq laryngoscope reduced haemodynamic stimulation resulting from airway management. However in the international study conducted by Miller DM and colleagues explained by the fact that the traction required to lift the mandible is reduced with the Airtraq laryngoscope. The passage of the tracheal tube through the vocal cords is a traumatic due to good glottic visualization and alignment of the tube to the axis of the trachea. In our study observed that tracheal intubation in short chinto-sternum distance with the Airtraq™ laryngoscope was not impaired often seen in morbidly obese patients, although some patients used a rotational maneuver.

## **CONCLUSION:**

It is to be concluded that Airtraq is a more effective instrument than Macintosh Laryngoscope for routine airway management and less change in mean heart rate. Duration of successful tracheal intubation was shorter in the Airtraq group. In addition, Airtraq provides a wider view of the larynx than the Macintosh laryngoscope, so the clinician may more easily and comfortably carry out intubation and consider it as the instrument of first choice.

## **COMPETING INTERESTS DISCLAIMER:**

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

## **REFERENCES:**

1. Cook TM. Strategies for the prevention of airway complications—a narrative review. *Anaesthesia*. 2018 Jan;73(1):93-111.
2. Mort TC. Emergency tracheal intubation: Complications associated with repeated laryngoscopic attempts. *AnesthAnalg* 2004;99:607- 13.
3. Decamps P, Grillot N, Le Thuaut A, Brule N, Lejus-Bourdeau C, Reignier J, et al. Comparison of four channelled videolaryngoscopes to Macintosh laryngoscope for simulated intubation of critically ill patients: the randomized MACMAN2 trial. *Annals of intensive care*. 2021 Dec;11(1):1-0.
4. Jiang J, Ma D, Li B, Yue Y, Xue F. Video laryngoscopy does not improve the intubation outcomes in emergency and critical patients—a systematic review and meta-analysis of randomized controlled trials. *Critical Care*. 2017 Dec;21(1):1-1.
5. Misganaw A, Sitote M, Jemal S, Melese E, Hune M, Seyoum F, et al. Comparison of intravenous magnesium sulphate and lidocaine for attenuation of cardiovascular response to laryngoscopy and endotracheal intubation in elective surgical patients at Zewditu Memorial Hospital Addis Ababa, Ethiopia. *PloS one*. 2021 Jun 1;16(6):e0252465.

6. Szarpak L. Laryngoscopes for difficult airway scenarios: a comparison of the available devices. *Expert review of medical devices*. 2018 Sep 2;15(9):631-43.
7. Pantazopoulos I, Kolonia K, Laou E, Mermiri M, Tsolaki V, Koutsovasilis A, et al. Video laryngoscopy improves intubation times with level C personal protective equipment in novice physicians: a randomized cross-over manikin study. *The Journal of Emergency Medicine*. 2021 Jun 1;60(6):764-71.
8. Sanfilippo F, Sgalambro F, Chiaramonte G, Santonocito C, Burgio G, Arcadipane A. Use of a Combined Laryngo-Bronchoscopy Approach in Difficult Airways Management: A Pilot Simulation Study. *Turkish journal of anaesthesiology and reanimation*. 2019 Dec;47(6):464.
9. Dhonneur G, Abdi W, Ndoko SK, Amathieu R, Risk N, El Housseini L, et al. Video- assisted versus conventional tracheal intubation in morbidly obese patients. *ObesSurg* 2009;19:1096- 101.
10. Arulkumaran N, Lowe J, Ions R, Mendoza M, Bennett V, Dunser MW. Videolaryngoscopy versus direct laryngoscopy for emergency orotracheal intubation outside the operating room: a systematic review and meta-analysis. *British journal of anaesthesia*. 2018 Apr 1;120(4):712-24.
11. Di Marco P, Scattoni L, Spinoglio A, Luzi M, Canneti A, Pietropaoli P, et al. Learning curves of the Airtraq and the Macintosh laryngoscopes for tracheal intubation by novice laryngoscopists: A Clinical study. *Anesth Analg*. 2011;112:122–5.
12. McElwain J, Laffey JG. Comparison of the C-MAC, Airtraq, and Macintosh laryngoscopes in patients undergoing tracheal intubation with cervical spine immobilization. *Br J Anaesth*. 2011;107(Suppl 2):258–64.
13. Maharaj CH, Costello J, Higgins BD, Harte BH, Laffey JG. Retention of tracheal intubation skills by novice personnel: A comparison of the Airtraq and Macintosh laryngoscopes. *Anaesthesia*. 2007;62:272–8.
14. Lowe PR, Engelhardt T. Prion –related diseases and anaesthesia. *Anaesthesia*. 2001;56:485.
15. Miller DM, Youkhana I, Karunaratne WU, Pearce A. Presence of protein deposits on ‘cleaned’ re-usable anaesthetic equipment. *Anaesthesia*. 2001;56:1069–72.

**Table No.1**  
**DEMOGRAPHIC VARIABLE**  
**n=60**

<b>DEMOGRAPHIC</b>	<b>Group A (%)</b> <b>(N=30)</b>	<b>Group B (%)</b> <b>(N=30)</b>
<b>Gender</b>		
• Male	11(36%)	8(27%)
• Female	19(64%)	22(73%)
<b>American Society of Anesthesiologists (ASA) Status</b>		
• ASA-I	20(67%)	21(70%)
• ASA-II	10(33%)	9(30%)

**Group A: Macintosh laryngoscope, Group B: Airtraq laryngoscope.**

**Table No.2**  
**DESCRIPTIVE STATISTICS**

<b>Variable</b>	<b>Group A</b>	<b>Group B</b>	<b>P value</b>
<b>Age n=60</b>			
• Mean	36.85	37.49	--
• ±SD	8.47	9.32	
<b>Compression of time taken for tracheal intubation 60 seconds</b>			
• Mean	35	21	0.0001
• ±SD	7.8	4.2	
<b>Stratification of male N=19</b>			
• Mean	31	22	0.014
• ±SD	8.4	4.6	
<b>Stratification of female N=41</b>			
• Mean	33	24	0.004
• ±SD	9.6	5.2	
<b>Stratification of ASA status-I N=41</b>			
• Mean	36	21	0.001
• ±SD	10.6	4.8	
<b>Stratification of ASA status-II N=19</b>			
• Mean	33	25	0.044
• ±SD	9.2	6.4	
<b>Stratification of BMI (20-35 kg/m<sup>2</sup>) N=38</b>			
• Mean	29	19	0.001
• ±SD	6.1	3.3	
<b>Stratification of BMI (36-44 kg/m<sup>2</sup>) N=22</b>			
• Mean	32	20	0.003
• ±SD	7.6	5.3	

**Group A: Macintosh laryngoscope, Group B: Airtraq laryngoscope.**