



# To Compare Mean Time Taken for Tracheal Intubation with Airtraq Versus Macintosh Laryngoscope in Elective Surgeries: A Randomised Clinical Trial

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## **Authors' contributions**

This work was carried out in collaboration among all authors. Authors KN and NZ were involved in conception of idea and study design. Author RT did data collection and performed bench work. Author ZK performed the statistical analysis. Authors MA and THM managed the literature searches. All authors read and approved the final manuscript.

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## **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.

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**Materials and Methods:** 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.

*Keywords: Airtraq; airway; laryngoscope; macintosh; tracheal intubation.*

## 1. INTRODUCTION

The routine practice of anesthetic was still challengeable for intubating trachea [1]. Despite various innovations and advances in airway devices, the Macintosh laryngoscope has been the most widely used orotracheal intubation device since 1943 [1-2]. The Airtraq laryngoscope is a newly developed video laryngoscope for use in patients with normal or difficult airways [3]. 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 [4]. 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 [5].

Various studies have shown that Airtraq reduces intubation time for experienced as well as novice intubators [6-7]. Another study showed that the Airtraq significantly improved intubation time in difficult airways [8]. 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 [9]. 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) [9]. 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 [10]. 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.

### 1.1 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.

## 2. MATERIALS AND METHODS

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.

## 3. 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 2.

## 4. 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

**Table 1. Demographic variable**

**n=60**

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

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

**Table 2. Descriptive statistics**

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

Group A: Macintosh laryngoscope, Group B: Airtraq laryngoscope

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. [11]. 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 [12]. 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. [13] 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±9.48 years. As compared with the study Lowe PR [14] over all mean age of the patients in both groups were 36.23±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 [15].

## 5. 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.

## DISCLAIMER

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.

## CONSENT AND ETHICAL APPROVAL

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.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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