



Paediatric

COMPARISON OF EASE OF TRACHEAL INTUBATION USING MACINTOSH LARYNGOSCOPE AND AIRTRAQ™ OPTICAL LARYNGOSCOPE IN PAEDIATRIC PATIENTS BY NOVICE ANAESTHETISTS.

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ABSTRACT **Method:** 64 patients between 2 – 12 years of age requiring general anaesthesia with endotracheal intubation were included. Endotracheal intubation was attempted by a resident anaesthetist under the guidance of a senior anaesthetist. Time taken for intubation, number of intubation attempts, Intubation Difficulty Score, were noted.

Results: Time taken for intubation was 51.594 + 17.544 s in the Airtraq group compared with 64.156 + 20.743 s in the Macintosh group (P = 0.011). Using Airtraq 25 subjects were intubated in the first attempt and 7 in the second attempt compared to 17 in the first attempt and 15 in the second attempt for Macintosh (P = 0.035). The intubation difficulty score was 0.469 + 0.803 for Airtraq group versus 1.406 + 1.563 for Macintosh group (P = 0.004).

Conclusion: Airtraq optical laryngoscope is an easy to use device for tracheal intubation, by novice anaesthetists, with shorter learning curve. Airtraq reduced the difficulty of intubation and provided better hemodynamic conditions.

KEYWORDS : Airtraq, Macintosh, Novice Anaesthetists

Introduction:

Tracheal intubation is a core anaesthetic skill and failed or prolonged attempts at intubation are major causes of morbidity.¹ The Macintosh laryngoscope is the most commonly used device for endotracheal intubation.² The Macintosh blade is placed in the vallecula anterior to the epiglottis, lifting it out of view to enable glottic exposure. Videolaryngoscopy has been gaining popularity, particularly in patients with difficult airways or as rescue devices in failed intubation attempts. Airtraq™ is a channeled optical laryngoscope device for indirect tracheal intubation. It is designed to enable viewing of the glottis without aligning the oral, pharyngeal and laryngeal axes thereby enabling intubation with minimal head manipulation and positioning. Studies have shown that Airtraq performs better than Macintosh laryngoscope when used by experienced anaesthetists, with a rapid learning curve.³ Hence we proposed that Airtraq may have advantages over Macintosh Laryngoscope for use by novice anaesthetists.

Methods:

This randomised trial was approved by the hospital ethics committee and informed parental consent was taken prior to the procedure. 64 ASA I-II patients between 2 – 12 years of age requiring general anaesthesia with endotracheal intubation were included. Patients with risk factors of aspiration, anticipated difficult airway and patients whose parents didn't give consent for the study were excluded. The novice anaesthetists were the first year anaesthesia residents with no prior experience of using any of the device. They received a demonstration on an airway manikin by an experienced anaesthesiologist on intubation techniques using the Macintosh and Airtraq blades. Each resident performed 15 intubations each, with the Airtraq and Macintosh, on a Pediatric Airway Manikin before participating in the study. After confirming starvation and obtaining a written informed consent, patients randomly allocated in two groups using the computer generated random number table. Group M where patients were intubated using the Macintosh laryngoscope and Group A where patients were intubated using Airtraq laryngoscope.

After injection of iv fentanyl 2mcg/kg, anaesthesia was induced with iv propofol 3mg/kg followed by injection rocuronium 1mg/kg in both groups. Endotracheal intubation was attempted three minutes later by a novice anaesthetist under the guidance of a senior anaesthetist. A maximum of two attempts was allowed after which the senior anaesthetist would take over. If oxygen saturation decreased to <92% during the process of laryngoscopy and intubation, patient was ventilated using 100% oxygen.

Duration of intubation was measured as the time from insertion of blade till the appearance 1st capnographic trace. An attempt was defined as introduction of either Airtraq or Macintosh in the airway for

laryngoscopy. Attempts were considered unsuccessful if the user was not able to intubate the trachea at all.

Primary Aim was the time taken for intubation and secondary aims were : Number of intubation attempts, Ease of use of the device (1- very difficult - 5 - very easy), Intubation Difficulty score⁴, Cormack Lehane Grading, Use of optimization manoeuvres (use of external pressure, chin lift), Hemodynamic parameters like heart rate, mean arterial pressure, Complications like trauma to the lips and teeth, bleeding.

Unpaired t test was used to compare the quantitative data and Chi square test was used to assess the categorical data. Significant threshold for P value was set at <0.05.

Results:

A total of 64 patients were randomly allocated to one of the two groups for intubation with the Airtraq (Group A) or the Macintosh laryngoscope (Group M). Demographic and descriptive data are presented in Table - I. Both groups were matched for age, weight, gender distribution, and ASA class.

Table 1 Demographic Characteristics of patients enrolled in the study

	Macintosh	Airtraq
Age (years)	6.226 ± 2.473	5.893 ± 2.660
Sex(M/F)	18/14	20/12
Weight (kg)	23.645 ± 7.526	20.672 ± 7.323
ASA Classification I/II	28/4	29/3
Mallampatti Classification Grade I/II/III	20/12/0	22/9/0

Table 2 Intubation Characteristics

Parameter	Macintosh	Airtraq	P value
No. of attempts for Successful intubation (1/2)	17/15	25/7	0.035
Mean time taken for intubation (secs)	64.156 ± 20.743	51.594 ± 17.544	0.011
Cormack Lehane Grading CL I / CL II / CL III	12/13/7	23/09/00	0.004
Ease of handling the device mean score (1 very difficult to 5 very easy)	3.313 ± 0.780	3.719 ± 0.729	0.035
Intubation difficulty score (Mean score)	1.406 ± 1.563	0.469 ± 0.803	0.004
Optimization Manoeuvre (not required)	72%	94%	0.020

Time taken for intubation was 51.594 ± 17.544 s in the Airtraq group and 64.156 ± 20.743 s in the Macintosh group ($P = 0.011$). Rate of successful intubation was 100% in both the groups. Using Airtraq 25 subjects were intubated in the first attempt and 7 in the second attempt compared to 17 in the first attempt and 15 in the second attempt for Macintosh ($P = 0.035$). No optimization maneuvers were required to improve the glottic exposure in 94% patients in the Airtraq group versus 72% of patients in the Macintosh group ($P = 0.020$). The CL grading was better with the Airtraq group. It was Grade I in 72% patients in the Airtraq group compared to 37.5% in Macintosh group ($P = 0.004$). The intubation difficulty score was 0.469 ± 0.803 for Airtraq group versus 1.406 ± 1.563 for Macintosh group ($P = 0.004$). The mean heart rate was 103.6 ± 7.401 , in the Airtraq group versus 110.41 ± 8.932 in the Macintosh group during the laryngoscopy ($P = 0.002$) (Fig 1). The mean arterial pressure was also lower in the Airtraq group 63.5 ± 2.5 as compared to the Macintosh group 65.96 ± 2.44 ($P = 0.003$) (Fig 2). There was no complication with the use of either device.

Discussion:

The Macintosh laryngoscope is the most commonly used device for pediatric orotracheal intubation. Airtraq is an optical laryngoscope which has a guiding channel in which to place the tracheal tube and a heating system to prevent fogging of the view finder. We compared Airtraq with the Macintosh laryngoscope and assessed the ease of intubation with each device. We observed that the time taken for tracheal intubation was shorter in the Airtraq group compared with the Macintosh group. Similar results were reported in various adult studies which show that Airtraq reduces the intubation time in novice as well as experienced intubators.^{5,6} In our study, none of the patients had difficult airway. Studies have shown that the intubation time is lesser with Airtraq in patients with difficult airways as well.^{8,9} The success rate in both groups was 100%. Using Airtraq, 78% patients were intubated in the first attempt compared to 53% in the second attempt for Macintosh. Similar results have been reported with a 73% success rate with Airtraq during the first attempt.⁶ No optimization manoeuvres were required to improve the glottic exposure in 94% patients in the Airtraq group versus 72% of patients in the Macintosh group. Bhandari et al also had similar results.¹⁰ The CL grading was better with the Airtraq group. Using the Macintosh blade alignment of oral, pharyngeal and tracheal axes is necessary for an appropriate glottic view, while the alignment is not necessary with Airtraq due to the blade curvature and the special internal arrangement of the optical components, i.e. indirect laryngoscopy to allow visualization of the glottic plane. Hence the novice anesthetists could facilitate a quicker and better glottic exposure with Airtraq. The intubation difficulty scale scores were low in both groups, but the mean scores and the number of patients with a score of > 1 were significantly lower in patients intubated using the Airtraq ($P = 0.004$). Orotracheal intubation is a complex skill to learn and retain, Mahraj et al showed that novice users have a better retention of intubation skills with Airtraq compared to Macintosh laryngoscope.¹¹ In our study the ease of intubation using Airtraq by novice anesthetists was studied on pediatric patients. However we did not study the long term retention of intubation skills in the novice anesthetists recruited in the study, due to time constraints. This could be a subject for future study.

Conclusion:

Airtraq optical laryngoscope is an easy to use device for tracheal intubation, by novice anesthetists, with shorter learning curve. Airtraq reduces the difficulty of intubation and also provides better hemodynamic conditions.

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