

A Comparative Study of Airtraq with Macintosh Laryngoscope for Intubation in Paediatric Population

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Abstract

Context: Paediatric airway is different than adult airway in terms of anatomy and physiology, therefore techniques and tools for securing the airway are different. Macintosh laryngoscope is most commonly used but, Airtraq is new tool, that allows high quality viewing of the vocal cords, without requiring a straight line of sight. **Aims:** To compare use of Airtraq with Macintosh laryngoscope for intubation in paediatric subject posted for elective surgeries. **Materials and Methods:** After written and informed consent of parents/guardians, 50 patients of ASA 1 & 2, 2 - 6 years of age were divided into two groups (group A & M). Patients pre-medicated with ondansetron, glycopyrrolate, midazolam, paracetamol. Anaesthesia was induced with ketamine, propofol, succinylcholine and maintain on O₂, N₂O, sevoflurane and atracurium. Group M (n=25) were intubated with Macintosh and group A (n=25) patients with Airtraq. Intubation time, number of attempts, optimization manoeuvres were recorded. Hemodynamic changes were recorded before induction and after induction at interval of 1, 3, 5 minutes after intubation. **Statistical analysis:** The statistical analysis was assessed by unpaired t-test on Microsoft excel and IBM SPSS (Statistical Package for Social Sciences) version 21. P-value significant if <0.05. **Results:** Time taken for intubation was 33.96 + 15.7 seconds for group A and 44.80 + 16.3 seconds for group M. The calculated p value (p=0.02) showed there was statistically significance. **Conclusion:** Airtraq required shorter time to intubate, lesser number of attempts, lesser optimization manoeuvres' and better laryngeal view as compared to Macintosh in paediatric patients.

Keywords: Airtraq; Macintosh; Paediatric; Airway.

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Introduction

Securing airway is a vital task for the anaesthesiologist. Paediatric patients have different airway anatomy than adult [1]. Most conventionally used tool for airway management is Macintosh laryngoscope. It consists a handle and four sets of interchangeable blades. It indirectly opens the

epiglottis by applying pressure to vallecula.

The Airtraq is a disposable battery-operated laryngoscope that allows high quality viewing of the vocal cords, without requiring a straight line of sight [2]. The blade comprises two side-by-side channels, one for tracheal tube placement, other contains a light source. So, we compared Airtraq with Macintosh for intubation in paediatric subject.

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Methods

This study was conducted after approval from ethical committee. All patient's parents/ guardians participating in this study, were explained about the purpose of the study in the language they could understand. Written and informed consent was obtained. The study was comparative, randomized and interventional in nature.

Inclusion criteria

- American Society of Anesthesiologist (ASA) grade I and II.
- Age between 2 to 6 years of both sexes.
- Patients posted for elective surgery requiring endotracheal intubation.

Exclusion criteria

- Patient's parent's refusal
- ASA physical status III and IV
- Subject with history of difficult intubation
- Risk of gastric aspiration

We studied 50 patients of ASA I & II of either gender, fulfilling the inclusion criteria, posted for elective surgeries required endotracheal intubation. All patients were randomly divided by slip in box technique in to 2 groups. Patients in group A (n=25) were intubated with Airtraq and Group M (n=25) were intubated with Macintosh laryngoscope.

All patients were kept nil per orally 6 hours for solid food and 3 hours for clear liquid. Pre-anaesthetic check-up and routine investigations were carried out. Patients were brought to the pre-anaesthetic room and base line vital parameters were recorded. Patients were shifted to operation theatre; intravenous line was secured and inj. isolyte-P solution was started according to weight of the patients. Patients were premedicated with inj. glycopyrrolate 0.004 mgkg⁻¹ i.v., inj. ondansetron 0.1 mgkg⁻¹ i.v., inj. midazolam 0.05 mgkg⁻¹ i.v., inj. paracetamol 10 mgkg⁻¹ i.v. and pre-oxygenated for 3-5 minutes with 100% oxygen (O₂), induced with inj. ketamine 1 mgkg⁻¹ i.v. and inj. propofol 1-2 mgkg⁻¹ i.v. After adequate depth of anaesthesia was achieved, inj. succinylcholine 2 mgkg⁻¹ i.v. given, intermittent positive pressure ventilation (IPPV) with 100% O₂ on bag and mask was given. In group A patients were intubated with Airtraq laryngoscope and group M patients were intubated with Macintosh laryngoscope. Patients were maintained on controlled ventilation with O₂

and N₂O (50:50), sevoflurane 2-3% inj. atracurium 0.5 mgkg⁻¹ i.v.

Parameters to be measured

1. Time taken for intubation with Airtraq compared with Macintosh laryngoscope: was calculated from termination of manual ventilation with a facemask to initiation of ventilation through endotracheal tube (ETT).
2. Number of intubations attempts to intubate the patients.
3. Number of optimizations manoeuvres required such as repositioning the head, external laryngeal pressure, need for the second assistant to aid tracheal intubation
4. Haemodynamic parameters heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP) measured at 1, 3, 5 minutes post intubation.
5. Any complication like blood staining on ETT or laryngoscope blade.

At the end of the operation, anaesthetic agents were discontinued. Reversal of muscle relaxant was done with inj. neostigmine 0.05 mg kg⁻¹ i.v. and inj. glycopyrrolate 0.008 mgkg⁻¹ i.v. After adequate recovery patients were monitored in post anaesthesia care unit for next 12 hours.

Results

Table 1: Demographic data

	Group A Mean+SD	Group M Mean+SD	P value S- Significant NS- Not significant
Age(years)	3.88 + 1.20	3.72 + 1.45	0.67 NS
weight (Kg)	13.64 + 2.76	12.96 + 3.56	0.68 NS
Gender (Male/ Female)	16/9	15/10	-
ASA physical status (I/II)	13/12	11/14	-

Table 2: Time taken for intubation in both groups

Group	Time Taken Mean + SD	p value Significance
A	33.96 + 15.75	0.021
M	44.80 + 16.37	S

Table 3: No. of attempts for intubation

No. of attempt	A	M
1 st	24 (96%)	21 (84%)
2 nd	1 (4%)	4 (16%)

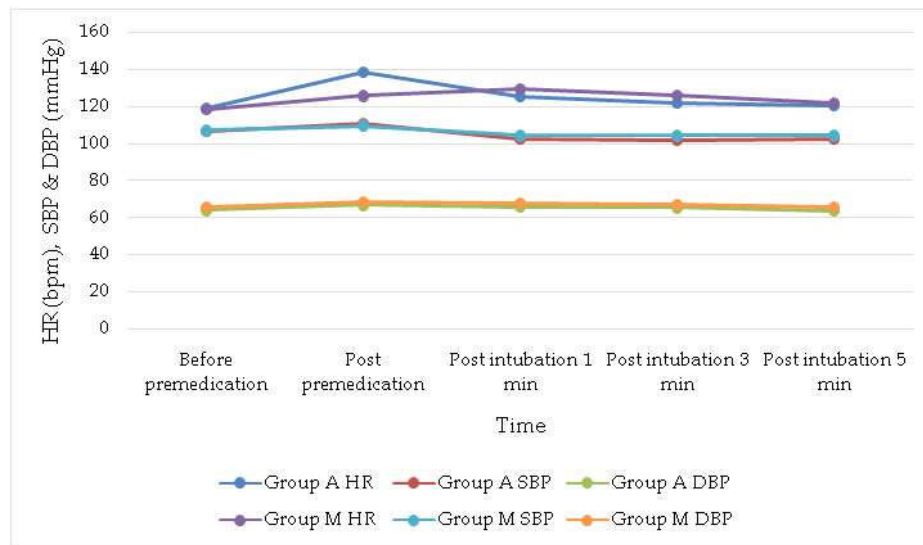


Chart 1: Peri-operative haemodynamic changes in both groups

Table 4: Post - operative complication

Complication	Group A	Group M
Blood staining	1 (4%)	1 (4%)
Sore throat	-	-

Discussion

In the present study 50 patients of ASA I and II were randomly assigned to two groups (group A-Airtraq, group M-Macintosh) of 25 patients each. There is no significant difference in age distribution, ASA grading of the patients, female: male ratio and Mean weight of the patients (Table 1).

Our study was quite similar demographically with A. Vlatten et al. [3], M.C. White et al. [4], Q.E. Ali et al. [5] and Waleed Riad et al. [6].

In group A mean time taken for intubation was 33.96 ± 15.7 seconds and in group M it was 44.80 ± 16.3 seconds. The calculated p value (p=0.02) showed there was statistically significant difference between both groups (p<0.05). Time taken for intubation was relatively less in group A than group M as Airtraq is easier to insert. Our results were very similar to Q.E. Ali et al. [5] & Waleed Riad et al. [6]. While A. Vlatten et al. [3], M.C. White et al. findings were in contrast to our findings (Table 2).

In group A intubation done successfully in first attempt in 24/25 patients (96%) only one patient required second attempt. In group M intubation done successfully in first attempt in 21/25 patients (84%), for patients required second attempt (16%). Airtraq was easier to insert in first attempt as compared to the Macintosh. Our results were very similar to Q.E. Ali et al. [5] (Table 3).

Waleed Raid et al. [6] study showed from data of 50 patients that first attempt intubation success rate was higher for the Airtraq than for the Macintosh.

These studies also concluded success rate in first attempt of intubation with Airtraq compared to the Macintosh laryngoscope. Thus, our findings were in corroboration to other studies that Airtraq was easier to insert and required less attempts compared to Macintosh.

In group A no optimization maneuver was required but in group M median of optimization maneuver was 2. Waleed Raid et al. [6] study showed no optimization maneuver was required for Airtraq group, whereas the median of optimization maneuver was 1(1-1) for Macintosh group. A. Vlatten et al. [3] study showed that there was significantly less use of external manoeuvre in Airtraq group (0/24) than in the direct laryngoscopy group (12/25).

These studies showed that Airtraq required relatively less or no optimization maneuver compared to Macintosh laryngoscope. Our study also had similar results.

Hemodynamic parameters were compared between two groups through process of intubation and after definite time of intubation. The hemodynamic parameters were comparable in our study.

There was an increase in the heart rate and blood pressure immediately after laryngoscopy, that was due to sympathetic stimulation. Then after parameters settled down near the base line values.

Waleed Raid et al. [6] study showed that there were no significant difference in SBP, DBP and MAP between both groups (p=0.86, 0.67 and

0.72 respectively). There was significant increase in the heart rate 5 min after intubation in the Macintosh group.

In our study, blood staining on the ETT was observed in 1/25 patient in group A and 1/25 patient in group M. No any other complication was observed in both groups.

Q.E. Ali et al. [5] study include post-op complication like airway trauma and oesophageal intubation were 2 and 1 respectively in Macintosh group compared to none in Airtraq group. A. Vlatten et al. [3] study showed that there was no complication related to intubation, visual red-out or fogging and patient oxygen saturation down not seen in either group.

M.C. White et al. [4] study showed that there was no evidence of traumatic intubation in either group and no patient had blood on ETT on removal. The study conducted on 60 patients (30-30) out of which in Airtraq group, 1 patient had sore throat in recovery, 3 patient had sore throat 24-48 hours post-operatively, 2 patients had hoarse voice or cry in recovery and 8 patients had hoarse voice or cry 24-48 hours post-operatively. Similarly, in Macintosh group, no patient had sore throat in recovery, 4 patient had sore throat 24-48 hours post-operatively, 2 patients had hoarse voice or cry in recovery and 8 patients had hoarse voice or cry 24-48 hours post-operatively.

The paediatric Airtraq has not been formally evaluated in children with difficult airway and information is limited to a few case reports. The aim of our study was to provide data on the use of the paediatric Airtraq in routine rather than difficult airway situation.

Conclusion

From this present study we conclude that the Airtraq required shorter time to intubate,

lesser number of attempts, lesser optimization manoeuvres and better laryngeal view as compared to Macintosh laryngoscope in paediatric patients. Moreover, Airtraq is more user friendly, simple, easy to use as compared to Macintosh laryngoscope. Thorough knowledge and expertise are required for its use. It results in a lower alteration in heart rate compared with direct visualisation by Macintosh laryngoscope.

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Conflict of Interest: None

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