

Original Article

COMPARISON OF AIRTRAQ AND MACINTOSH LARYNGOSCOPES FOR ELECTIVE INTUBATION IN PATIENTS WITHOUT PREDICTED DIFFICULT

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Objective: To compare conventional Macintosh laryngoscope with Airtraq for elective tracheal intubation.

Material and Methods: A In this randomized control trial conducted during Jan-June 2013. 50 ASA I & II patients without predicted difficult airway included in each group. Main outcomes were intubation time and intubation success rate, number of attempts, airway injury, and number of optimization maneuvers, glottic view and failure of intubation.

Results: Airtraq has significantly less intubation time, number of optimization maneuvers required and better glottic view ($P < 0.005$) as compared to Macintosh laryngoscope.

Conclusions: During elective intubation, Airtraq has better laryngoscopic view and shorter intubation time as compared to Macintosh laryngoscope.

Keywords: Airtraq, Macintosh laryngoscope, intubation and airway.

Introduction

Many types of laryngoscopes and optic devices are being used for intubation e.g Macintosh, McCoy, Miller, Glidescope, CMAC for direct laryngoscopy. Tracheal intubation using Macintosh laryngoscope has been demonstrated to fail in up to 35% of patients with an unpredicted difficult airway.¹ Problems in securing the airway are still the main contributors to anesthesia-related morbidity and mortality.² Airtraq is a relatively new tracheal intubation device that has been developed for the management of normal and difficult airways. Compared with the traditional Macintosh laryngoscope, the Airtraq reduces the difficulty of tracheal intubation in patients at high risk for difficult laryngoscopy³, provides faster intubation and less airway trauma in simulated difficult airways.^{4,5} Recently the Airtraq has been reported to limit cervical spine movement compared with Macintosh laryngoscopy, without an increase in the intubation time.⁶ It is designed to provide a view of the glottis without using the classic sniffing position, needed to align the oral, pharyngeal, and tracheal axes for direct laryngoscopy with a Macintosh laryngoscope.⁷ The Airtraq is a useful laryngoscope in unskilful anaesthesiology residents and showed significantly better laryngeal view with no difference in intubation time as compared to Macintosh laryngoscope.⁸

In an airway simulation trial among emergency technician, paramedics and doctors, it was observed that Airtraq has significantly less first attempt, overall intubation success rate and longer

intubation time when compared with direct laryngoscope and other video laryngoscopes.⁹

Airtraq is not in widespread use in anaesthesia locally as yet due to less experience, high cost and variable success rate. The main objective of our study was to compare conventional Macintosh laryngoscope with Airtraq for tracheal intubation so that intubation failure rate can be reduced

Material and Methods

After approval from Institutional Ethical Committee and written informed consent, 100 ASA I & II patients aging 15-55 years of both gender scheduled for elective surgery needing intubation were enrolled by using convenient sampling technique. This Randomized Control trail was conducted in Operation Theatres of Jinnah Hospital Lahore during Jan-June 2013. Sample size was calculated (Sample Size Calc 2.0) considering average intubation time with Airtraq 14.3s while 47.7s with Macintosh laryngoscopes while power of test 80% and margin of Error 5%. Total calculated sample size 100 (50 in each group).

In all patients airway assessment was done by a senior resident. Patients with previous history of difficult airway or predicted difficult airway on pre-operative assessment were excluded. Mallampatti, neck extension, mouth opening, thyromental distance and mandible protrusion tests were used for airway assessment. Difficult airway was considered Whenever ≥ 2 tests for difficult airway were present among the five tests mentioned above. Patients were

randomly allocated (random table) into two groups. Group "A" in which intubation will be done with Airtraq and Group "M" in which intubation will be done with conventional Macintosh laryngoscope. All patients received a standardized general anesthetic. ECG, non-invasive blood pressure, SpO₂ and end-tidal CO₂ were monitored. Anaesthesia was induced with nalbuphine 0.1 mg/kg, titration of propofol 12 mg/kg and 0.5 mg/kg Atracurium. After induction of anaesthesia, all patients' were manually ventilated with Sevoflurane 2.0%3% in oxygen. Three minutes after administration of Atracurium 0.5 mg.kg⁻¹, patients were intubated by an anesthetists having 10 years experience with the use of both devices and having the patient's head and neck placed in sniffing position without a pillow in both groups. Other than demographic data, primary endpoints were intubation time and success rate of tracheal intubation. Secondary outcomes were number of attempts, airway injury, number of optimization maneuvers after intubation attempt (numbers of maneuvers were counted using 0= no, 1= one maneuver 2= two maneuvers), the Cormack and Lehane grading of the glottic view, the lowest recorded arterial oxygen saturation during or immediately following intubation attempts, and failure of intubation. Intubation time was defined as time taken from insertion of the intubation device between the teeth to the time when the device was removed from the oral cavity.

An unsuccessful intubation attempt was labeled when either one of esophageal intubation, inability to place the tracheal tube into the trachea within 120 s; or more than three attempts required. In case of failed or unsuccessful intubation by Airtraq, intubation would be done in subsequent attempt by conventional laryngoscope. if failed intubation encountered with Macintosh laryngoscopy then

subsequent intubation would be attempted by Airtraq. After intubation, anesthesia with Sevoflurane and Nitrous/Oxygen 50: 50 ratio.

All data was entered into SPSS Version 17.0. Mean and standard deviation will be calculated for age, intubation time while frequency will be determined for gender, no of attempts, success rate, and failure. All the data collected were analysed using Chi Square tests, Fisher's exact test and t-test. P value of <0.05 was considered significant.

Results

There were no significant differences in demographic or baseline airway parameters between the groups (**Table 1**). There were no differences with regard to anaesthetic management in both groups.

There was no statistically significant difference between two groups regarding overall success rate, number of attempts, failure of intubations and minimum SpO₂. Regarding intubation time, number of optimization maneuvers and the Cormack and Lehane grading of the glottic view, there was significant difference between two groups (P<0.005) (**Table-2**)

Discussion

In our study, we enrolled patients without predicted difficult airway on pre-operative assessment.

Table-1: Demographic characteristics of patients.

Mean ± SD.

| | Macintosh group (M) (n=50) | Macintosh group (M) (n=50) |
|-------------------|----------------------------|----------------------------|
| Age (years) (SD) | 68.2±15.4 | 64±14 |
| ASA Status I / II | 31/19 | 33/17 |
| Weight (kg) (SD) | 60.7±16.167 | 62.49±17 |
| SEX (Male/Female) | 23/27 | 26/24 |

Table-2: Comparison between two groups for intubation. .

| | Macintosh Group (M) (n=50) | Airtraq Group (M) (n=50) | P Value |
|--|----------------------------|--------------------------|---------|
| Overall success rate | 94% (47/50) | 98% (47/50) | 0.09 |
| Duration of successful intubation: seconds | 33±12 | 16±5 | 0.01 |
| Airway trauma | 8% (4/50) | 2% (1/50) | 0.06 |
| Number of intubations attempts | 1st - - 90% (45/50) | 96 % (48/50) | 0.09 |
| | 2nd - - 6% (3/50) | 2 % (1/50) | |
| | 3rd - - 4% (2/50) | 2 % (1/50) | |
| Failure of intubation % | 2% (1/50) | 2% (1/50) | |

| | | | |
|------------------------------|----------------|-------------|------|
| No of optimization Maneuvers | 0- 70% (35/50) | 98% (49/50) | 0.03 |
| Scoring of AKUADS | 1- 16%(8/50) | 2% (1/50) | |
| Glottic View Grade) | 2- 14%(7/50) | | |
| | 1-74% (37/50) | 96% (48/50) | 0.02 |
| | 2-6% (3/50) | 4%(2/50) | |
| | 3-8% (4/50) | 0 | |
| Minimum SpO2% | 4-12% (6/50) | 0 | |
| | 93±2 | 97±2 | 0.09 |

We found that there was no significant statistical difference regarding overall intubation success rate, number of attempts, minimum fall in SpO₂ during or immediate after intubation and failure of intubation Airtraq and Macintosh laryngoscope. These findings are contrary to the observation by Maharaj¹⁰ et al. On the other hand our study and work done by Maharaj et al have same findings regarding intubation time, glottic view on laryngoscopy and number of optimization required maneuvers during intubation with Airtraq and Macintosh laryngoscope. The major difference in our and Maharaj et al study were that, we enrolled patients without predictive difficult airway and they included patients with predicted difficult airway.

There is no significant difference between Airtraq and Macintosh laryngoscope regarding intubation time, glottis view and number of maneuvers required during intubation in patients with low risk of difficult airway which are opposite to our findings. Airtraq is associated with less hemodynamic changes.³

The Airtraq has been reported to limit cervical spine movement compared with Macintosh laryngoscopy, without an increase in the intubation time. It is designed to provide a view of the glottis without using the classic sniffing position, which is needed to align the oral, pharyngeal, and tracheal axes for direct laryngoscopy with a Macintosh laryngoscope.^{6,7} Lu Y et al did a meta analysis by including eleven studies published between 2006-2011 and found that Airtraq laryngoscope facilitates

a more rapid and accurate intubation, especially when used by relatively untrained persons.¹¹ In a simulation based trial among 5 different airway management devices: Storz CMAC, Glidescope GVL, Airtraq, King LTS-D, and direct laryngoscopy (DL) were used by emergency medical technician, paramedics, residents and staff physicians. It was found that Airtraq is significantly less effective tool for intubation as compared to other video or optic airway management devices.⁹ In a clinical trial, Airtraq and Macintosh usage by unskillful anesthesia residents was observed Airtraq has better glottic view during intubation.⁸

Our study results and other literature regarding Airtraq usage showed that Airtraq is useful in airway management in patients and for the training purpose of unskillful anesthesia residents. Airtraq usage as a routine airway management device is questionable due to its cost. So its usage should be limited to special circumstances unless we have more conclusive data.

Conclusion

During elective intubation, Airtraq laryngoscope has better laryngoscopic view, requires less number of optimization maneuvers and shorter intubation time as compared to Macintosh laryngoscope in patients without predicted difficult airway in adults.

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