Original Research Article

A Comparative Evaluation of POGO Scoring and Hemodynamic Changes Using McCoy and Airtraq Laryngoscopes

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Abstract

Background: Anesthesia accounts for the initial step of any surgery; with different means of establishing a secured airway. Amongst the various devices used for endotracheal intubation (EI)**,** the McCoy (MC) laryngoscope which was used more commonly, was compared with the Airtraq (AT) laryngoscope, which has been developed for use in patients with normal or difficult airways for Comparing the POGO scoring in two groups using McCoy and Airtraq laryngoscope and comparison of hemodynamic changes observed by using both the laryngoscopes.

Materials and methods: This cross-sectional study was carried out in a teaching hospital, in Aligarh from January to March 2012; on a sample of 50 patients, randomly divided into two groups of 25 patients each using chit-in-a-box technique.

Observations: The male: female ratio was 0.8:1. The mean ± SD age in the AT group was 36.76 ± 9.09 years and in the MC group was 38.48+15.19 years. The POGO scoring of the patients using Airtraq laryngoscope was better than that of McCoy laryngoscope. The fluctuations in heart rate were more evident in the McCoy group as compared to the Airtraq within the first few seconds and this was found to be highly statistically significant ($p<0.001$). The fluctuations in mean arterial blood pressure (MABP) was more pronounced in the MC group as compared to the AT group in the first (1sec) and third second (3secs) readings which was also found to statistically highly significant ($p<0.001$).

Conclusion: Airtraq might be a better device for EI.

Key words

Anesthesia, Endotracheal intubation, McCoy laryngoscope, Airtraq laryngoscope.

Introduction

Anesthesia accounts for an intact functional respiration requiring careful airway assessment. Although vast improvements in patient monitoring, airway devices, and clinical protocols and training have reduced the risk associated with an unpredicted difficult airway (DA), these have not reduced the incidence of problems in clinical practice [1]. The Macintosh laryngoscope is considered to be the "gold-standard" but newer devices like the Airtraq laryngoscope have been developed. The designing of the Airtraq blade allows visualization of the glottic plane without alignment of the oral, pharyngeal, and tracheal axis [2]. There are studies comparing the hemodynamic changes using Macintosh and other laryngoscopes but not many comparing McCoy and Airtraq. Therefore, the present study was taken up with the objectives of comparing the Percentage of glottic opening (POGO) and the hemodynamic changes observed using McCoy and Airtraq laryngoscopes.

Materials and methods

Ethics: Following approval by the Board of Studies and ethical committee of Department of Anesthesiology, 50 ASA I and II, a written informed consent was obtained from all the study participants prior to the collection of data. Utmost care was taken for maintaining confidentiality of the collected data including identity of the study participants.

Type of study: This cross-sectional study was undertaken in a teaching hospital in Aligarh.

Study area: The study was carried out in the Department of Anesthesiology in a teaching hospital

Study period: The study was taken up for a period of two years and was completed in March 2012.

Sample size: A statistically adequate sample size of 50 was considered for the study.

Sampling technique: A total of 50 patients were included in the study. The study participants were randomly divided into two groups of 25 patients each using Chit in- a-box technique [3]. A semi-structured, pretested questionnaire was used to collect relevant Socio- demographic details of the study participants. Group A Patients were intubated using Airtraq (AT) whereas patients in group B were intubated using McCoy (MC) laryngoscope. Blinding of the attending laryngoscopist was not possible as the two laryngoscopes were conspicuously different.

Inclusion criteria

- Patients of either sex (age range 20-60 years)
- Patients undergoing general anesthesia for elective surgery (nonmalignant, non-head and neck surgery)

Exclusion criteria

- Patients with predicted difficult laryngoscopy and intubation (except all ranges of Mallampati grading)
- Morbidly obese (Body mass index (BMI) >40)
- Patients planned for head and neck surgery or with malignancies.

Method of inducing anesthesia and subsequent intubation:

The anesthetic technique comprised of premedication with injection Midazolam 0.025 mg/kg, Ondansetron 4.0 mg, and Tramadol 2.0 mg/kg. All the drugs were administered intravenously (I.V.) 15 minutes prior to induction of anesthesia. Heart rate (HR) was recorded from the pulse oximeter and the blood pressure (BP) was recorded using non-invasive manual blood pressure measuring instrument. Anesthesia was induced with 2 mg/kg of Propofol. After adequate muscle relaxation with Succinylcholine 2 mg/kg, all laryngoscopies and intubations were carried out by an anesthetist who was well versed with use of McCoy laryngoscope and had an

experience of more than 25 intubations with Airtraq laryngoscope. Laryngeal mask airway (LMA) of appropriate size was kept ready in cases of failed intubation. Following successful intubation, breathing circuit was attached and an infusion of Propofol (6 mg/kg/h) started while the patient received 60% NO_2 in Oxygen.

The mean arterial blood pressure (MABP) was calculated by multiplying the diastolic blood pressure by two (2) and then adding the sum to the systolic blood pressure, thereby dividing the recording by three (3).
The heart rate (HR) was read from the attached monitor.
The values of heart rate, mean arterial blood pressure were recorded at the following intervals:
0 - Base line
1 - 1 min after intubation
2 - 3 min after intubation
3 - 5 min after intubation
4 - 10 min after intubation

The above description of recording time was adhered for tabulating the observation on heart rate and systolic blood pressure.

The recording of POGO scoring was done in percentage. The POGO score represents the percentage of glottis opening seen, defined by the linear span from the anterior commissure to the inter aryteniod notch. A score of 0 represents that even the inter arytenoid notch is not seen [4].

Data was entered into Microsoft excel spreadsheet and analyzed by SPSS 16.0. The result was presented in number, percentage, mean and standard deviation. Student't' test, Chi square test, Mann Whitney U test were used as per applicability to analyze the observations. A p value of <0.05 was considered as statistically significant in this study.

Informed Consent: Written informed consent was taken from all the participants before commencing the procedure. They were explained about the procedure in details before taking consent.

Results

In this cross-sectional study among 50 participants (25 patients intubated with AT and 25 patients intubated with MC) the male: female ratio was found to be 0.8: 1. The mean ± SD age in the AT group was 36.76 ± 9.093 years and in the MC group it was 38.48+15.191 years. Among the study subjects around 40% of the participants in group A and 28% of participants in Group B were overweight. Obesity with BMI >27 was seen in 20% of the patients in Group A whereas 16% in Group B were found to be obese. The socio-demographic details of the study participants are depicted in **Table - 1**.

Table - 1: Socio-demographic characteristics of the study participants in both the groups.

Socio demographic variable	AT (Group A) (n=25) No. (%)	MC (Group B) (n=25) No. (%)
Age group (In years)		
<30	4(16.0%)	8(32.0%)
30-39	10(40%)	6(24.0%)
40-49	8(32.0%)	4(16.0%)
>50	3(12.0%)	7(28.0%)
Sex		
Female	15(60.0%)	13(52.0%)
Male	10(40.0%)	12(48.0%)
BMI		
Normal (18.5-22.9)	10(40.0%)	14(56.0%)
Over weight (23.0-26.9)	10(40.0%)	7(28.0%)
Obese (>=27.0)	5 (20.0%)	4(16.0%)

Table - 2: Distribution of patients in both groups according to POGO scoring.

POGO score	GROUP		Row Total
	Airtraq (25)	McCoy(25)	
0	0(0%)	5(20%)	5(10%)
33	4(16%)	5(20%)	9(18%)
100	21(84%)	15(60%)	36(72%)
Column Total	**25(100%)**	**25(100%)**	**50(100%)**

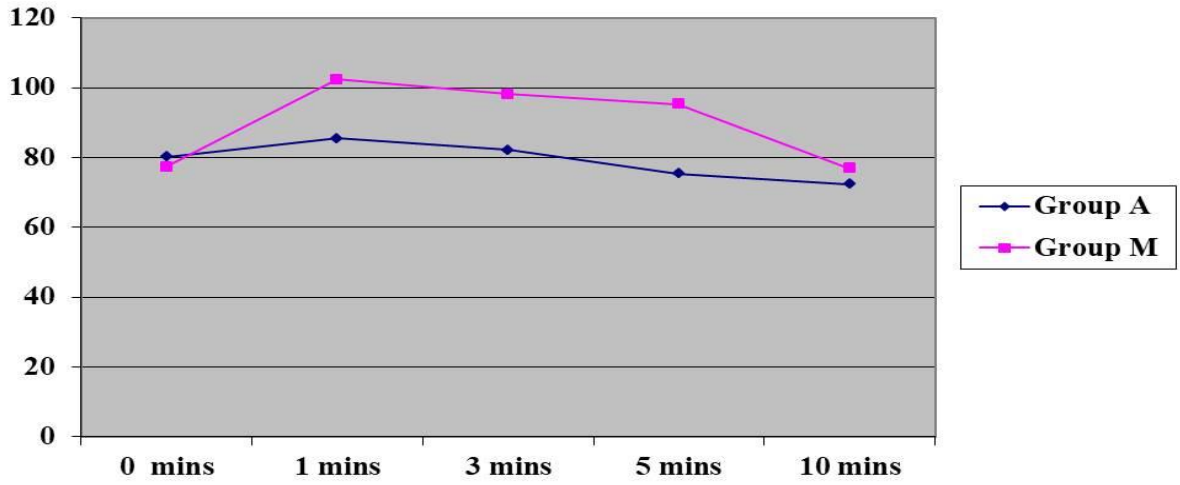
Table - 3: Pre-anesthetic mean arterial blood pressure and mean heart rate among the study participants.

	Airtraq (N=25)	McCoy (N=25)	T value	Df	P value
Pre anesthetic Heart rate (pre-HR)	80.16±9.308	77.28±9.361	1.091	48	0.281
Pre anesthetic mean arterial blood pressure (MABP)	93.24±3.503	94.00±3.162	0.805	48	0.425

Table - 4: Changes in Heart rate at various intervals in both groups.

Change in HR from baseline	Mean ± SD		Mann-Whitney U test	P value
	Airtraq (N=25)	McCoy (N=25)		
After 1sec	-5.36±3.303	-25.04±7.749	3.000	0.000
After 3 sec	-2.00±4.359	-20.88±7.876	6.000	0.000
After 5 sec	4.96±-17.88	4.835±8.447	0.500	0.000
After 10 sec	7.76±6.666	0.48±7.666	140.500	0.001
Note: Negative value of change in heart rate indicates an increase from the baseline while positive values indicate a decrease				

Figure - 1: Fluctuation in heart rates from the base-line in both the groups.



The largest number of patients in Group A was in between 30 -39 years followed by 40-49 years. In Group B the largest number of patients was less than 30 years of age and around 28.0 % were in the age group of more than 50 years. As obesity is a risk factor of difficult intubation [5] the BMI of the study participants was calculated and the mean BMI of AT was 24.12 + 2.43 and that of MC was 23.57+2.96 (**Table – 1**).

Table - 5: Changes in Mean arterial blood pressure at various intervals in both groups.

Change in MABP from baseline	Mean ± SD		Mann-Whitney U	P value
	Airtraq (N=25)	McCoy (N=25)		
After 1sec	-7.84±3.412	-16.16±5.039	52.000	0.000
After 3 sec	-5.76±2.948	-11.68±4.151	80.500	0.000
After 5 sec	-4.60±2.944	-7.48±3.229	159.000	0.003
After 10 sec	-3.20±3.266	-4.16±5.161	280.000	0.512
Note: Negative value of change in MABP indicates an increase from the baseline				

Figure - 2: The fluctuations in MABP at various intervals using McCoy and Airtraq laryngoscopes.

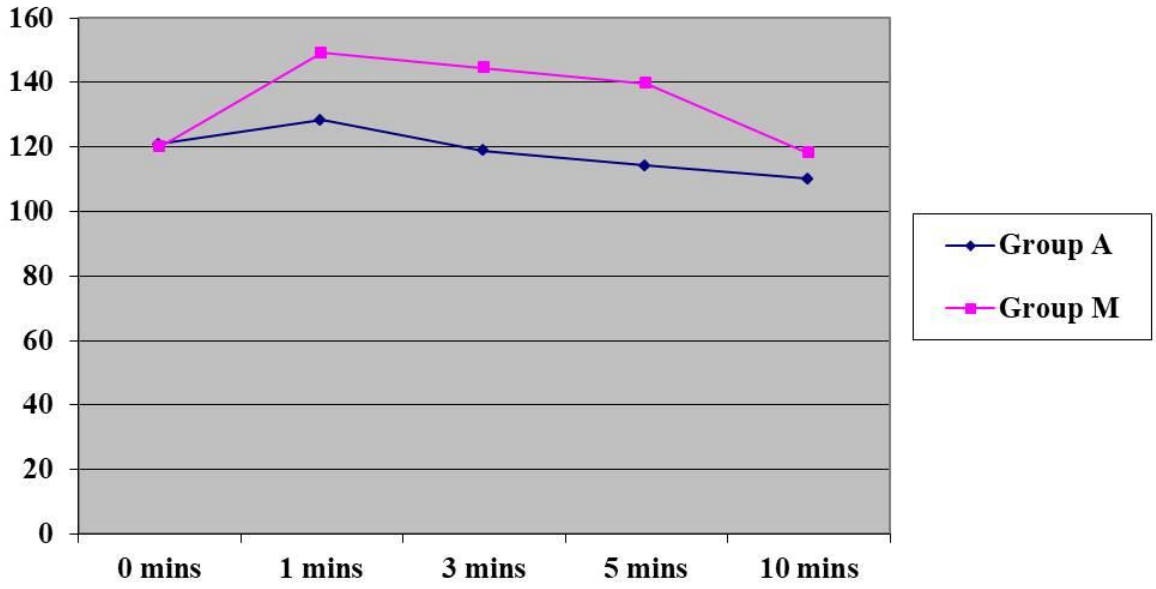


Table - 2 shows the POGO scoring of the patients in both the groups. **Table - 2** depicts that the POGO scoring of the patients using Airtraq laryngoscope was better than that of McCoy laryngoscope.

Table - 3 shows the hemodynamic changes observed by using both the laryngoscopes. **Table - 3** shows that there was no statistically significant difference between Airtraq and McCoy groups for the means of HR and MABP in the pre-anaesthetic period.

Table - 4 depicts that while the heart rates in patients from both the groups appeared to have reached the baseline value or gone even below by the 5th second, the fluctuations were more evident in the McCoy group as compared to the Airtraq within the first few seconds (at 1 and 3 sec) and this was found to be highly statistically significant ($p<0.001$). **Figure - 1** shows the graphical representation of the changes in heart rates.

The fluctuations in MABP were more pronounced in the McCoy group as compared to the Airtraq group in the first (1sec) and third second (3secs) readings. This was found to be highly statistically significant ($p<0.001$). Patients in the latter group were closer to the baseline after 5 seconds as compared to those in the former ($p=0.003$). However, there was no obvious difference by the end of the 10th second ($p=0.512$) as per **Table - 5**. **Figure – 2** depicts fluctuations in MABP at various intervals using McCoy and Airtraq laryngoscopes.

Discussion

In the present study the mean age of the participants was found to be 36.76 ± 9.093 years in the AT group and 38.48 ± 15.191 years in the MC group. Another similar study Durga, et al. reported a higher mean age among the study participants where it was found to be 44.78 ± 10.21 years [6]. The present study reported a higher percentage of female participants (60%) whereas the study by Durga, et al. consisted a higher percentage of male participants (58.3%) [6]. Among the study subjects around 40% of the participants in group A and 28% of participants in Group B were overweight. The present study evaluated the POGO scoring among the study participants at100 to be 84% in AT group and 60% in MC group.

The hemodynamic changes were evaluated by non-invasive methods in the present study. The fluctuations in HR and MABP was more evident in the McCoy group as compared to the Airtraq within the first few seconds (at 1 and 3 sec) and this was found to be highly statistically significant in the present study whereas another similar study by Saracoglu K.T., et al. reported pronounced fluctuations in hemodynamic parameters with intubation using Airtraq laryngoscope [7]. This result is different from the findings of the present study. In the present study, there were no traumatic episodes (spotting on the blade of the laryngoscope) reported whereas the previous study reported that 4 (13.33%) out of 30 patients intubated with Airtraq had traumatic episodes. This might have been due to inclusion of morbidly obese patients for the study purpose. Saracoglu K.T., et al. also reported of post-operative sore throat within 6hours of intubation, more pronounced with those who had trauma, but the present study, none of the participants reported of any post-operative sore throat following intubation with Airtraq laryngoscope [7].

Another study conducted by Hossalli, et al. reported of similar hemodynamic changes as that of the present study [8]. Another study on hemodynamic changes on intubation by Arshad Z, et al. revealed higher fluctuation in diastolic blood pressure and heart rate with those intubated with McCoy laryngoscope. This result is similar to the results of the present study [9].

Conclusion

The results of this study enforce the fact that Airtraq laryngoscope is a better device that can be used for intubation in predicted difficult airways and differs from the findings of other studies that it has a higher prevalence of post-operative sore throat. It exhibits a better hemodynamic stability than the conventional McCoy laryngoscope.

Airtraq was found to be a better device for endotracheal intubation than the McCoy laryngoscope, with better hemodynamic stability. The post-operative sore throat was absent with intubation using Airtraq laryngoscope.

Implication

Airtraq can be used in patients with normal and difficult airways safely causing less traumatic injury.

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