

“Comparative Study of Laryngoscope View And Intubation Response To Laryngoscopy Using McCoy And Macintosh Blades”

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Abstract:

Background and objectives: The objects of the study were to compare the laryngoscopic view and the hemodynamic changes by using flex tip McCoy laryngoscope with Macintosh laryngoscope. **Observations and results:** The mean rise in heart rate from a pre-induction value of 72.74 ± 0.1976 to 97.68 ± 0.2892 Beats per Minute (bpm) was noted in group Macintosh, while in group Mc'Coy the mean rise in heart rate was observed from 72.64 ± 0.1995 to 86.10 ± 0.2559 bpm. The mean rise in SBP from the pre-induction value from 113.5 ± 0.3490 to 145.3 ± 0.3366 mm of Hg was noted in group Macintosh, while in group Mc coy the mean rise in SBP was observed from 112.9 ± 0.2686 to 127.6 ± 0.1639 mm of Hg. **Laryngeal view comparison:** All patients in both groups were of Mallampati 1 and 2. patients intubated with Macintosh blade; it was found that 18 out of 50 patients were of Cormack and Lehane grade II. In patients intubated with McCoy blade, it was found that only 2 out of 50 patients were of Cormack and Lehane grade II. **Conclusion:** McCoy laryngoscope blade is useful in reducing the stress response to laryngoscopy when compared to Macintosh laryngoscope blade and McCoy blade improves laryngoscopic view when compared to Macintosh blade.

Keywords: Macintosh laryngoscope blade, McCoy laryngoscope blade, laryngoscopy, tracheal intubation, Visualization of vocal cords.

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I. Introduction

Stress response to laryngoscopy and tracheal intubation has a profound influence on the circulatory parameters and the intracranial pressure. it has been documented since 1951. This response manifest as tachycardia, hypertension, dysrhythmias and it may have deleterious respiratory, neurological and cardiovascular effects. Visualization of vocal cords for intubation was popularized by Sir Robert Macintosh and Sir Evan Magill in early 1940's. The flex tip McCoy laryngoscope was developed in the early 1990's as an aid to differences has been reported in the view obtained with Macintosh laryngoscope blade and those with McCoy blade. It has been reported that among the patients with initial poor laryngoscope view, the McCoy blade might enable faster and easier tracheal intubation.

Objectives: Comparison of 1) Laryngoscope view of while using Macintosh and McCoy type blades in ASA I and II undergoing general anaesthesia for various surgical procedures with predicted difficult airway. 2) Intubation response while using Macintosh and McCoy type of blades in patients of ASA I and II undergoing general anaesthesia for various surgical procedures.

II. Patients And Methods

The present clinical study has been carried out from November 2013 to October 2015 over a period of two years after getting informed consent from the patient and clearance from ethical committee. The study was conducted in 100 patients of ASA grades I and II aged between 20 – 50 years undergoing various surgical procedures requiring general anaesthesia and endotracheal intubation at Government General Hospital, Guntur. A prospective randomized controlled study was done. A standard anaesthesia technique is used in all the patients. Patients were randomly assigned to either of the following groups. Group A (n=50)- conventional Macintosh laryngoscope (blade size 3 or 4) is used. Group B (n=50)- McCoy laryngoscope (blade size 3 or 4) will be used. Both the groups were matched demographically preoperative visit is made and a detailed history of the patient is taken. A thorough clinical examination is conducted and necessary investigations are sent and reviewed if necessary. **Inclusion criteria:** 1. Patients undergoing various surgical procedures requiring general anaesthesia and endotracheal intubation. Age group of 20-50 years of ASA grades I and II. **Exclusion criteria:** 1. Patients with morbid obesity. 2. Pregnant patients. 3. Patients with Diabetes Mellitus. 4. Patients with

uncontrolled Hypertension.5 Patients with Coronary Artery Disease.6.Patients with major kidney, liver and heart disease.7. Patients with allergy to any of the drugs used in the study.8.Patients with the anticipated difficult airway.

III. Results

All patients representing both sexes and age ranging from 20 to 50 years belonging to ASA Grade I and II were included in the study. Patients were scheduled to undergo various elective surgical procedures under general anaesthesia and were divided into 2 groups of 50 each: Group A. Laryngoscopy and Intubation carried out using Macintosh Laryngoscope blade. Group B: Laryngoscopy and Intubation carried out using McCoy blade.Data were collected in both groups for following parameters and observations of the analysed data were tabulated as follows. Age:-All the patients were between the ages of 20-50 years.

Weight: All the patients were between the weights of 50 to 65 kg. Intraoperative parameters Heart rate,Blood pressure,SpO2,Cormack and Lehane score were monitored and maintained. Non-invasive blood pressure(SBP,DBP,MAP), pulse rate and SpO2 will be recorded at preinduction, preintubation and post-intubation at 1, 3 and 5 minutes. No other drug was used for reducing the pressor response in the first 5 minutes. The observations were analysed statistically by _unpaired t-test and ANOVA test. Statistical significance was assumed if $p < 0.05$.

Table 1. Intragroup comparison of pulse rate.

Group-A	Pre Induction	Pre Intubation	Post Intubation At 1 Minutes	Post Intubation At 3 Minutes	Post Intubation At 5 Minutes	P Value
Mean Pulse Rate	77.08+/-0.2925	72.74 ± 0.1976	97.68 ± 0.2892	92.28 ± 0.2800	87.06 ± 0.2146	<0.0001

Group-B	Pre Induction	Pre Intubation	Post Intubation At 1 Minutes	Post Intubation At 3 Minutes	Post Intubation At 5 Minutes	P Value
MEAN PULSE RATE	76.48+/-0.2343	72.64 ± 0.1995	86.10 ± 0.2559	81.48 ± 0.1857	74.54 ± 0.3067	<0.0001

Table 2. Inter group mean pulse rate/heart rate comparison.

	Group A	Group B	P VALUE	
1	PRE INDUCTION	77.08 +/- 0.2925	76.48 +/- 0.2343	P = 0.1126.,NS
2	PRE INTUBATION	72.74 ± 0.1976, N=50	72.64 ± 0.1995, N=50	P = 0.7225.,NS
3	POST INTUBATION AT 1 MINUTE	97.68 ± 0.2892, N=50	86.10 ± 0.2559, N=50	P = < 0.0001., SIGNIFICANT
4	POST INTUBATION AT 3 MINUTES	92.28 ± 0.2800, N=50	81.48 ± 0.1857, N=50	P = < 0.0001., SIGNIFICANT
5	POST INTUBATION AT 5 MINUTES	87.06 ± 0.2146, N=50	74.54 ± 0.3067, N=50	P = < 0.0001., SIGNIFICANT

Following laryngoscopy and intubation, the mean rise in heart rate from a pre-induction value of 72.74 ± 0.1976 to 97.68 ± 0.2892 Beats Per Minute (bpm) was noted in group Macintosh, while in group Mc'Coy the mean rise in heart rate was observed from 72.64 ± 0.1995 to 86.10 ± 0.2559 bpm. Mean heart rate in both groups at laryngoscopy and intubation was compared and the difference was highly significant ($P < 0.0001$). At 3 minutes post intubation, the heart rate in group Macintosh was 92.28 ± 0.2800 bpm while in group Mc coy it was 81.48 ± 0.1857 bpm. The difference was statistically significant ($P < 0.0001$). At 5 minutes, the heart rate in group Macintosh was 87.06 ± 0.2146 while in group Mc 'coy it was 74.54 ± 0.3067 .The difference was statistically significant ($P < 0.0001$).

Table 3. Intra group comparison of systolic blood pressures.

Group-A	Pre Induction	Pre Intubation	Post Intubation At 1 Minute	Post Intubation At 3 Minutes	Post Intubation At 5 Minutes	P Value
SBP	113.5 ± 0.3490	105.1 ± 0.3673	145.3 ± 0.3366	137.4 ± 0.1914	130.2 ± 2.058	P = < 0.0001

group - b	pre induction	pre intubation	post intubation at 1 minute	post intubation at 3minutes	post intubation at 5 minutes	p value
SBP	112.9 ± 0.2686	105.9 ± 0.3048	127.6 ± 0.1639	122.8 ± 0.2429	117.4 ± 0.2036	P = < 0.0001

		Group A	Group B	P-VALUE
1	PRE INDUCTION	113.5 ± 0.3490	112.9 ± 0.2686	P = 0.1910.,NS
2	PRE INTUBATION	105.1 ± 0.3673	105.9 ± 0.3048	P = 0.0890.,NS
3	POST INTUBATION AT 1MINUTE	145.3 ± 0.3366	127.6 ± 0.1639	P = < 0.0001
4	POST INTUBATION AT 3 MINUTES	137.4 ± 0.1914	122.8 ± 0.2429	P = < 0.0001
5	POST INTUBATION AT 5 MINUTES	130.2 ± 2.058	117.4 ± 0.2036	P = < 0.0001

Following laryngoscopy and intubation, the mean rise in SBP from the pre-induction value from 113.5 ± 0.3490 to 145.3 ± 0.3366 mm of Hg was noted in group Macintosh, while in group McCoy the mean rise in SBP was observed from 112.9 ± 0.2686 to 127.6 ± 0.1639 mm of Hg. This mean rise in SBP at laryngoscopy and intubation was compared and the difference was highly significant (P < 0.0001). After 3 minutes, the SBP in group Macintosh was 137.4 ± 0.1914 mm of Hg while in group McCoy it was 122.8 ± 0.2429mm of Hg. The difference in the rise in SBP was statistically significant (P < 0.0001). After 5 minutes, the SBP in Macintosh group was 130.2 ± 2.058 mm of Hg while in group McCoy it was 117.4 ± 0.2036 mm of Hg. The difference in a rise in SBP was statistically significant (P < 0.0001).

Table 4. Intra group comparison of diastolic blood pressures.

Group- a	Pre induction	Pre intubation	Post intubation at 1 minute	Post intubation at 3 minutes	Post intubation at 5 minutes	P value
Dbp	72.10 ± 0.2308	63.04 ± 0.2267	97.36 ± 0.1756	92.52 ± 0.2065	87.10 ± 0.2429	< 0.0001
Group- b	Pre induction	Pre intubation	Post intubation at 1 minute	Post intubation at 3 minutes	Post intubation at 5 minutes	P value
DBP	72.68 ± 0.2127	63.08 ± 0.2388	82.38 ± 0.2193	76.06 ± 1.450	74.22 ± 0.1408	< 0.0001

Table 5: Inter group comparison of mean diastolic blood pressures.

		Group A	Group B	P-VALUE
1	pre induction	72.10 ± 0.2308	72.68 ± 0.2127	P = 0.0676.,NS
2	pre intubation	63.04 ± 0.2267	63.08 ± 0.2388	P = 0.9036.,NS
3	post intubation at 1minute	97.36 ± 0.1756	82.38 ± 0.2193	P = < 0.0001
4	post intubation at 3 minutes	92.52 ± 0.2065,	76.06 ± 1.450,	P = < 0.0001
5	post intubation at 5 minutes	87.10 ± 0.2429,	74.22 ± 0.1408,	P = < 0.0001

Following laryngoscopy and intubation, the mean rise in DBP from the pre-induction value from 72.10 ± 0.2308 to 97.36 ± 0.1756 mm of Hg was noted in group Macintosh, while in group McCoy the mean rise in DBP was observed from 72.68 ± 0.2127 to 82.38 ± 0.2193mm of Hg. This mean rise in DBP at laryngoscopy and intubation was compared and the difference was highly significant (P < 0.0001). After 3 minutes, the DBP in group Macintosh was 92.52 ± 0.2065 mm of Hg while in group McCoy it was 76.06 ± 1.450 mm of Hg. The difference in a rise in SBP was statistically significant (P < 0.0001). After 5 minutes, the DBP in Macintosh group was 87.10 ± 0.2429 mm of Hg while in group McCoy it was 74.22 ± 0.1408 mm of Hg. The difference in a rise in SBP was statistically significant (P < 0.0001).

Laryngeal view (Cormack and Lehane score) C

Omparison:

All patients in both groups were of Mallampati 1 and 2. patients intubated with Macintosh blade it was found that 18 out of 50 patients were of Cormack and Lehane grade II. In patients intubated with McCoy blade, it was found that Only 2 out of 50 patients were of Cormack and Lehane grade II.

Table 6. laryngeal view comparison.

	Group A	Group B
Grade I	32 (64%)	48 (96%)
Grade II	18 (36%)	02 (4%)
Grade III	0	0
Grade IV	0	0

All the patients in both the groups belonged to Cormack and Lehane score I and II. 64% of the patients in Macintosh group had grade I whereas in McCoy 96 % of the patients had Cormack and Lehane grade I indicating a significant difference in laryngoscopic view ($p < 0.0001$).

IV. Discussion

McCoy blade was introduced in 1993; it decreases the number of forces exerted during laryngoscopy and endotracheal intubation so the exaggerated reflex haemodynamic response is clinically insignificant. In a study by McCoy EP (1995) et al measured the heart rate, arterial blood pressure and plasma noradrenaline and adrenaline concentration before and at laryngoscopy at 1, 3 and 5 minutes later. They found that there was a significant increase in both heart rate and blood pressure after the laryngoscopy using the Macintosh blade. The use of the McCoy blade did not result in any significant change in either heart rate or arterial blood pressure. They found that the stress response to laryngoscopy is less marked with the use of the McCoy blade. The results of our study were comparable with the study. ^[1] McCoy EP et al (1996) found that the use of the McCoy blade resulted in significantly less force being applied during laryngoscopy. This is due to the reduction in stress response with the use of the McCoy blade. These study findings are similar to ^[2] Nishiyama et al (1997) who compared Stress responses during laryngoscopy were compared among the situations using three different laryngoscopes, Macintosh (curved standard blade), Miller (straight blade), or McCoy (levering). Blood pressure, heart rate. Systolic blood pressure after laryngoscopy was significantly higher in the Miller group than in other two groups. These results suggest that the stress response during laryngoscopy without intubation is the biggest in using the Miller laryngoscope and the smallest in using the McCoy laryngoscope.

Similarly [3] Tewari et al. compared the two blades in 160 neurosurgical patients and showed that use of McCoy laryngoscope resulted in a lesser change in HR and BP, compared to Macintosh blade. [4] Sarabjit Kaur et al in 2009 conducted study on 100 patients of ASA grade I and II of either sex, in the age group of 20-50 undergoing various surgical procedures requiring general anaesthesia and concluded that McCoy's laryngoscope blade is useful not only in difficult intubation but in all laryngoscopies as it reduces the stress response to laryngoscopy, incidence of dental and other injuries as well, as it makes the laryngeal view better than the Macintosh laryngoscope blade.

^[5] S. Singhal et al in 2007 conducted a prospective randomized study to compare the hemodynamic response to laryngoscopy and intubation using McCoy and Macintosh laryngoscope. McCoy laryngoscope produces significantly less rise in haemodynamic parameters as compared to Macintosh laryngoscope during laryngoscopy and intubation. ^[6] P. Bhosle et al in 2013 conducted a study and compared the circulatory response to laryngoscopy and intubation with Macintosh and McCoy blade. They concluded that reduced pressor response with the McCoy blade. ^[7] Haidry MA et al compared hemodynamic response between tracheal intubation with Macintosh and McCoy blade. They studied the hemodynamic response to laryngoscopy and tracheal intubation in 60 ASA 1 AND 2 Adults. They concluded that the hemodynamic response to laryngoscopy and intubation with McCoy laryngoscope was significantly less than with Macintosh laryngoscope and within 15% of baseline values in ASA 1 and 2 patients. In this study, all patients in both groups with Mallampati 1 and 2 were taken into consideration and are comparable.

In patients intubated with Macintosh blade, it was found that 18 out of 50 patients were of Cormack and Lehane grade II. In patients intubated with McCoy blade, it was found that 10 out of 50 patients were of Cormack and Lehane grade II. and with full levering action improved the laryngeal view from II to I in 8 patients. ^[8] Zia Arshad et al concluded that the McCoy blade may be an answer to Macintosh blade in difficult airway cases, but not the substitute of Macintosh blade in every case. The McCoy blade improved the laryngeal view in patients with limited neck extension.

V. Conclusion

McCoy laryngoscope blade is useful in reducing the stress response to laryngoscopy when compared to Macintosh laryngoscope blade and it reduces the use of other measures used during intubation like opiates in reducing the stress response. McCoy blade improves laryngoscopic view when compared to Macintosh blade.

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