Comparison of Glottis View and Hemodynamic Response by using Macintosh and MacCoy Laryngoscopes for Endotracheal Intubation in General Anaesthesia for Elective Surgery

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ABSTRACT

Introduction: The aim of laryngoscopy is to obtain good visualization of the vocal cords to facilitate smooth endotracheal intubation. To reduce hemodynamic response to Intubation, laryngoscope blades of different shapes have been designed and studied. We tried to evaluate efficacy of MacCoy laryngoscope blade (straight) versus conventional Mcintosh (curved) blade in providing good glottic view and reducing hemodynamic response during endotracheal intubation.

Material and methods: 200 American Society of Anaesthesia grade I and II patients requiring general anaesthesia were randomly divided in two groups; Group I (macintosh blade) and group II (MacCoy blade**).** Laryngoscopy was done by the attending anaesthesiologist by either of the blade to intubate the trachea. The Cormac-lehane grade was obtained from anaesthesia charts maintained by anaesthesiologist at the end of the procedure. Haemodynamic parameters were also recorded at periodic intervals during the procedure.

Results: When Cormack-lehane(C & L) grading was compared between two groups we found that in group I; Grade I was 36%, Grade II was 38% and Grade III was 13%. In group 2, 82% patients had C and L grading I, 18% C & L grade II and zero C&L grade III. Rise in mean arterial blood pressure following intubation was more in Macintosh group as compared to the MacCoy group which was found to be statistically significant.

Conclusion: MacCoy blade provides better visualization of larynx and intubating conditions with minimal Hemodynamic response to laryngoscopy and intubation as compared to Macintosh blade.

Keywords: Cormac-Lehane grade, Hemodynamic stability, MacCoy blade, Macintosh Blade,

INTRODUCTION

Laryngoscopy forms an important part of General Anesthesia and endotracheal intubation. Laryngoscopes are used to view the larynx and adjacent structures for inserting endotracheal tube into the trachea. The aim of laryngoscopy is to obtain good visualization of the vocal cords to facilitate smooth endotracheal intubation.

Direct laryngoscopic view is best seen in sniffing in the morning air position which improves glottis view.[1] To reduce hemodynamic response to Intubation, laryngoscope blades of different shapes have been designed and studied. Many factors have shown to influence laryngoscopic view of vocal cords. These include forward displacement of mandible, prominent or absent teeth, backward displacement of the tongue. The proof of this can be easily obtained by the existence of many different types of laryngoscope blades.[2,3]

Furthermore, laryngoscopy and endotracheal intubation trigger major stress responses; one due to sympathetic stimulation releasing catecholamines that leads to tachycardia and hypertension which increases the myocardial oxygen demand and the other due to vagal stimulation leading to parasympathetic activation that manifests as bradycardia and hypotension. Both of these may be catastrophic in patients with known history of ischemic heart disease.[4,5]

This prospective observational study was designed to evaluate the efficacy of MacCoy laryngoscope blade (straight) versus MacIntosh (curved) blade in providing good glottic view and reducing hemodynamic response during endotracheal intubation.

This study was undertaken with the aim to compare the laryngoscopic view and hemodynamic responses using MacCoy blade versus Macintosh blade for intubation

MATERIAL AND METHODS

After obtaining approval from institutional ethics committee and obtaining valid written informed consent from individual patients, 200 ASA grade I and II patients requiring general anaesthesia were randomly divided in two groups; Group I (macintosh blade) and group II (MacCoy Blade**).** Patients in Both the groups were given identical premedication and were induced the same way.

Sample size: Sample size was calculated with help of difference in mean method and sample size is found to be 100 per group at 80% power and 95% confidence interval. Accordingly we had total of 200 patients which were later got divided randomly in two groups.

After induction, laryngoscopy was done by the attending anaesthesiologist by either of the blade to intubate the trachea. Heart Rate, Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Blood Pressure (MBP) were recorded in each patient at various time intervals viz. baseline (i.e before coming to operating room), pre-induction ,post- induction ,pre-intubation, at 1 and 3 minutes after intubation. The Cormac-lehane grade was obtained from anaesthesia charts maintained by anaesthesiologist at the end of the procedure.

STATISTICAL ANALYSIS

After data entry – data analysis was done with the help of SPSS

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version 21 using parametric and non-parametric test.

Quantitative data such as heart rate, blood pressure (both systolic& diastolic) and

Mean arterial pressure were analyzed with help of mean, SD and median. Comparison among study group was done with the help of paired and unpaired t test.Qualitative data such as Cormac lehane grading for glottis view among study group was assessed by *chi* square test. 'P' value < 0.05 taken as significant.

RESULTS

When data was analysed, no statistically significant difference pertaining to age, sex, MPC grade and ASA grade amongst two study groups was found. When Cormack-lehane(C & L) grading was compared between two groups it was found that in group I (macintosh blade) Grade I was 36%, grade II was38% and grade III was 13% (Table-1).

In group 2 (Mac coy), 82% patients had C and L grading I, 18% C & L grade II and zero C&L grade III (Table-1).

Visualization of larynx was better in patients with MacCoy blade as compared to that of Macintosh blade which was found to be statistically significant between the two groups. There was no statistically significant variation noted in heart rate during base line and pre induction periods in both the groups.

Rise in heart rate following intubation was more in Macintosh group as compared to the MacCoy group which was found to be statistically significant. There was no statistically significant variation noted in mean arterial blood pressure during base line and pre and post induction periods in both the groups.

Rise in mean arterial blood pressure following intubation was more in Macintosh group as compared to the MacCoy group which was found to be statistically significant ($P < 0.05$) (Table-2).

DISCUSSION

Laryngoscopy forms an important part of general anaesthesia and endotracheal intubation. To ease the process of intubation, laryngoscope blades of different shapes have been designed and studied.

Thus, use of different types of laryngoscope blades can help in decreasing haemodynamic response and at the same time facilitate good laryngoscopic view for smooth endotracheal intubation.

In this prospective observational study we evaluated the laryngoscopic view, and haemodynamic response using Macintosh blade and was compared with that obtained using MacCoy blade. The laryngeal view was compared using Cormack and Lehane grading. In Group II (MacCoy blade), 82% patients had Grade I view and 18% patients had Grade II view. In Group I (Macintosh blade), 36% patients had Grade I view, 38% had Grade II view and 26% had Grade III view.

This shows that the visualization of larynx was better with MacCoy blade as compared to Macintosh blade which was found to be statistically significant as shown in the study by Sakai T et al. They compared the grade of laryngeal visualization with the MacCoy, Macintosh and the Miller blade in 117 patients for elective surgery under general anesthesia requiring tracheal intubation. They found that the grades of laryngeal visualization with McCoy blade were significantly better than those with Macintosh blades.[6]

Harioka et al, studied 219 patients and concluded that without external laryngeal pressure, the MacCoy blade provided a better laryngoscopic view than that obtained by the Macintosh laryngoscope ($p<0.05$).[7] Beilin b, yardeni iz et al, in their study found that the McCoy blade significantly improves laryngoscopic view.[8]

MacCoy EP, Mirakhur RK. et al compared the stress response to laryngoscopy, using the Macintosh and MacCoy blade. The cardiovascular changes and catecholamine concentrations were compared in 20 patients before and after laryngoscopy with

Cormack Lehane Grade		Type of laryngoscope blade		Total
		Mac coy	Macintosh	
Grade 1	Count	82	36	118
	Percent	82.0%	36.0%	59.0%
Grade 2	Count	18	38	56
	Percent	18.0%	38.0%	28.0%
Grade 3	Count	0	26	26
	Percent	0.0%	26.0%	13.0%
Total	Count	100	100	200
	Percent	100.0%	100.0%	100.0%
Chi-Square test	Value	df	P Value	Association is Significant
Pearson Chi-Square	51.075	2	0.231	

Table-1: Cormack Lehane grading

MAP (mmHg)	MacCoy			Macintosh			P Value
	Mean	SD	% Change	Mean	SD	% Change	
BL	94.24	8.65		92.31	6.64		0.079
Pre induction	94.24	7.58	0.00%	94.53	7.05	2.40%	0.480
Post induction	89.76	7.03	4.75%	90.54	7.06	1.92%	0.433
After intubation	84.11	6.80	3.05%	104.11	7.93	12.78%	0.221
After 1 min	94.90	6.36	0.71%	99.03	8.01	7.28%	0.351
After 3min	81.63	7.26	-0.65%	86.74	8.82	6.96%	0.386
Note: P Value calculated by Unpaired T test.							

Table-2: Comparison of mean arterial pressure

either the Macintosh or the MacCoy laryngoscope blades. There was significant increase in both heart rate (33%) and arterial blood pressure (27%) after laryngoscopy using the Macintosh blade ($P < 0.05$). Use of the MacCoy blade did not result in any significant change in either heart rate or arterial blood pressure. It was concluded that the stress response to laryngoscopy is less marked with the use of MacCoy blade and it is probably due to a reduction in the force necessary to obtain a clear view of the larynx.[9]

Nishiyama T, et al.1998 compared the stress response during laryngoscopy using three different laryngoscopes, Macintosh, Miller, or MacCoy. Blood pressure, heart rate (in 58 patients) and plasma concentration of catecholamine (in 29 patients) were measured before, during and after laryngoscopy without tracheal intubation. The results suggest that the stress response during laryngoscopy without intubation is the highest with the Miller blade and the least with the MacCoy blade.[10]

The results in our study shows that the MacCoy laryngoscope blade improves the visualization of the larynx and significantly attenuates haemodynamic parameters during laryngoscopy and intubation as compared to that with Macintosh laryngoscope blade.

It can be utilized as an additional tool along with pharmacological interventions for obtunding stress response to laryngoscopy and endotracheal intubation. This shows that Haemodynamic response to laryngoscopy was less with MacCoy blade as compared to that with Macintosh blade which was found to be statistically significant ($P < 0.05$) as shown in the study by MacCoy EP. et al and also this shows that the visualization of larynx was better with MacCoy blade as compared to Macintosh blade which was found to be statistically significant, $P<0.05$, as shown in the study by Sakai T et al.[6]

CONCLUSION

Thus, our study shows that MacCoy blade provides better visualization of larynx and intubating conditions with minimal hemodynamic response to intubation as compared to Macintosh blade. MacCoy blade which is a modification of the Macintosh blade with its tip levering significantly, Improves the visualization of the larynx. MacCoy blade provides better visualization of larynx and intubating conditions with minimal Hemodynamic response to laryngoscopy and intubation as compared to Macintosh blade.

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