Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

Original research article

Intubating conditions and stress response to laryngoscopy: Comparison between macintosh and Mccoy's type laryngoscope blades

[1]Karan Juneja, [2]Sehrawat Kritika, [3]Aditya Rathee, [4]Aastha, [5]Anumeha Vashisht, [6]Ankit Aggarwal, [7]Ajay Kumar, [8]KC Khanduri

[1,3]Senior Resident, Department of Anaesthesiology, Faculty of Medicine & Health Sciences, SGT University, Gurugram, Haryana, India

[2]Senior Resident, Department of Anaesthesiology, Max Super Speciality Hospital, New Delhi, India

[4,7]Assistant Professor, Department of Anaesthesiology, Faculty of Medicine & Health Sciences, SGT University, Gurugram, Haryana, India

[5,6]Junior Resident, Department of Anaesthesiology, Faculty of Medicine & Health Sciences, SGT University, Gurugram, Haryana, India

[8]Retired Professor, Department of Anaesthesiology,78 JDM Apartment Plot 11, Sector-5, Dwarka, New Delhi, India

Corresponding Author: Aditya Rathee

Abstract

Background and Aims: Laryngoscopy and endotracheal intubation are critical aspects of general anesthesia, often provoking significant stress responses that impact circulatory parameters. This study aims to compare the hemodynamic stress responses and intubation conditions between the Macintosh and McCoy blades in patients with ASA grades I and II undergoing various surgical procedures under general anesthesia.

Methods: A total of 100 patients were randomly assigned into two groups: Group A (Macintosh blade) and Group B (McCoy blade), each consisting of 50 patients. Hemodynamic parameters, including heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP), were recorded at Pre-Induction, At the Start of Laryngoscopy, Immediately After Intubation, 1 Minute After Intubation, 3 Minutes After Intubation, 5 Minutes After Intubation,
10 Minutes After Intubation. Intubation ease was evaluated by recording the duration of laryngoscopy, Cormack and Lehane Grades, Modified Mallampati scores, and the necessity for optimal external laryngeal manipulation (OELM) or stylet use.

Results: The Macintosh group exhibited significantly higher HR, SBP, DBP, and MAP immediately after intubation compared to the McCoy group ($p < 0.001$). The McCoy blade was associated with better attenuation of the hemodynamic response and facilitated improved laryngeal view under Cormack and Lehane grading, particularly beneficial in patients with higher Mallampati grades.

Conclusion: The McCoy blade offers superior hemodynamic stability and enhanced visualization during intubation compared to the Macintosh blade, making it potentially more advantageous for patients with challenging airways, although further research in Mallampati grades III and IV is warranted.

Keywords: Haemodynamic changes, hypertension, tachycardia, stress response, laryngoscopy, mccoy, macintosh

Introduction

Airway management is an important aspect of general anaesthesia and tracheal intubation is a key step in airway control. A direct laryngoscopic view is a crucial requirement before endotracheal intubation. Stress response to laryngoscopy and tracheal intubation has a profound effect on the circulatory parameters and the intracranial pressure [1] and has been documented since 1951. This response manifests as tachycardia, hypertension, dysrrhythmias, intraocular and intracranial hypertension. Thus, it may have harmful respiratory, neurological, and cardiovascular effects [1]. Forces transmitted by means of the laryngoscope blade on the base of the tongue are assumed to be a chief stimulus.

Laryngoscopy leads to an increase in the serum catecholamines [2]. Sympathoadrenal response arises from the stimulation by the laryngoscope blade in conjunction with the tracheal tube placement and cuff inflation. When planning induction of anaesthesia, these effects must be diminished as much as possible

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

especially if the patient is a high-risk population, for example, patients with coronary artery disease, hypertension, asthma, elevated intracranial pressure, and cerebral aneurysm etc. Modification of instruments, use of other intubating devices like intubating laryngeal mask airway (ILMA) [3] and various pharmacological interventions (intravenous/topical) [4] have been tried to reduce haemodynamic response to laryngoscopy and intubation.

This clinical study was undertaken to compare stress response and intubating conditions while using the Macintosh and McCoy blades. The Macintosh blade is probably the most successfully used in the history of anaesthesia to date [4]. The laryngoscope was designed for precise visualization of vocal cords to facilitate clean endotracheal intubation.

The Macintosh blade tenses the glossoepiglottic ligament with the aid of being positioned within the vallecula. With both blades, the handle is raised up and away from the patient in a plane perpendicular to the patient's mandible to expose the vocal cords. A levering motion should never be applied to the patient's dentition because such actions lead to dental trauma and decrease the best of the laryngoscopic view.

The McCoy blade, invented within the early nineties is an amendment of the Macintosh blade (with tip hinged) [4]. When the McCoy blade is inserted into the vallecula, the elevation of the tip acts on the Hyo-epiglottic ligament and lifts the epiglottis out of the view to expose more of the glottis while decreasing the overall movement. The McCoy blade decreases the range of forces exerted through laryngoscopy and endotracheal intubation. Thus, the exaggerated reflex haemodynamic responses are likely to become less severe.

Despite using the laryngoscope blades, various drugs are tried during intubation to attenuate the haemodynamic responses. Lignocaine has also been tried intravenously for suppressing these haemodynamic responses [5]. Vasodilators like nitroprusside, hydralazine and nitroglycerine have been used to attenuate these haemodynamic responses with varying degrees of success [6, 7, 8]. Calcium channel blockers [9] beta-blockers [10] and opioids such as alfentanil [11], fentanyl [12] and remifentanil [13] have also been used in different dosage regimens to attenuate haemodynamic response to laryngoscopy and intubation.

Methods

One hundred patients recruited for the study were randomly allocated into 2 groups of 50 each, using a computer-generated randomization table:

Group A: Patients undergoing laryngoscopy with the Macintosh blade.

Group B: Patients undergoing laryngoscopy with the McCoy blade.

A day before the surgery, the pre-operative visit was made and a detailed history and clinical examination were conducted. Airway assessment was done using the Modified Mallampati Score on the day before the surgery. All patients were kept nil per oral (NPO) for 8 hours/overnight. They were premedicated with tab alprazolam 0.25mg the night before surgery.

After confirming NPO status, patients were shifted to the operating room on the day of surgery. Patients were connected to a multiparameter monitor for monitoring and recording baseline values of NIBP, SpO_2, HR and ECG.

A head ring was kept under the head to maintain the sniffing position (flexion at the lower cervical and extension at the atlanto-occipital joint). All patients were premedicated with ondansetron 0.1 mg/kg, midazolam 0.03 mg/kg and fentanyl 1µg /kg bodyweight intravenously. Then the patients were pre-oxygenated with a mask for 3 minutes and preinduction HR, NIBP, SpO_2 and ECG monitoring was done. General anaesthesia was induced with intravenous propofol 2 mg /kg and intravenous vecuronium bromide 0.1 mg /kg was given for neuromuscular block. After mask ventilation for 3 minutes with 60% N_2O, 40% O_2 and isoflurane (0.5%), HR, NIBP, ECG and SpO_2 were recorded and laryngoscopy was done with Macintosh and McCoy blades in groups A and B respectively.

In group A, if the glottis was not visible, optimal external laryngeal manipulation (OELM) with backward, upward, and rightward pressure (BURP) and the use of stylets was done if required and the record was maintained. If there would be difficulty in exposing the glottis, the McCoy laryngoscope was tried to facilitate intubation and records were maintained. The total duration of laryngoscopy and intubation, along with the number of attempts were recorded.

In group B, using the appropriate size McCoy blade, moderate to full levering action of the flex tip was applied to improve the laryngeal view. If the glottis was not visible, then the OELM manoeuvre and stylet would be used to facilitate orotracheal intubation and record maintained.

The extent of exposure of the glottis was noted on laryngoscopy according to Cormack and Lehane's score in groups A and B and the same were compared.

The results obtained in the study were presented in a tabulated manner.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

Results

1. Comparison of the two groups in terms of change in heart rate (BPM) over time

Heart Rate (BPM)	Group		P value for comparison of the two groups at each of the timepoints (Wilcoxon-Mann-Whitney Test)
	Macintosh	McCoy	
	Mean (SD)	Mean (SD)	
Pre-Induction Baseline	84.60 (13.65)	82.64 (16.47)	0.354
At Start of Laryngoscopy	88.24 (13.45)	85.80 (14.16)	0.304
Immediately After Intubation	109.82 (13.77)	98.02 (14.49)	<0.001
1 Minute After Intubation	102.90 (14.13)	94.70 (13.55)	0.004
3 Minutes After Intubation	96.02 (13.35)	90.12 (13.08)	0.026
5 Minutes After Intubation	85.90 (12.27)	82.14 (15.56)	0.200
10 Minutes After Intubation	82.66 (10.39)	78.66 (13.00)	0.058
P Value for change in Heart Rate (BPM) over time within each group (Friedman Test)	<0.001	<0.001	
Overall P Value for comparison of change in Heart Rate (BPM) over time between the two groups (Generalized Estimating Equations)	<0.001		

The two groups differed significantly in terms of Heart Rate (BPM) at the following timepoints: Immediately After Intubation, 1 Minute After Intubation, 3 Minutes After Intubation.

In Group: Macintosh, the mean Heart Rate (BPM) increased from 84.60 at the Pre-Induction Baseline timepoint to a maximum of 109.82 at the Immediately After Intubation timepoint, and then decreased to 82.66 at the 10 Minutes After Intubation timepoint. This change was statistically significant (Friedman Test: $\chi 2 = 200.4$, $p = <0.001$).

In Group: McCoy, the mean Heart Rate (BPM) increased from 82.64 at the Pre-Induction Baseline timepoint to a maximum of 98.02 at the Immediately After Intubation timepoint, and then decreased to 78.66 at the 10 Minutes After Intubation timepoint. This change was statistically significant (Friedman Test: $\chi 2 = 181.0$, $p = <0.001$).

The overall change in Heart Rate (BPM) over time was compared in the two groups using the Generalized Estimating Equations method. There was a significant difference in the trend of Heart Rate (BPM) over time between the two groups ($p = <0.001$).

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

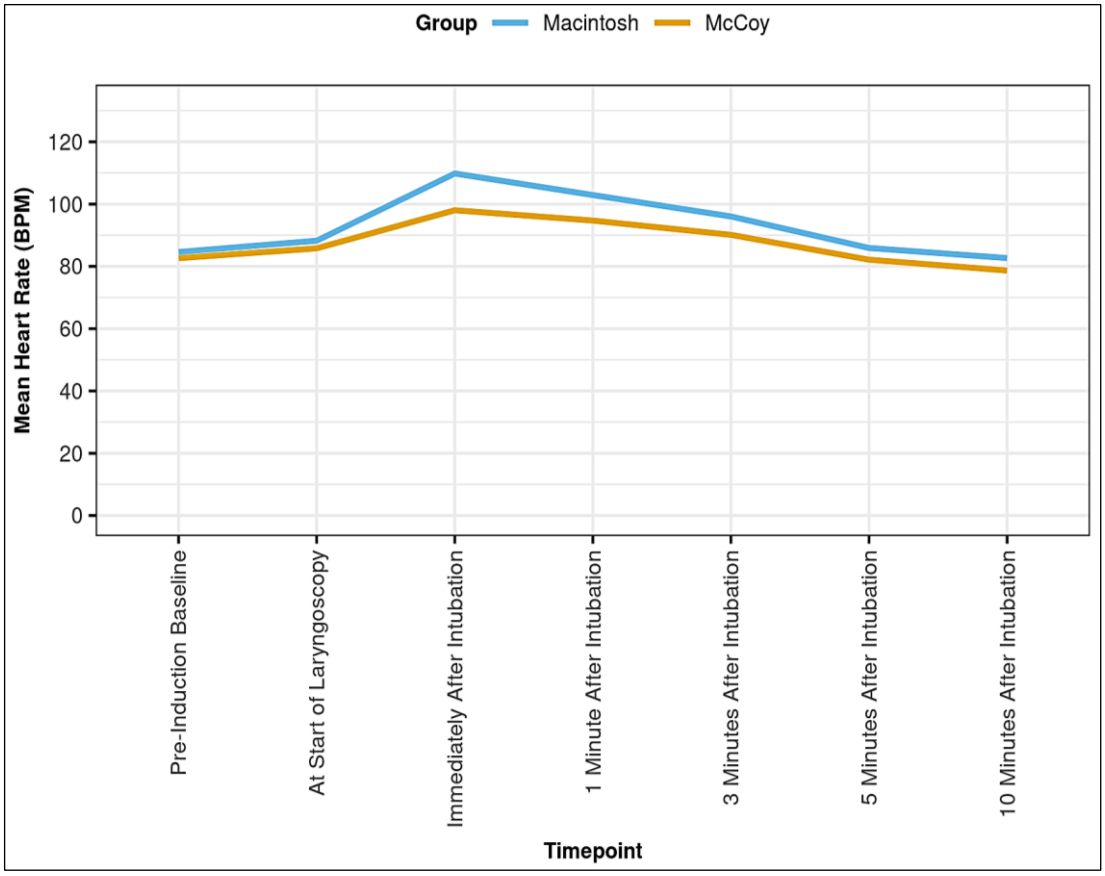

Fig 1: Change in Heart Rate (BPM) Over Time

In Group: Macintosh, the Heart Rate (BPM) differed significantly from the Pre-Induction Baseline timepoint at the following timepoints: Immediately After Intubation, 1 Minute After Intubation, 3 Minutes After Intubation. The maximum percent change from the Pre-Induction Baseline timepoint was observed at the Immediately After Intubation timepoint.

In Group: McCoy, the Heart Rate (BPM) differed significantly from the Pre-Induction Baseline timepoint at the following timepoints: Immediately After Intubation, 1 Minute After Intubation, 3 Minutes After Intubation, 10 Minutes After Intubation. The maximum percent change from the Pre-Induction Baseline timepoint was observed at the Immediately After Intubation timepoint.
The two groups differed significantly in terms of percent change in Heart Rate (BPM) from the Pre-Induction Baseline timepoint to the following timepoints: Immediately After Intubation, 1 Minute After Intubation.

2. Comparison of the two Groups in Terms of change in Systolic BP (mmHg) over time

Systolic BP (mmHg)	Group		P value for comparison of the two groups at each of the timepoints (Wilcoxon-Mann-Whitney Test)
	Macintosh	McCoy	
	Mean (SD)	Mean (SD)	
Pre-Induction Baseline	119.00 (12.36)	116.32 (13.18)	0.261
At Start of Laryngoscopy	103.46 (13.96)	106.04 (17.50)	0.699
Immediately After Intubation	131.30 (15.90)	121.52 (15.65)	0.004
1 Minute After Intubation	119.02 (14.24)	116.48 (12.96)	0.530
3 Minutes After Intubation	110.56 (14.55)	109.74 (13.75)	0.915
5 Minutes After Intubation	107.78 (13.69)	109.40 (12.84)	0.329
10 Minutes After Intubation	107.34 (9.87)	112.12 (9.70)	0.005

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

Systolic BP (mmHg)	Group		P value for comparison of the two groups at each of the timepoints (Wilcoxon-Mann-Whitney Test)
	Macintosh	McCoy	
	Mean (SD)	Mean (SD)	
P Value for change in Systolic BP (mmHg) over time within each group (Friedman Test)	<0.001	<0.001	
Overall P Value for comparison of change in Systolic BP (mmHg) over time between the two groups (Generalized Estimating Equations)	<0.001		

The two groups differed significantly in terms of Systolic BP (mmHg) at the following timepoints: Immediately After Intubation, 10 Minutes After Intubation.

In Group: Macintosh, the mean Systolic BP (mmHg) increased from 119.00 at the Pre-Induction Baseline timepoint to a maximum of 131.30 at the Immediately After Intubation timepoint, and then decreased to 107.34 at the 10 Minutes After Intubation timepoint. This change was statistically significant (Friedman Test: $\chi 2 = 164.5$, $p = <0.001$).

In Group: McCoy, the mean Systolic BP (mmHg) increased from 116.32 at the Pre-Induction Baseline timepoint to a maximum of 121.52 at the Immediately After Intubation timepoint, and then decreased to 112.12 at the 10 Minutes After Intubation timepoint. This change was statistically significant (Friedman Test: $\chi 2 = 86.9$, $p = <0.001$).
The overall change in Systolic BP (mmHg) over time was compared in the two groups using the Generalized Estimating Equations method. There was a significant difference in the trend of Systolic BP (mmHg) over time between the two groups ($p = <0.001$).

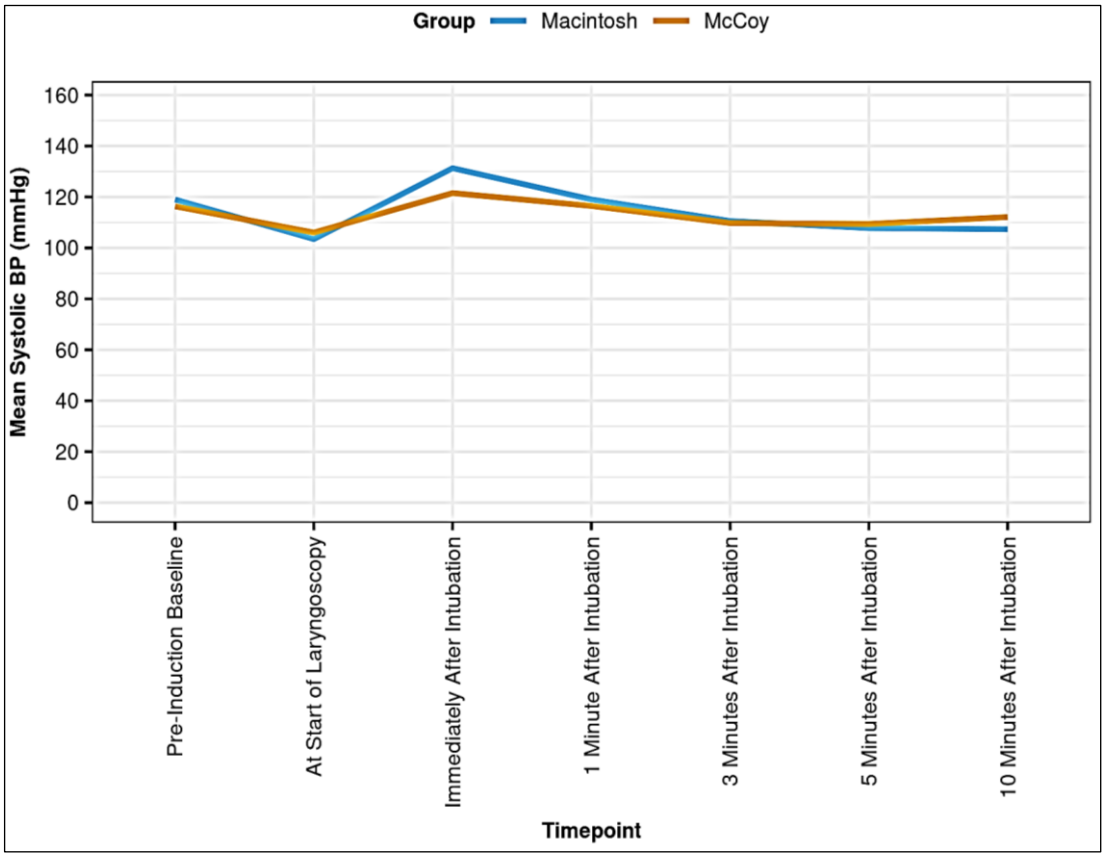

Fig 3: Change in Systolic BP (mmHg) Over Time

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

3. Comparison of the two groups in terms of change in Diastolic BP (mmHg) over time

Diastolic BP (mmHg)	Group		P value for comparison of the two groups at each of the timepoints (t-Test)
	Macintosh	McCoy	
	Mean (SD)	Mean (SD)	
Pre-Induction Baseline	72.08 (9.44)	69.34 (10.44)	0.172
At Start of Laryngoscopy	62.04 (11.38)	61.88 (11.92)	0.945
Immediately After Intubation	86.54 (11.35)	76.40 (12.16)	<0.001
1 Minute After Intubation	74.50 (11.57)	70.06 (9.88)	0.042
3 Minutes After Intubation	69.22 (10.78)	66.16 (9.82)	0.141
5 Minutes After Intubation	70.26 (9.87)	69.06 (8.72)	0.521
10 Minutes After Intubation	71.84 (9.80)	74.06 (8.21)	0.223
P Value for change in Diastolic BP (mmHg) over time within each group (Repeated Measures ANOVA)	<0.001	<0.001	
Overall P Value for comparison of change in Diastolic BP (mmHg) over time between the two groups (Generalized Estimating Equations)	<0.001		

The two groups differed significantly in terms of Diastolic BP (mmHg) at the following timepoints: Immediately After Intubation, 1 Minute After Intubation.

In Group: Macintosh, the mean Diastolic BP (mmHg) increased from 72.08 at the Pre-Induction Baseline timepoint to a maximum of 86.54 at the Immediately After Intubation timepoint, and then decreased to 71.84 at the 10 Minutes After Intubation timepoint. This change was statistically significant (Repeated Measures ANOVA: F = 12.5, p = <0.001).

In Group: McCoy, the mean Diastolic BP (mmHg) decreased from 69.34 at the Pre-Induction Baseline timepoint to a minimum of 61.88 at the At Start of Laryngoscopy timepoint, and then increased to 74.06 at the 10 Minutes After Intubation timepoint. This change was statistically significant (Repeated Measures ANOVA: F = 4.4, p = <0.001).
The overall change in Diastolic BP (mmHg) over time was compared in the two groups using the Generalized Estimating Equations method. There was a significant difference in the trend of Diastolic BP (mmHg) over time between the two groups (p = <0.001).

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

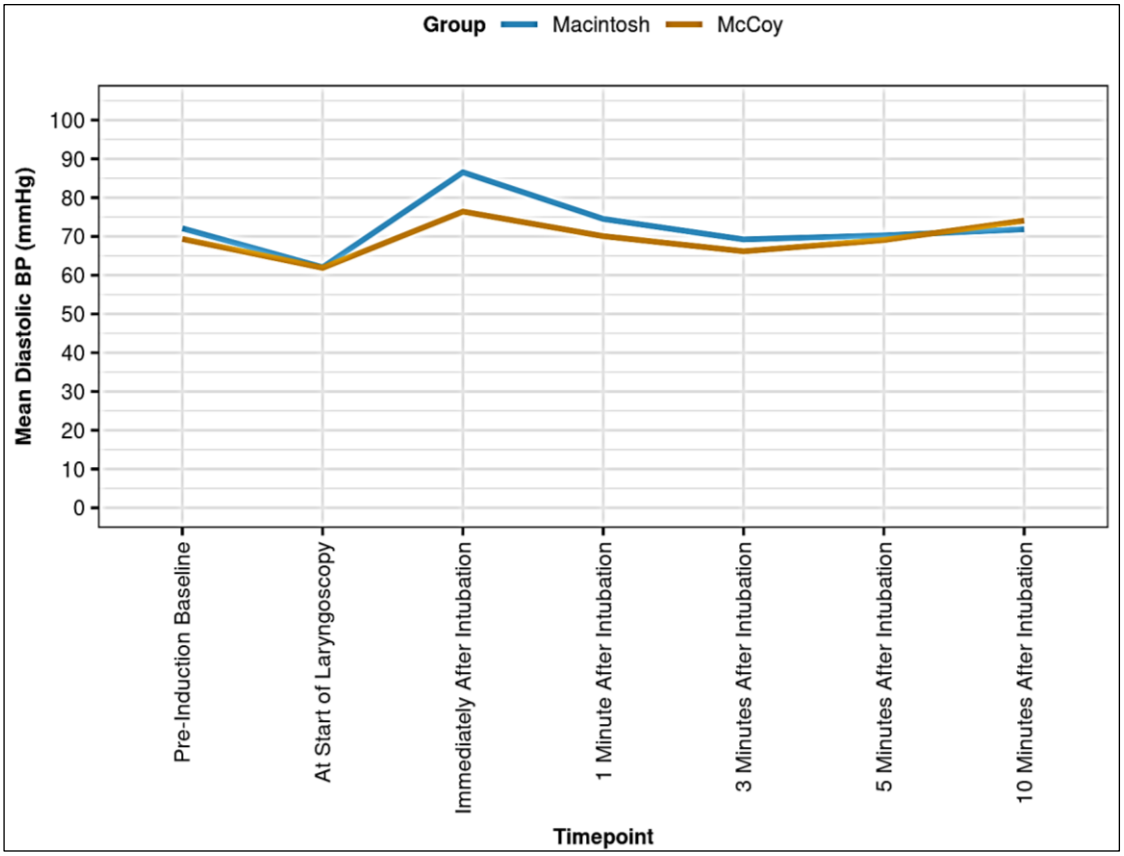

Fig 4: Change in Diastolic BP (mmHg) Over Time

4. Comparison of the two groups in terms of change in MAP (mmHg) over time

MAP (mmHg)	Group		P value for comparison of the two groups at each of the timepoints (Wilcoxon-Mann-Whitney Test)
	Macintosh	McCoy	
	Mean (SD)	Mean (SD)	
Pre-Induction Baseline	86.00 (11.57)	84.24 (10.81)	0.357
At Start of Laryngoscopy	75.10 (11.47)	75.68 (12.10)	0.961
Immediately After Intubation	101.34 (11.35)	90.04 (12.38)	<0.001
1 Minute After Intubation	89.06 (11.43)	84.14 (9.81)	0.046
3 Minutes After Intubation	82.22 (12.01)	79.48 (11.11)	0.420
5 Minutes After Intubation	84.88 (10.88)	81.98 (10.99)	0.313
10 Minutes After Intubation	85.96 (9.08)	84.56 (8.99)	0.693
P Value for change in MAP (mmHg) over time within each group (Friedman Test)	<0.001	<0.001	
Overall P Value for comparison of change in MAP (mmHg) over time between the two groups (Generalized Estimating Equations)	<0.001		

The two groups differed significantly in terms of MAP (mmHg) at the following timepoints: Immediately After Intubation, 1 Minute After Intubation.

In Group: Macintosh, the mean MAP (mmHg) increased from 86.00 at the Pre-Induction Baseline timepoint to a maximum of 101.34 at the Immediately After Intubation timepoint, and then decreased to 85.96 at the 10 Minutes After Intubation timepoint. This change was statistically significant (Friedman Test: $\chi 2 = 156.8$, $p = <0.001$).

In Group: McCoy, the mean MAP (mmHg) decreased from 84.24 at the Pre-Induction Baseline timepoint to a minimum of 75.68 at the At Start of Laryngoscopy timepoint, and then increased to 84.56 at the 10 Minutes After Intubation timepoint. This change was statistically significant (Friedman Test: $\chi 2 = 105.1$, $p = <0.001$).

The overall change in MAP (mmHg) over time was compared in the two groups using the Generalized Estimating Equations method. There was a significant difference in the trend of MAP (mmHg) over time between the two groups ($p = <0.001$).

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

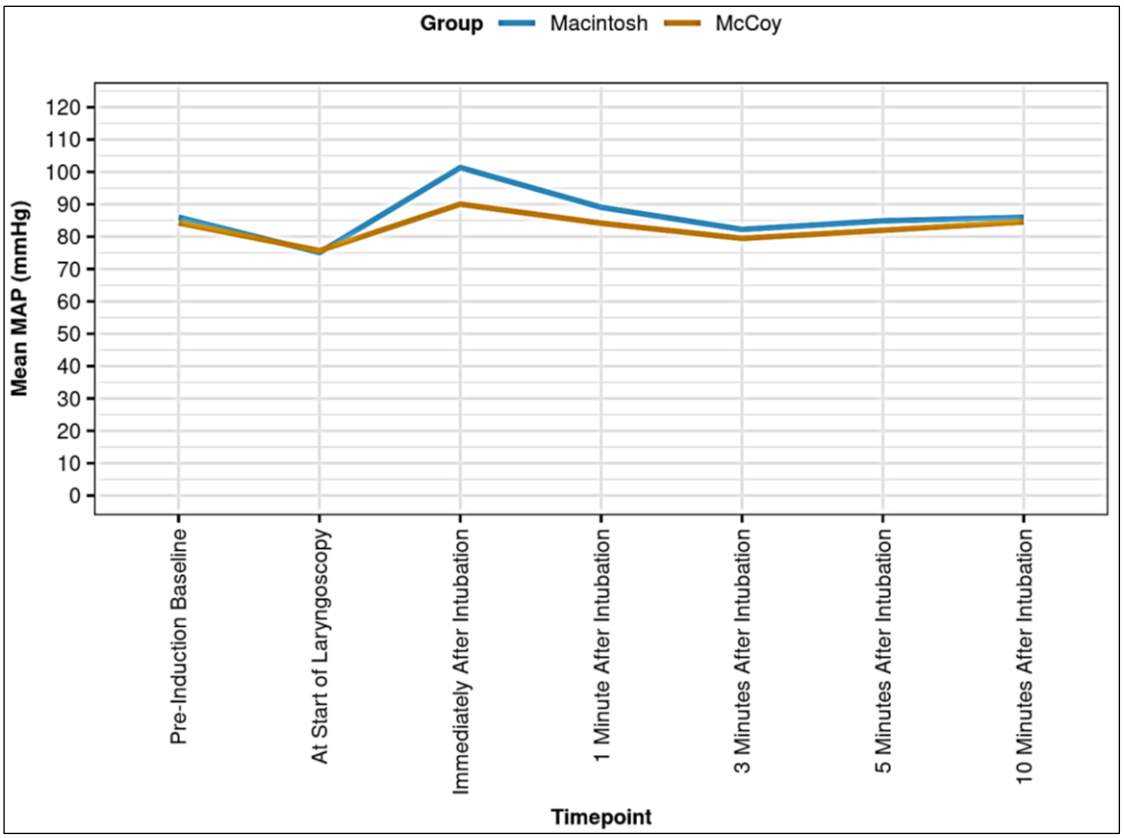

Fig 5: Change in MAP (mmHg) Over Time

5. Summary table for association between group and parameters

Parameters	Group		p value
	Macintosh (n = 50)	McCoy (n = 50)	
Age (Years)	32.64 ± 7.55	32.56 ± 9.02	0.962[1]
Age			0.164[2]
20-29 Years	16 (32.0%)	23 (46.0%)	
30-39 Years	23 (46.0%)	14 (28.0%)	
40-50 Years	11 (22.0%)	13 (26.0%)	
Gender			0.423[2]
Male	28 (56.0%)	24 (48.0%)	
Female	22 (44.0%)	26 (52.0%)	
Weight (kg)	59.94 ± 10.69	61.68 ± 11.17	0.505[3]
ASA Grade			0.218[2]
I	42 (84.0%)	46 (92.0%)	
II	8 (16.0%)	4 (8.0%)	
Comorbidities (Nil)	50 (100.0%)	50 (100.0%)	1.000[2]
MMP Class			0.839[2]
I	21 (42.0%)	20 (40.0%)	
II	29 (58.0%)	30 (60.0%)	
CL Grade***			0.009[4]
I	17 (34.0%)	31 (62.0%)	
II	32 (64.0%)	19 (38.0%)	
III	1 (2.0%)	0 (0.0%)	
Laryngoscope Size			0.689[2]
Number 3	23 (46.0%)	25 (50.0%)	
Number 4	27 (54.0%)	25 (50.0%)	
Heart Rate (BPM) (Pre-Induction Baseline)	84.60 ± 13.65	82.64 ± 16.47	0.519[1]
Heart Rate (BPM) (At Start of Laryngoscopy)	88.24 ± 13.45	85.80 ± 14.16	0.379[1]
Heart Rate (BPM) (Immediately After Intubation) ***	109.82 ± 13.77	98.02 ± 14.49	<0.001[1]
Heart Rate (BPM) (1 Minute After Intubation) ***	102.90 ± 14.13	94.70 ± 13.55	0.004[1]
Heart Rate (BPM) (3 Minutes After Intubation) ***	96.02 ± 13.35	90.12 ± 13.08	0.028[1]
Heart Rate (BPM) (5 Minutes After Intubation)	85.90 ± 12.27	82.14 ± 15.56	0.183[1]
Heart Rate (BPM) (10 Minutes After Intubation)	82.66 ± 10.39	78.66 ± 13.00	0.058[3]

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

Systolic BP (mmHg) (Pre-Induction Baseline)	119.00 ± 12.36	116.32 ± 13.18	0.297[1]
Systolic BP (mmHg) (At Start of Laryngoscopy)	103.46 ± 13.96	106.04 ± 17.50	0.699[3]
Systolic BP (mmHg) (Immediately After Intubation) ***	131.30 ± 15.90	121.52 ± 15.65	0.003[1]
Systolic BP (mmHg) (1 Minute After Intubation)	119.02 ± 14.24	116.48 ± 12.96	0.530[3]
Systolic BP (mmHg) (3 Minutes After Intubation)	110.56 ± 14.55	109.74 ± 13.75	0.915[3]
Systolic BP (mmHg) (5 Minutes After Intubation)	107.78 ± 13.69	109.40 ± 12.84	0.329[3]
Systolic BP (mmHg) (10 Minutes After Intubation) ***	107.34 ± 9.87	112.12 ± 9.70	0.005[3]
Diastolic BP (mmHg) (Pre-Induction Baseline)	72.08 ± 9.44	69.34 ± 10.44	0.238[3]
Diastolic BP (mmHg) (At Start of Laryngoscopy)	62.04 ± 11.38	61.88 ± 11.92	0.945[1]
Diastolic BP (mmHg) (Immediately After Intubation) ***	86.54 ± 11.35	76.40 ± 12.16	<0.001[1]
Diastolic BP (mmHg) (1 Minute After Intubation) ***	74.50 ± 11.57	70.06 ± 9.88	0.042[1]
Diastolic BP (mmHg) (3 Minutes After Intubation)	69.22 ± 10.78	66.16 ± 9.82	0.141[1]
Diastolic BP (mmHg) (5 Minutes After Intubation)	70.26 ± 9.87	69.06 ± 8.72	0.521[1]
Diastolic BP (mmHg) (10 Minutes After Intubation)	71.84 ± 9.80	74.06 ± 8.21	0.223[1]
MAP (mmHg) (Pre-Induction Baseline)	86.00 ± 11.57	84.24 ± 10.81	0.434[1]
MAP (mmHg) (At Start of Laryngoscopy)	75.10 ± 11.47	75.68 ± 12.10	0.806[1]
MAP (mmHg) (Immediately After Intubation) ***	101.34 ± 11.35	90.04 ± 12.38	<0.001[1]
MAP (mmHg) (1 Minute After Intubation) ***	89.06 ± 11.43	84.14 ± 9.81	0.046[3]
MAP (mmHg) (3 Minutes After Intubation)	82.22 ± 12.01	79.48 ± 11.11	0.239[1]
MAP (mmHg) (5 Minutes After Intubation)	84.88 ± 10.88	81.98 ± 10.99	0.313[3]
MAP (mmHg) (10 Minutes After Intubation)	85.96 ± 9.08	84.56 ± 8.99	0.440[1]
Intubation Time (Seconds)	12.40 ± 2.39	12.16 ± 1.93	0.819[3]
Manoeuvre			0.362[4]
Nil	46 (92.0%)	49 (98.0%)	
Burp/Stylet	4 (8.0%)	1 (2.0%)	
Ease of Intubation			0.117[4]
Easy	46 (92.0%)	50 (100.0%)	
Difficult	4 (8.0%)	0 (0.0%)	
Complications			0.117[4]
Nil	46 (92.0%)	50 (100.0%)	
Gum Bleeding	2 (4.0%)	0 (0.0%)	
Lip Injury	2 (4.0%)	0 (0.0%)	
ECG Changes			1.000[4]
Nil	48 (96.0%)	48 (96.0%)	
Arrythmia	2 (4.0%)	2 (4.0%)	
Final Blade Used***			<0.001[2]
Macintosh	46 (92.0%)	0 (0.0%)	
McCoy	4 (8.0%)	50 (100.0%)	
Number of Attempts			0.242[4]
1	47 (94.0%)	50 (100.0%)	
2	3 (6.0%)	0 (0.0%)	

***Significant at p<0.05, 1: t-test, 2: Chi-Squared Test, 3: Wilcoxon-Mann-Whitney U Test, 4: Fisher's Exact Test

The following variables were significantly associated (p<0.05) with the variable 'Group':

- CL Grade.
- Heart Rate (BPM) (Immediately After Intubation).
- Heart Rate (BPM) (1 Minute After Intubation).
- Heart Rate (BPM) (3 Minutes After Intubation).
- Systolic BP (mmHg) (Immediately After Intubation).
- Systolic BP (mmHg) (10 Minutes After Intubation).
- Diastolic BP (mmHg) (Immediately After Intubation).
- Diastolic BP (mmHg) (1 Minute After Intubation).
- MAP (mmHg) (Immediately After Intubation).
- MAP (mmHg) (1 Minute After Intubation).
- Final Blade Used.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

Discussion

Using both the standard Macintosh blade and the McCoy blade, we compared the intubating conditions and the stress response in this cross-sectional study. Regarding the demographic profile, ASA grade, and MMP grade, both groups of our study population (group A-Macintosh blade and group B-McCoy blade) were comparable. Both groups employed the same induction procedure.

Assessment of the haemodynamic variables (HR, SBP, DBP, and MAP) was done before intubation, at the start of laryngoscopy & immediately after the intubation at intervals of 1, 3, 5 and 10 minutes.

In Macintosh Group, the mean HR increased from 84.60 at the pre-induction baseline to a maximum of 109.82 immediately after intubation, and then decreased to 82.66 at the 10 Minutes after intubation. This change was statistically significant (Friedman Test: $\chi2 = 200.4$, $p = <0.001$).

In McCoy Group, the mean HR increased from 82.64 at the pre-induction baseline to a maximum of 98.02 immediately after intubation, and then decreased to 78.66 at 10 minutes after intubation. This change was statistically significant (Friedman Test: $\chi2 = 181.0$, $p = <0.001$).

The overall change in HR over time was compared in the two groups using the Generalized Estimating Equations method. There was a significant difference in the trend of HR over time between the two groups ($p = <0.001$).

The two groups differed significantly in terms of Systolic BP at the following time points: immediately after intubation, and 10 Minutes after intubation.

In Macintosh group, the mean Systolic BP increased from 119.00 at the pre-induction baseline to a maximum of 131.30 immediately after intubation, and then decreased to 107.34 at 10 Minutes after intubation. This change was statistically significant (Friedman Test: $\chi2 = 164.5$, $p = <0.001$).

In McCoy group, the mean Systolic BP increased from 116.32 at the pre-induction baseline to a maximum of 121.52 immediately After Intubation and then decreased to 112.12 at the 10 Minutes. This change was statistically significant (Friedman Test: $\chi2 = 86.9$, $p = <0.001$).

Although BP at 10 minutes in case of McCoy group was slightly higher compared to Macintosh group, but was not clinically significant. This could be due to less analgesia according to weight of the participants.

On comparison of two groups in terms of change in Diastolic BP over time, there is significant decrease in Diastolic BP in McCoy group at the following timepoints: immediately after intubation, 1 minute after intubation.

In Macintosh group, the mean Diastolic BP increased from 72.08 at the pre-induction baseline to a maximum of 86.54 immediately after intubation and then decreased to 71.84 at the 10 Minutes. This change was statistically significant (Repeated Measures ANOVA: $F = 12.5$, $p = <0.001$).

In McCoy group, the mean Diastolic BP decreased from 69.34 at the pre-induction baseline to a minimum of 61.88 at the just before laryngoscopy and then increased to 76.40 immediately after intubation. This change was statistically significant (Repeated Measures ANOVA: $F = 4.4$, $p = <0.001$).

The overall change in Diastolic BP over time was compared in the two groups using the Generalized Estimating Equations method. There was a significant difference in the trend of Diastolic BP over time between the two groups ($p = <0.001$).

On the comparison of two groups in terms of change in MAP over time, there is significant decrease in MAP at the following time points: Immediately After Intubation, 1 Minute After Intubation.

In Macintosh group: the mean MAP increased from 86.00 at the pre-induction baseline to a maximum of 101.34 at Immediately after intubation, and then decreased to 85.96 at the 10 Minutes After Intubation. This change was statistically significant (Friedman Test: $\chi2 = 156.8$, $p = <0.001$).

In McCoy group, the mean MAP decreased from 84.24 at the pre-induction baseline to a minimum of 75.68 at the Just before Laryngoscopy and then increased to 84.56 at 10 Minutes After Intubation timepoint. This change was statistically significant (Friedman Test: $\chi2 = 105.1$, $p = <0.001$).

The overall change in MAP (mmHg) over time was compared in the two groups using the Generalized Estimating Equations method. There was a significant difference in the trend of MAP (mmHg) over time between the two groups ($p = <0.001$).

In the 2019 study conducted by Sarika Samel et al [24] A total of 105 ASA grade I and II patients were intubated utilizing the Macintosh, McCoy, and Miller blades on three different groups of patients. HR, systolic and diastolic blood pressure were recorded at baseline, right before induction, right after induction, and at 1, 3, and 10 minutes after intubation. Cormack and Lehane grade of glottic view was also obtained.

As a result, in the Macintosh group, 18 patients (51.4%) had CL grade I and 17 (48.6%) had CL grade II; in the McCoy group, 24 (68.6%) had CL grade I and 11 (31.4%) had CL grade II; and in the Miller group, 32 (91.4%) had CL grade I and 3 (8.6%) had CL grade II.

The Miller blade caused the highest increase in HR after intubation, followed by Macintosh and McCoy, and this difference was statistically significant (P 0.01). The Miller blade caused the greatest increase in both systolic and diastolic blood pressure after intubation, followed by Macintosh, and McCoy. Statistics showed that the difference from the starting values was substantial (P 0.01). They concluded that while the McCoy blade produced the least haemodynamic response and the Miller blade provided the best

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

larynx visualization.

In our study there was statistically significant rise in haemodynamic variables in terms of Diastolic BP over time immediately after intubation and 1 minute after intubation, the rise in HR in the Macintosh group as compared to the McCoy group continued to be statistically significant at immediately after intubation, 1 minute after intubation and 3 Minutes after intubation.

Singhal *et al.* [37] compared the haemodynamic response to laryngoscopy and intubation with the use of the McCoy and Macintosh laryngoscopes. Following laryngoscopy, each group has had a statistically great rise in HR and blood pressure. A similar rise was seen in all variables following intubation, which continued until one minute after intubation. The changes were statistically incredibly vast with the Macintosh blade as compared to the McCoy blade.

In our study also, it has been observed that the McCoy blade produced overall less stress response as compared to the Macintosh blade. A comparable rise has become visible in all variables following intubation, which persisted until one minute after intubation.

Sarabjit Kaur *et al.* [36] discovered that the McCoy blade was associated with less incidence of difficult airway manoeuvre. They needed to use BURP in 2 patients with CL grade III view while using the Macintosh blade for laryngoscopy to facilitate laryngeal exposure and intubation. In four patients (CL grade III) they had to change laryngoscope blade from Macintosh to McCoy after failure of intubation. Intubation turned into a success with McCoy blade with full levering movement plus BURP.

In our study, four patients in the Macintosh group, we had to use McCoy blade due to difficult intubation. There was a significant difference between the various groups in terms of the distribution of final blade used ($\chi 2 = 85.185$, $p = <0.001$). In the Macintosh group, we used stylet and BURP to facilitate laryngeal view for intubation in 4 patients.

Conclusion

This study has shown that the McCoy blade provides overall better attenuation of hemodynamic response as compared to the Macintosh Blade. McCoy Blade also facilitates a better vision under CL Grading. It can be more beneficial for the patients of Mallampati (MP) grades III and IV undergoing general anaesthesia for various surgical procedures. This, however needs further study on MP III & IV patients.

Financial support: Nil.

Conflict of interest: None.

References

1. Henderson JJ, Popat MT, Latto IP, Pearce AC. Difficult Airway Society guidelines for management of the unanticipated difficult intubation. Anaesthesia. 2004;59:675-694.
2. Acharya N, Routray D. A prospective randomized study of efficacy of clonidine in attenuating haemodynamic response to laryngoscopy and tracheal intubation. Ann Int Med Den Res. 2017;3(2):30-4.
3. Denlinger JK, Ellison N, Ominsky AJ. Effects of intratracheal lidocaine on circulatory responses to tracheal intubation. Anesthesiology. 1974;41:409-12.
4. Fassoulaki A, Kaniaris P. Intranasal administration of nitroglycerine attenuates the pressor responses to laryngoscopy and intubation of the trachea. Br J Anaesth. 1983;55:49-52.
5. Sameenakousar M, Srinivasan KV. Comparison of fentanyl and clonidine for attenuation of the haemodynamic response to laryngoscopy and endotracheal intubation. J Clin Diagn. Res JCDR. 2013;7:106.
6. Wijeysundera DN, Naik JS, Beattie WS. Alpha-2 adrenergic agonists to prevent perioperative cardiovascular complications: a meta-analysis. Am J Med. 2003;114:742-52.
7. Collins SR. Direct and indirect laryngoscopy: equipment and techniques. Respir Care. 2014;59:850-64.
8. Giovannitti JA, Thoms SM, Crawford JJ. Alpha-2 adrenergic receptor agonists: a review of current clinical applications. Anesth Prog. 2015;62:31-9.
9. Kalra NK, Verma A, Agarwal A, Pandey H. Comparative study of intravenously administered clonidine and magnesium sulfate on hemodynamic responses during laparoscopic cholecystectomy. J Anaesthesiol Clin Pharmacol. 2011;27:344-8.
10. Madhusudan M, Lavakumar A, Rao MH, Samantaray A, Charupalli K. Effect of intravenous dexmedetomidine on haemodynamic responses to laryngoscopy, tracheal intubation and anaesthetic and analgesic requirements: a randomized double-blind clinical efficacy study. J Clin Sci Res. 2016;5:205-13.
11. Nayak RR, Vennel JE, Patil AD, D'Souza O. Effect of oral clonidine premedication on perioperative haemodynamic response and postoperative analgesic requirements for patients undergoing laparoscopic surgeries. Indian J Anaesth. 2018;5(4):610-7.
12. Altan A, Turgut N, Yıldız F, Türkmen A, Üstün H. Effects of magnesium sulphate and clonidine on

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

propofol consumption, haemodynamics and postoperative recovery. Br J Anaesth. 2005;94:438-41.
13. Zalunardo MP, Zollinger A, Spahn DR, Seifert B, Pasch T. Cardiovascular stress protection following anesthesia induction: comparison of clonidine and esmolol. Anaesthesist. 2001;50:21-9.