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COMPARATIVE ASSESSMENT OF DIFFERENT TYPES OF LARYNGOSCOPES BLADES - MACINTOSH, MILLER AND MCCOY FOR LARYNGEAL VIEW AND PRESSOR RESPONSE

Dr Sanjay Kumar[1], Dr Urmila Sinha[2], Dr Sanjeev Sinha[3], Dr Ranju Sinha[4]

[1]Assistant professor, Department of Anesthesiology, Andaman and Nicobar Islands Institute of Medical Science (ANIIMS), Port Blair India.

[2]Assistant Professor, Department of Anatomy, Andaman and Nicobar Islands Institute of Medical Science (ANIIMS), Port Blair, India.

[3]Senior Resident, Upgraded Department of Pediatrics, Patna Medical College and Hospital, Patna, Bihar, India.

[4]Tutor, Department of Pharmacology, Patna Medical College and Hospital, Patna, Bihar, India.

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Address for Correspondence: Dr Urmila Sinha, Assistant Professor, Department of Anatomy, Andaman and Nicobar Islands Institute of Medical Science (ANIIMS), Port Blair, India.
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ABSTRACT:
The laryngoscopy is known to have profound cardiovascular effects. This includes pressor response and tachycardia along with an increase in catecholamine concentration, mainly norepinephrine. The major cause of the sympathoadrenal response is believed to arise from stimulation of supraglottic region by laryngoscopic blade with tracheal tube placement and cuff inflation contributing little additional stimulation. Complications of pressor respo laryngoscopy include myocardial ischemia, cardiac failure, intracranial haemorrhage and increase in intracranial pressure. Hence the present study planned to evaluate the laryngeal view and pressor response by using three different blades – Macintosh, McCoy and Miller laryngoscopes.
The study was planned in the Department of Anaesthesia in Andaman and Nicobar Islands Institute of Medical Science (ANIIMS), Port Blair India, From Jun 2016 to Jun 2017 . The 30 patient undergoing the Laryngoscopy were enrolled in the present study. For the 10 patients using the Macintosh Blade were divided in Group I. The next 10 patients using the Miller blade were considered in the Group II. The remaining 10 patients were studied by use of McCoy blade.
The results in our study show 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.
Keywords: Laryngoscopy, Intubation, pressor response, Macintosh, miller and Mccoy laryngoscopes, etc

INTRODUCTION:

Laryngoscopy is endoscopy of the larynx, a part of the throat. It is a medical procedure that is used to obtain a view, for example, of the vocal folds and the glottis. Laryngoscopy may be performed to facilitate tracheal intubation during general anaesthesia or cardiopulmonary resuscitation or for surgical procedures on the larynx or other parts of the upper tracheobronchial tree.

Direct laryngoscopy is carried out (usually) with the patient lying on his or her back; the laryngoscope is inserted into the mouth on the right side and flipped to the left to trap and move the tongue out of the line of sight, and, depending on the type of blade used, inserted either anterior to the epiglottis and then lifted with an upwards and forward motion ("away from you and towards the roof "). This move makes a view of the glottis possible. This procedure is done in an operation theatre with full preparation for resuscitative measures to deal with respiratory distress. There are at least ten different types of laryngoscope used for this procedure, each of which has a specialized use . This procedure is most often employed by anaesthetists for endotracheal intubation under general anaesthesia, but also in direct diagnostic laryngoscopy with biopsy. It is extremely uncomfortable and is not typically performed on conscious patients, or on patients with an intact gag reflex.

Early laryngoscopes used a straight "Magill Blade", and this design is still the standard pattern veterinary laryngoscopes are based upon; however the blade is difficult to control in adult humans and can cause pressure on the vagus nerve, which can cause unexpected cardiac arrhythmias to spontaneously occur in adults.

Two basic styles of laryngoscope blade are currently commercially available: the curved blade and the straight blade. The Macintosh blade is the most widely used of the curved laryngoscope blades,[1] while the Miller blade[2] is the most popular style of straight blade.[3] Both Miller and Macintosh laryngoscope blades are available in sizes 0 (neonatal) through 4 (large adult). There are many other styles of curved and straight blades (e.g., Phillips, Robertshaw, Sykes, Wisconsin, Wis-Hipple, etc.) with accessories such as mirrors for enlarging the field of view and even ports for the administration of oxygen. These specialty blades are primarily designed for use by anesthetists, most commonly in the operating room.[4] Additionally, paramedics are trained to use direct laryngoscopy to assist with intubation in the field.

The Macintosh blade is positioned in the vallecula, anterior to the epiglottis, lifting it out of the visual pathway, while the Miller blade is positioned posterior to the epiglottis, trapping it while exposing the glottis and vocal folds. Incorrect usage can cause trauma to the front incisors; the correct technique is to displace the chin upwards and forward at the same time, not to use the blade as a lever with the teeth serving as the fulcrum.

The Miller, Wisconsin, Wis-Hipple, and Robertshaw blades are commonly used for infants. It is easier to visualize the glottis using these blades than the Macintosh blade in infants, due to the larger size of the epiglottis relative to that of the glottis. [5]

The laryngoscopy is known to have profound cardiovascular effects. This includes pressor response and tachycardia along with an increase in catecholamine concentration, mainly norepinephrine. The major cause of the sympathoadrenal response is believed to arise from stimulation of supraglottic region by laryngoscopic blade with tracheal tube placement and cuff inflation contributing little additional stimulation. Complications of pressor respo laryngoscopy include myocardial ischemia, cardiac failure, intracranial haemorrhage and increase in intracranial pressure. Hence the present study planned to evaluate the laryngeal view and pressor response by using three

different blades – Macintosh, McCoy and Miller laryngoscopes.

Methodology:

The study was planned in the Department of Anaesthesia in Andaman and Nicobar Islands Institute of Medical Science (ANIIMS),Port Blair India, From Jun 2016 to Jun 2017 The 30 patient undergoing the Laryngoscopy were enrolled in the present study. For the 10 patients using the Macintosh Blade were divided in Group I. The next 10 patients using the Miller blade were considered in the Group II. The remaining 10 patients were studied by use of McCoy blade.

Intravenous line was started and psychological assurance given to the patient. and non-invasive blood pressure, pulse oximeter, ECG were connected. Pre induction parameters: Heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure and any changes on the ECG are noted.

The laryngeal view obtained was compared according to Cormack and Lehane [6] grading as follows.

1. Grade I: Full view of glottis.
2. Grade II: Only posterior commissure visible.
3. Grade III: Only Epiglottis visible.

All patients were intubated using appropriate size of oral endotracheal tube for that age and sex of the patient. The degree of difficulty with intubation was rated as follows.

- Grade I: Intubation easy.
- Grade II: Intubation requiring an increased anterior lifting force and assistance to pull the right corner of the mouth upwards to increase space.
- Grade III: Intubation requiring multiple attempts and a curved stylet.
- Grade IV: Failure to intubate with the assigned laryngoscope.

Inclusion Criteria:

Exclusion Criteria: Patients with Cardiovascular, cerebrovascular, renal respiratory, neuromuscular, endocrinal or psychiatric disorders or those with suspected difficult airway

Results & Discussion:

The data from the all three groups undergoing the laryngoscopy were collected and presented as below.

Table 1: Demographic Details

Parameters	Group A	Group B	Group C
No. of Cases	10	10	10
Blade	Macintosh Blade	Miller Blade	Mc Coy Blade
Age	32 – 44 years	29 – 38 years	28 – 45 years
Weight in kg	53 – 79 kg	58 – 75 kg	48 – 68 kg
Males	7	6	5
Females	3	4	5

Table 2: Duration of laryngoscopy, intubation & change of blade

Parameters	Group A	Group B	Group C
No. of Cases	10	10	10
Blade	Macintosh Blade	Miller Blade	Mc Coy Blade
Duration of laryngoscopy in seconds	14.3 – 24.5	18.5 – 23.9	13.8 – 18.5
Duration of intubation in seconds	4.5 – 8.9	5.3 – 15.8	4.6 – 6.9
Change of blade require	0	2	0

Table 3: Ease of laryngeal view and Ease of Intubation

Parameters	Group A	Group B	Group C
No. of Cases	10	10	10
Blade	Macintosh Blade	Miller Blade	Mc Coy Blade
Ease of laryngeal view by Cormack and Lehane grading			
Grade I: Full view of glottis	6	8	7
Grade II: Only posterior commisure visible	3	2	3
Grade III: Only Epiglottis visible	1	0	0
Total	10	10	10
Ease of intubation by groups			
Grade I	7	9	8
Grade II	3	1	2
Grade III	0	0	0
Grade IV	0	0	0
Total	10	10	10

Table 4: Hemodynamic Parameters

Parameters	Group A	Group B	Group C
No. of Cases	10	10	10
Blade	Macintosh Blade	Miller Blade	Mc Coy Blade
Heart Rate: Before After	 68 - 95 80 - 110	 72 - 91 86 - 116	 71- 94 73-109
Systolic BP: Before After	 98 - 135 121 - 140	 108 – 132 124 – 142	 105 – 127 112 – 126
Diastolic BP: Before After	 71 – 85 78 - 88	 73 – 88 75 – 90	 69 – 83 71 - 85

Our anaesthesia technique of premedication, induction and relaxation followed by laryngoscopy with appropriately chosen blade was in accordance with most other studies, were a similar technique was used. The position of the patient at the time of intubation in neutral position best ease was recorded, whether it was neutral position or head was extended by putting 5cm donut below head as per protocol decision we were able to do the laryngoscopy and intubation in the neutral position in McCoy group as compared to Macintosh group and Miller group.

Laryngoscopy is the most important step of general anaesthesia requiring endotracheal intubation. Laryngoscopes are used to view the larynx and adjacent structures, for the purpose of intubation through vocal cords. To aid and ease the process of intubation, laryngoscopic blades of different shapes have been designed and studied. The shape of a laryngoscope blade affects the exposition of the larynx. Intubating conditions apart from varying anatomical

structures are highly dependent on the shape and length of the laryngoscope blade. The laryngoscopy is known to have profound cardiovascular effects. This include pressor response and tachycardia along with an increase in catecholamine concentration mainly noradrenaline. Both may be hazardous to those with hypertension, myocardial insufficiency and cerebrovascular disease. Thus the blades used for laryngoscopy should facilitate good laryngoscopic view of vocal cords to ease the process of intubation and should trigger minimal stress response.

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. [7]

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 [8] 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. Harioka et al [9] 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. Beilin b, yardeni iz et al, in their study found that the McCoy blade significantly improves laryngoscopic view. [10]

Similarly Tewari et al [11] 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. Sarabjit Kaur et al [12] 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 [13] 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. P Bhosle et al [14] 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. Haidry MA et al [15] compared hemodynamic response between to 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.

Conclusion:

The results in our study show 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.

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