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ORIGINAL ARTICLE

Evaluation of Glottic Visualization and Ease of Intubation at Induction of General Anesthesia: A comparison between Macintosh and Mccoy Blade Laryngoscopes

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ABSTRACT

Aim: To compare the frequency of better glottic visualization and ease of tracheal intubation in Macintosh versus McCoy blades.
Study design: An observational analytical study.
Settings: Department of Anesthesia, Lahore Medical and Dental College/Ghurki trust teaching hospital, Lahore.
Study duration: Six months (2nd September 2017 to 1st March 2018)
Methods: After approval from research, education and clinical audit department, we selected 60 patients for elective procedures under general anesthesia of age ranges from 20-40 years including both males and females. Patients were randomized by lottery method into two groups I & II. Laryngoscopy was performed with McCoy in group I and with Macintosh in group II and the best possible view of the glottis was obtained. After achieving best possible glottis view of each patient, vocal cord visualization was determined according to Grade-I to IV. Ease of tracheal intubation was also noted.
Results: The demographic data was comparable in both groups. In this study, we have found better glottic visualization in 60.0% of patients with Macintosh blade (group II) and with McCoy blade (group I), it was 83.33% (p-value = 0.045). Ease of intubation was 73.33% with Macintosh blade (group II) and with McCoy blade (group I), it was 93.33% (p-value = 0.038).
Conclusion: We concluded that frequency of better glottic visualization and ease of tracheal intubation with McCoy blade is higher as compared to Macintosh blade.
Keywords: Endotracheal intubation, Glottic visualization, McCoy blades, Macintosh blades.

INTRODUCTION

Endotracheal intubation is a technique to pass a tube through the vocal cords. The endotracheal tube cuff is usually inflated for providing a good seal to allow positive pressure ventilation and protecting the airway from the gastric contents and upper airway secretions[1].

There are several Indications to pass endotracheal tube (ETT) e.g. general anesthesia (alternatives to ETT are available), to allow positive pressure ventilation, prevention of airway from aspiration of materials from gastrointestinal tract, surgical procedures , lateral decubitus and prone positions in which airway control is difficult for anesthetist, surgical procedures within the chest, cranium and abdomen, controlled breathing in the case of high intracranial and intraocular pressures, to control intracranial hypertension, to protect healthy lung from a diseased lung, severe pulmonary or multiorgan injury with respiratory failure and to facilitate breathing while giving neuromuscular blocking agents[2].

Direct laryngoscopy is a conventional method to pass endotracheal tubes in emergency departments[3]. But, it requires correct positioning of pharynx, larynx and trachea, endotracheal intubation is sometimes difficult or impossible in some patients with this method. Passing an endotracheal tube successfully is dependent on many key aspects, such as shape of blade, image quality on the monitor, proper illumination and visibility of the airways, anatomical variations, prior history of difficult intubation, electively or emergency intubation, skills, techniques and experience of intubating person and the settings (operation theatres, intensive care units or out of hospital)[4] .

There is a wide range of laryngoscope blades available for anesthetist in daily practices[5]. Patients in which direct laryngoscopy and tracheal intubation is not possible, a video laryngoscopes helps to show the glottis with lesser manipulation as compared to direct laryngoscopes. Moreover, as this technique is easier to learn, video laryngoscopy offers higher success rates for junior anesthetists as well[6].

Availability of new anesthesia equipment has led to lesser morbidity and mortality[7]. The McCoy laryngoscope (Intermed penlon Ltd., Abingdon, UK) has been made to lift the epiglottis with its hinged tip. It offers two advantages when compared to Macintosh laryngoscope (Welch Allyn, Skaneateles falls, New York, USA): at first place, a lesser force is needed for laryngoscopy, so the stress is lesser as well at this technique. Second advantage is the elevation of epiglottis that gives better view of larynx[8].

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The storz C-Mac laryngoscope is the modification of the karl storz berci DCI laryngoscope (Karl Storz, Tuttlingen, Germany) with better optics, improved field of vision, better quality video and easier methods to record still picture and motion video[9].

The McGrath video laryngoscope (aircraft Medical, Ltd, Edinburgh, UK) is equipped with a liquid-crystal display (LCD) screen on the top of its handle and a thin acrylic cover with a 60° angle that allows an indirect vision of glottis.[10] Garhwal AM and his associate has found in a study that better glottic visualization was 15% with Macintosh and ease of intubation was 38.33%[11].

Kulkarni AP and his associate has found that better glottic visualization was 63% with Macintosh and with McCoy 77%, ease of intubation was 90% with Macintosh and with McCoy 93%[12].

This kind of study was not done before in our part of the world. We therefore, planned to compare the Macintosh and McCoy laryngoscopy blades for glottic visualization and easiness for tracheal intubation in our general population to get further evidence.

METHODOLOGY

This observational analytical study was done in the department of anesthesiology, Ghurki Trust Teaching Hospital, Lahore for six months (2nd September 2017 to 1st March 2018) after approval from ethical committee. The sample size was calculated to be 60 cases, 30 cases in each group. Sampling technique was Non-probability, convenience sampling. Those 60 patients which met the inclusion criteria were included after grant of permission from ethical and research approval board. Demographic details of the patients (name, age, weight) were recorded. We got written and informed consent from every patient, making it confidential at the same time and ensuring that there is no added risk is possible to the patients which are part of this observational study.

Randomization was performed using the lottery method technique. So patients were divided into two groups. 30 patients in Group I while 30 patients in Group II.

Inclusion Criteria:

- Age 20-40 years
- Both Gender
- Scheduled for elective procedures under general anesthesia
- ASA score 1 and 2

Exclusion Criteria:

- History of difficult intubation
- History of diabetes mellitus
- History of hypertension
- History of asthma
- History of chronic obstructive airway disease
- History of ischemic heart disease
- Undergoing head and neck surgery
- Body mass index (BMI) more than 30.
- Pregnancy
- Consent refusal

Patients in this study did not take solids for minimum 8 hours before surgery and received oral alprazolam 0.25 mg at night before surgery. After premedication with Inj midazolam 0.03 mg/kg, patients were pre-oxygenated with 100 percent oxygen for three minutes. Anesthesia was induced with nalbuphine 0.1mg/kg and propofol 2mg/kg till loss of verbal response. Possibility of ventilation with a facemask was checked prior to injecting atracurium 0.5mg/kg IV as a muscle relaxant. Patients were ventilated with oxygen and isoflurane at 2 MAC with facemask. The laryngoscopy and intubation was done in sniffing position in both groups by an anesthetist with more than six months of experience and at least 50 successful endotracheal intubations with both blades. After 3 minutes of controlled ventilation, laryngoscopy was performed with McCoy in group I and with Macintosh in group II and the best possible view of the glottis was obtained. After getting the best possible view of the glottis, vocal cord visualization was recorded according to Grade-I to IV (Figure I). Easiness of tracheal intubation was determined as well (table I). The endotracheal cuffed tube of adequate size (7.0 and 7.5 mm internal diameter for women and men, respectively) was advanced into the trachea under direct vision. Finally, the laryngoscope was removed and the respiratory circuit was connected. Bleeding was avoided during this process. The appropriate ventilation was confirmed by end-tidal capnograph, visible chest rise and chest auscultation. Data was recorded for better glottic visualization (Grade-I) and ease of tracheal intubation (IDS score=0) from both groups. Data was collected on especially designed proforma and analyzed by SPSS version 20 , a statistical analysis program. Chi-square test was applied to compare better glottic visualization and ease of tracheal intubation in both groups, $p \leq 0.05$ was considered as significant statistically.

RESULTS

Ages of the patients range in this study vary from 20 to 40 years with mean age of 30.47±6.02 years. Patients in group I had mean age of 29.80 ± 6.07 years and in group II patients, mean age was 31.93±5.99 years. Majority of the patients 31 (51.67%) were between 31 to 40 years of age as shown in Table II.

Among these 60 patients, 35 (58.33%) were males and 25 (41.67%) patients were females making the male to female ratio of ratio of 1.4:1.

In our study, we have found better glottic visualization in 60.0% of patients with Macintosh blade (group II) and with McCoy blade (group I), it was 83.33% (p-value = 0.045). Ease of intubation was 73.33% with Macintosh blade (group II) and with McCoy blade (group I), it was 93.33% (p-value = 0.038) as shown in Table III **.**

Table-I: Intubation Difficulty Scale Score.

Intubation difficulty scale score

The intubation difficulty scale score is the sum of the following seven variables:

N1: Number of intubation attempts >1
N2: Number of operators >1
N3: Number of alternative techniques used
N4: Glottic exposure (Cormack and Lehane grade minus 1)
N5: Lifting force required during laryngoscopy (0 = normal; 1 = increased)
N6: Necessity for laryngeal pressure (0 = not applied)

IDS score	Degree of difficulty
0	Easy
0<IDS≤5	Slight difficulty
5<IDS	Moderate to major difficulty
IDS=infinity	Impossible intubation

IDS – Intubation difficulty scale

Rules for calculating IDS score

N_1	Every additional attempt adds 1 point
N_2	Each additional operator adds 1 point
N_3	Each alternative technique adds 1 point. Re-positioning or change of blade, etc.,
N_4	Apply cormack grade for 1st oral attempt
N6	Sellick's maneuver adds no point

IDS – Intubation difficulty scale

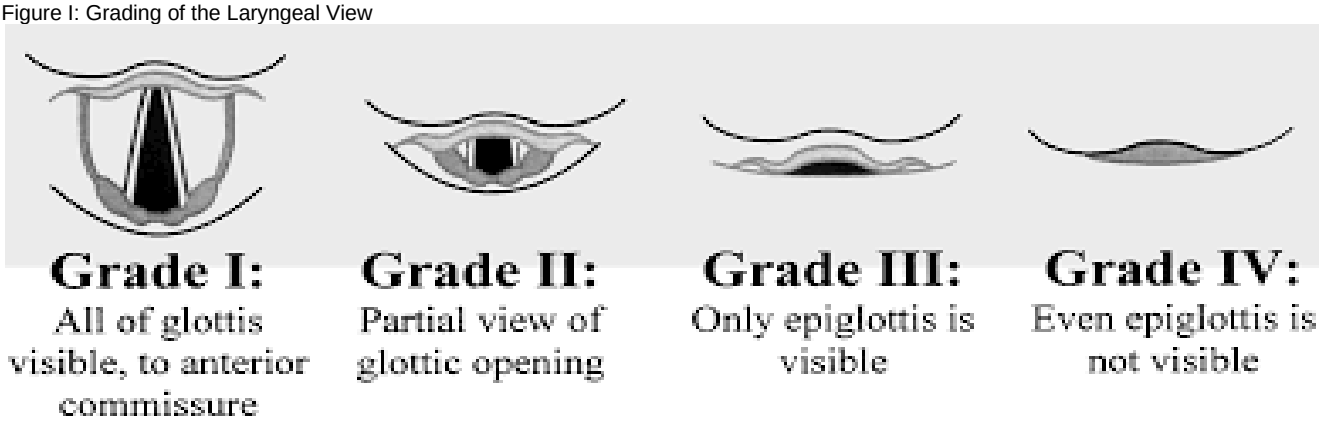
Table-II: Age distribution for both groups (n=60).

Age (years)	Group I (30 patients)		Group II (30 patients)		Total (n=60 patients)	
	n	%age	n	%age	n	%age
20-30	17	56.67	12	40.0	29	48.33
31-40	13	43.33	18	60.0	31	51.67
Mean ± SD	29.80 ± 6.07		31.93 ± 5.99		30.47 ± 6.02	

Table III: Comparison of frequency of better glottic visualization and ease of tracheal intubation in Macintosh versus McCoy blades in two groups.

Perinatal Outcome		Group 1 (30 patients)		Group II(30 patients)		P value
		n	%age	n	%age	
Better glottic visualization	Yes	25	83.33	18	60.0	0.045
	No	05	16.67	12	40.0	
Ease of tracheal intubation	Yes	28	93.33	22	73.33	0.038
	No	02	6.67	08	26.67	

Figure I: Grading of the Laryngeal View



DISCUSSION

A good and safe anesthetist is expected to be skilled in airway management [13]. Laryngoscopy and tracheal intubation are important techniques when it comes to securing the airway [14]. Considering these vital aspects of airway management in our study, we have observed and analyzed that McCoy laryngoscopy blades are considerably superior to Macintosh blades in viewing the glottis(60 % vs 83.33%) and easiness of tracheal intubation (73.33% v 93.33%).

Visualization of glottis is often difficult in patients with cervical spine injury because of restricted neck movements. Indirect methods of laryngoscopy can give better glottic views in this group of patients[15]. However, Sharon R Lewis and coauthors concluded in their database systemic review that there is no evidence of either lesser number of intubation attempts or lesser time to intubate with video laryngoscopes when compared to direct laryngoscopes in adult patients who need tracheal intubation. But, Video laryngoscopes can reduce the number of failed intubations, especially in patients with difficult airways. They also provide better glottic view and lesser injury to airways[16].

Recently, Haozhen Zhu and colleagues have shown that both non-channeled King Vision and McGrath MAC

Video laryngoscopes took significant lesser time for nasotracheal intubation in patients with predicted difficult intubations compared with Macintosh laryngoscope[17]. Use of Macintosh laryngoscope has been conventionally accepted as the first choice for tracheal intubation. McCoy laryngoscope blade is made to lift the epiglottis with its hinged tip. This design has advantages as compared to Macintosh laryngoscope blades; lesser force is required for laryngoscopy and stress level during laryngoscopy quite lesser, and difficult laryngeal view is often improved by lifting the epiglottis upwards.

The McCoy laryngoscopes and the ILMA have shown advantages over the Macintosh laryngoscopes. In a study with patients having no anticipated difficult intubations, both the ILMA and the McCoy laryngoscopes needed lesser number of intubation attempts , lesser tooth damage and the optimization maneuvers needed were lesser as well, when compared to Macintosh laryngocopes[18].

To get further evidence in our general population, we conducted this study to compare the frequency of better glottis visualization and easiness of tracheal intubation in Macintosh versus McCoy laryngoscopy blades. In our study, we found better glottic visualization in 60% of patients with Macintosh blade and with McCoy blade, it was 83.33% (p-value=0.045). Ease of intubation was 73.33% with Macintosh blade and with McCoy blade, it was 93.33% (p-value=0.038)

CONCLUSION

We have concluded that frequency of better glottis visualization and ease of tracheal intubation with McCoy blade is higher as compared to Macintosh blade.

Recommendation: So, we recommend that McCoy blades should be used and preferred for glottis visualization and tracheal intubation.

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