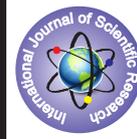


COMPARISON OF GLOTTIC VISUALIZATION AND EASE OF INTUBATION WITH MACINTOSH AND McCOY LARYNGOSCOPES



Anaesthesiology

KEYWORDS: Glottic visualisation, Ease of intubation, Macintosh, McCoy

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ABSTRACT

Introduction: An Anaesthesiologist should secure the airway during induction, maintenance of anaesthesia and recovery from anaesthesia. The Macintosh blade is one of the most popular blades with a gentle curved tongue which extends to the tip. McCoy is based on the standard Macintosh blade which has a hinged tip and operated by a lever mechanism on the back of the handle. **Aim:** An attempt has been made to compare the Macintosh and McCoy blade for the glottic visualization, with regard to the difference in the ease of intubation. **Method:** Institutional Ethics Committee approval was taken prior to commencement of study. An informed and written consent was taken from every patient selected for the study. 60 adults (18 – 60 years) of both sexes, ASA Grade I & II, undergoing elective surgery under general anaesthesia requiring endotracheal intubation were enrolled in this study. Using computer generated random allocation chart, patients were randomly allocated to one of the two groups depending upon the types of laryngoscope blade was used during intubation. After induction of anaesthesia laryngoscopy was performed and trachea was intubated. Group A – where McCoy Laryngoscope blade was used, Group B – where Macintosh Laryngoscope blade was used. Cormack Lehane grading, number of attempts, intubation difficulty score and need for external laryngeal manipulation were assessed. Statistical Analysis: Statistical analysis was done by using SPSS. Student t-Test, chi square test were applied according to the requirement. The level of significance was fixed at 95%. $P < 0.05$ was considered as statistically significant. **Results:** Cormack Lehane Grade 1 view was obtained by group A and group B are 80% and 66.7% respectively, where grade 2 view obtained by group A & group B are 20% and 26.7% respectively ($p > 0.05$). Intubation difficulty score (IDS) grade 1 in group A and group B are 93.3% and 86.7% respectively, where IDS grade 2 in group A and group B are 6.7% and 10% respectively ($p > 0.05$), 26.7% patients from group B needed external laryngeal manipulation where no patient from group A needed it which is statistically significant ($p < 0.05$). **Conclusion:** There is no significant change in glottic visualization with McCoy and Macintosh laryngoscope but as far as external laryngeal manipulation is concerned, McCoy laryngoscope is better than the Macintosh laryngoscope for the ease of intubation.

INTRODUCTION:

An Anaesthesiologist should secure the airway during induction, maintenance of anaesthesia and recovery from anaesthesia. Failure to provide airway during any steps of anaesthesia especially during induction can cause catastrophe including death of the patient.¹ The most common method used to secure and maintain airway is the orotracheal intubation which is an integral part of the anaesthesiologist's contribution to patient care.

Glottis is the combination of the vocal folds (vocal cords) and the space in between the folds (rima glottidis). Glottic visualization is classified by Cormack Lehane grading and percentage of glottic opening (POGO Score).² For better visualization of glottis external manipulation of trachea can be done by giving backward, upward, rightward pressure (BURP) or by bimanual laryngoscopy. During laryngoscopy and intubation, the need for external manipulation and number of attempts are indicators of difficulty.

The Macintosh blade is one of the most popular blades with a gentle curved tongue which extends to the tip. The McCoy blade laryngoscope was introduced in 1993.³ It is based on the standard Macintosh blade which has a hinged tip and operated by a lever mechanism on the back of the handle. The tip of the blade can be passed in glosso-epiglottic fold and by using the lever only the tip of the blade gets lifted. Thus it elevates the epiglottis and gives a better visualization of glottis.

In this study, an attempt has been made to compare the Macintosh and McCoy blade for the glottic visualization, with regard to the difference in the ease of intubation.

METHODOLOGY:

Institutional Ethics Committee approval was taken prior to commencement of study. An informed and written consent was taken from every patient selected for the study. 60 adults (18 – 60 years) of both sexes, ASA Grade I & II, undergoing elective surgery under general anaesthesia requiring endotracheal intubation were enrolled in this study. Patients with anticipated difficult intubation, NBM status <8 hours, Obese patients (BMI > 30), Oro-pharyngeal surgery were excluded from the study. Using computer generated random allocation chart, patients were randomly allocated to one of the two groups depending upon the types of laryngoscope blade was used during intubation. Group A – where McCoy Laryngoscope blade was used, Group B – where Macintosh Laryngoscope blade was used.

A detailed routine pre-anaesthetic check up was done in the pre-anaesthesia check-up clinic; where airway was assessed using Samsung and Young's modification of the Mallampati classification, inter-incisor gap and adequacy of neck movements. All the routine laboratory investigations were checked.

Samsung and Young's modification of the Mallampati classification

Class I: Soft palate, faucial pillars, uvula visible

Class II: Soft palate, uvula visible
 Class III: Soft palate and base of uvula or none visible
 Class IV: Only hard palate visible.

In the OT, pulse oximeter, ECG, capnography and automated non-invasive blood pressure were attached for monitoring and intravenous access was secured using 20 G IV cannula and an infusion of dextrose normal saline (DNS) was started slowly. Demographic data such as age, sex and weight of the patient was noted.

A Doughnut-shaped pillow was placed under the head of the patient to obtain classical sniffing position. The patient was pre-medicated by inj. glycopyrrolate (0.2mg), inj. midazolam (1mg), inj. ondansetron (4mg) and inj. pentazocin (0.3mg/kg) intravenously. The patient was pre-oxygenated with 100% oxygen for 3 min. Then Anaesthesia was induced with 2 mg/kg of propofol. Feasibility of ventilation with a face mask was checked prior to injection of depolarising muscle relaxant. After ventilation is confirmed inj succinylcholine 2 mg/kg was administered and the patient was ventilated with 100 % Oxygen. The laryngoscopy and intubation were carried out in classical intubating position by a single, trained anaesthesiologist. We studied following aspects during tracheal intubation.

1. Visualisation of laryngeal inlet: This was graded using Cormack Lehane (CL) Grades:

- Grade 1: Complete glottis visible
- Grade 2: Anterior glottis not seen
- Grade 3: Epiglottis seen but not glottis
- Grade 4: Epiglottis not seen.

If the view after laryngoscopy was more than CL Grade 2 external laryngeal manipulation was carried out.

2. Ease of intubation: This was graded as follows:

- Grade 1: Intubation easy
- Grade 2: Intubation requiring an increased anterior lifting force and assistance to pull the right corner of the mouth upwards to increase space
- Grade 3: Intubation requiring multiple attempts and a curved stylet
- Grade 4: Failure to intubate with the assigned laryngoscope.

- 3. The need for external manipulation was classified as
- Grade 1: No requirement of external laryngeal manipulations
- Grade 2: Requirement of external laryngeal manipulation

Number of attempts was noted. Patients was ventilated with 100% oxygen between attempts at laryngoscopy and intubation so that no patient was allowed to desaturate below 95%. After 2 attempts at intubation with assigned blade, patients was intubated by senior anaesthesiologist using Macintosh laryngoscope.

STATISTICAL ANALYSIS:

Statistical analysis was done by using SPSS. Student t-Test, chi square test were applied according to the requirement. The level of significance was fixed at 95%. P<0.05 was considered as statistically significant.

RESULTS:

Both the groups were comparable with regards to age, gender, weight, height, ASA physical status and MPC grading and there was no statistically significant difference among the two groups (p value >0.05), (Table 1). Cormack Lehane Grade 1 view was obtained by group A and group B are 80% and 66.7% respectively, where grade 2 view obtained by group A & group B are 20% and 26.7% respectively, which is statistically insignificant (p> 0.05),(Table 2),(Figure 1). Intubation difficulty score (IDS) grade 1 in group A and group B are 93.3% and 86.7% respectively, where IDS grade 2 in group A and group B are 6.7% and 10% respectively, which is statistically not significant (p > 0.05), (Table 3), (Figure 2). 3.3% patient from group A and 13.3%

patients from group B, needed two attempts at intubation respectively which is statistically not significant (p> 0.05), (Table 4), (Figure 3). 26.7% patients from group B needed external laryngeal manipulation where no patient from group A needed it which is statistically significant (p<0.05), (Table 5), (Figure 4).

Table 1: Demographic Data, ASA grading, MPC grading in – Group 'A' and Group 'B'

Parameters	Group A (n=30)	Group B (n=30)	p Value
Age (years)	47.1 9	48.5 8.5	> 0.05
Sex (Male: Female)	13: 17	14:16	> 0.05
Height (cm)	167 8.3	169 7.7	> 0.05
Weight (Kg)	58.5 8.6	59.7 7.2	> 0.05
ASA grading (I:II)	23:7	24:6	> 0.05
MPC grading (1:2)	18:12	20:10	> 0.05

Table 2: Glottic visualization by Cormack Lehane grade in group 'A' and group 'B'.

Cormack Lehane Grade	Group A (%)	Group B (%)	Total (%)
Grade 1	24 (80)	20 (66.7)	44 (73.3)
Grade 2	6 (20)	8 (26.7)	14 (23.3)
Grade 3	—	2 (6.6)	2 (3.4)
Total	30 (50)	30 (50)	60 (100)

Fisher exact Test was applied. P value was 0.38 (statistically not significant).

Figure 1: Bar diagram showing CL grading of patients in group 'A' and group 'B'

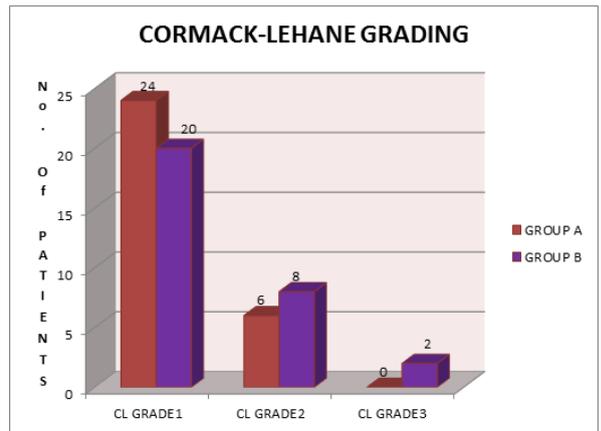


Table 3: Intubation difficulty Score of patients in group 'A' and group 'B'.

Intubation difficulty Score	Group A (%)	Group B (%)	Total (%)
Grade 1	28 (93.3)	26 (86.7)	54 (90)
Grade 2	2 (6.7)	3 (10)	5 (8.3)
Grade 3	—	1 (3.3)	1 (1.7)
Total	30 (50)	30 (50)	60 (100)

Fisher Exact Test was applied. P value was 0.83 (statistically not significant)

Figure 2: Bar diagram showing IDS grading of patients in group 'A' and group 'B'

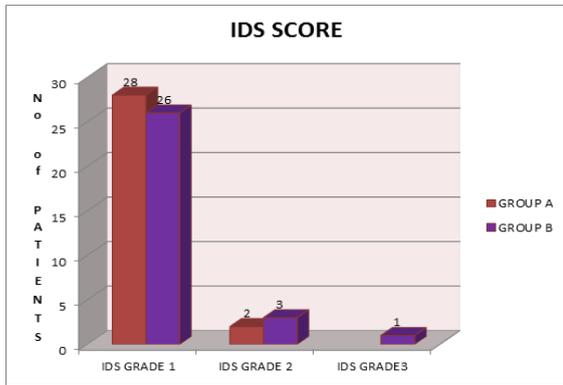


Table 4 : Number of attempts for intubation of the patients in group 'A' and group 'B'.

Number of Attempts at Intubation	GROUP A	GROUP B
1 st attempt	28	29
2 nd attempt	2	1

Figure 3: Bar diagram showing Number of attempts at intubation in group 'A' and group 'B'

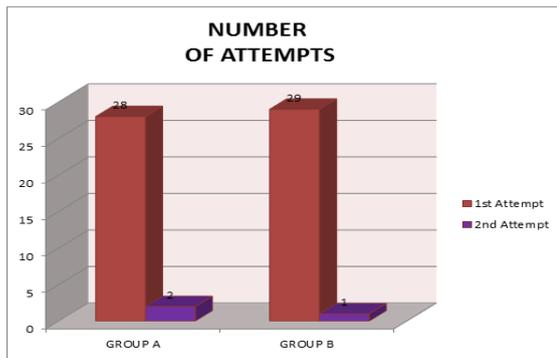
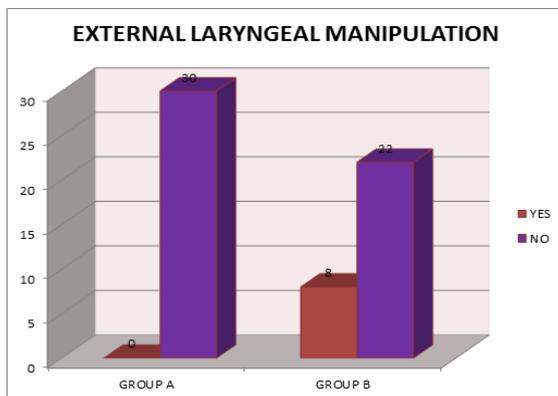


Table 5: Need for external laryngeal manipulation in group 'A' and group 'B'.

Need for external laryngeal manipulation	GROUP A	GROUP B
YES	0	8
NO	30	22

Fisher Exact Test was applied. P value was 0.002* (statistically significant)

Figure 4: Bar diagram showing need for external laryngeal manipulation in group 'A' and group 'B'



DISCUSSION:

With the Macintosh blade, the curvature of the blade acts as a visual “hill;” interrupting the line of sight, called the “Crest of the Hill” effect.⁴ When Macintosh blade is used the tongue should be displaced more into the submandibular space. With Macintosh blade, the oral axis makes an angle with the laryngeal axis, masking the glottis as it is covered by the epiglottis and this interferes with glottic view. When the McCoy blade is used, the epiglottis is lifted out of the way improving glottic exposure. Thus, the force required is reduced as the tongue only needs to be displaced laterally.⁵ There are some studies which showed that McCoy blade as well as external laryngeal manipulation are effective in cases of difficult intubation.⁶

Uchida et al. conducted a study and found that when laryngoscopy was performed with neck in neutral position the grade of glottic view improved with use of McCoy blade from Grade 2 to 3 views obtained with Macintosh blade.⁷ In a study conducted by Bito et al found that the views obtained with McCoy blade were the best (82 Grade I views) while Grade I view was obtained in least number of patients (47 Grade I views) with the Macintosh blade.⁸ Arino et al found that the levering tip of the McCoy blade significantly improved the laryngoscopic view (87/100 Grade I views) when it was compared to Macintosh blade (72/100 Grade I views).⁹

Cheung et al. found that the glottic view was significantly better with the Flexiblade, a type of levering laryngoscope blade similar to the McCoy, than the Macintosh laryngoscope.¹⁰ Gabbot et al conducted a study and found a significantly better glottic view with the McCoy laryngoscope when compared with the Macintosh laryngoscope.¹¹

In a study conducted by Atul P Kulkarni, Amar S Tirmanwar in may 2013, they compared between different laryngoscopy blades regarding comparison of glottis visualization and ease of intubation. They find out CL grade I view was obtained in 77% of patient by McCoy blade and 63% of patient by Macintosh blade. They also noted that view of glottis is interrupted by epiglottis when macintosh blade is used. But McCoy blade improves the glottis exposure and force required is reduced as the tongue only needs to be displaced laterally.⁵

We found that CL Grade I and Grade II of glottic visualisation were obtained in 80% and 20% of patients respectively with McCoy blade whereas with Macintosh blade CL Grade I, Grade II and Grade III view were obtained in 66.7%, 26.7% and 6.6% of patients respectively (p> 0.05).

Most of our patients were intubated at the first attempt. 26 patients in macintosh group were intubated at the first attempt as compared to McCoy blade 29 patients (P > 0.05). We also found that when McCoy laryngoscope was used 93.3% patients showed intubation difficulty score (IDS) grade I and 6.7% patients showed IDS grade II. But when Macintosh laryngoscope was used only 86.7% patients showed IDS grade I and 10% patients showed grade II and 3.3% patients showed grade III (p>0.05).

Benumof et al conducted a study and found that manoeuvres like external laryngeal manipulation improved glottic visualization when the view of glottis is poor.¹² We found that 26.6% patients required external laryngeal manipulation when macintosh blade was used and no patient from McCoy group required this maneuver (p< 0.05).

CONCLUSION:

There is no significant change in glottic visualization with McCoy and Macintosh laryngoscope but as far as external laryngeal manipulation is concerned McCoy laryngoscope is better than the Macintosh laryngoscope for the ease of intubation.

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