Original Article

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A Comparative Study of Cormack Lehane Grading by Macintosh, McCoy and Video Laryngoscope in Patients with Predicted Normal Airway

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Abstract

Background: The conventional Macintosh laryngoscope is used most commonly due to its familiarity and ease of use. Newer devices like video laryngoscope are also being commonly now-a-days. Hence a comparative study of the 3 commonly used laryngoscopes has been done.

Aims & Objectives: To compare direct laryngoscope view of the different laryngoscope blades & to find out the most suitable laryngoscope in patients with predicted normal airway.

Methodology: 150 ASA grade I-II patients with 50 patients in each group were taken. Their stress response, CML grading & intubation time were compared.

Results: Stress response was least & CML grading was best, however the time taken to intubate was maximum (P<.001) with Video-laryngoscope as compared to McCoy & Macintosh.

Conclusion: Video-Laryngoscope provides better visualization of glottic opening as compared to Macintosh and McCoy with less stress response but being a newer device needs more expertise to intubate the patient.

Keywords: Video-laryngoscope; Macintosh laryngoscope; CML; Tracheal intubation.

Introduction

As it is well known that the primary responsibility of the anesthesiologist is airway management. Most anesthesia mishaps happen at the time of induction, and difficulties in intubation may lead to fatal consequences.[1] Failure to oxygenate is the most common cause of death & severe neurological brain damage perioperatively. Conventionally intubation is done with Macintosh laryngoscope blade in predicted normal airway but when direct Laryngoscopic view is not up to the mark, Anesthesiologist may have to use another available option such as McCoy blade which has a hinged tip that is to be operated externally to improve vision & subsequently help in correct placement of the endotracheal tube under vision.[2] Recent advances in the airway management have resulted in the advent of various optical & video laryngoscopes which are beneficial in airway management.[3-5]

Aims: Find out the most suitable laryngoscope

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blade in patients with predicted normal airway.

Objective

The present study was conducted with following objectives:

1. To compare direct laryngoscopic view of the different laryngoscope blades.
2. Number of intubation attempts with each laryngoscope blades.
3. To study the utility of 3 different laryngoscope blades in routine anesthesia practices.

Methods

Institutional ethical committee approval was obtained. Informed written consent was taken from the patients & their relatives. This prospective randomized single blinded study was conducted in a tertiary care centre of M. P. between September 2019-July 2020. 150 patients of ASA grade I or II were randomly allocated into 3 groups Macintosh (M) group, McCoy (MC) group, video-laryngoscope (V) group. Randomization was done by computer generated codes that were concealed in sequentially numbered opaque envelopes. Each group had 50 patients who were between 20-70 years of age & were scheduled for elective surgery under General Anesthesia. Following patients were excluded-

1. Who refused to give consent to be a part of the study.
2. Anticipated difficult intubation or had some pathology in upper respiratory tract and neck.
3. Pregnant patients.
4. ASA grade III and IV.

Pre-Operatively the airway of all the patients was assessed by Mallampatti Grade (figure.1), thyromental distance (TMD) and neck movements, neck girth and patients with predicted normal airway were selected.

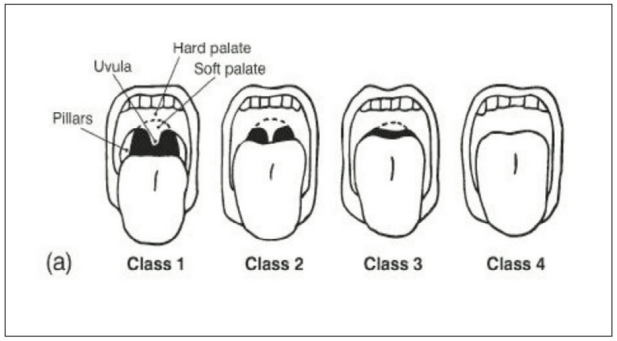

Figure 1. The Mallampati score:
Class 1. Complete visualization of the soft palate
Class 2. Complete visualization of the uvula
Class 3. Visualization of only the base of the uvula
Class 4. Soft palate is not visible at all

Patients were blinded for the group allotted but blinding of the anesthesiologist was not possible. In the operation theatre, the patient was shifted and the standard monitors (ECG, Pulse-Oximeter, Non-invasive B. P, temperature) were attached. Baseline parameters were recorded, I.V. access taken. After pre-oxygenation for 3 minutes following drugs were given, intravenously Injection Midazolam 0.05 mg/kg, Injection Glycopyrrolate 0.01 mg/kg, Injection Fentanyl 2 mcg/kg, Induction done with injection Propofol 2 mg/kg.

After confirmation of ability to mask ventilate Injection I.V. Atracurium 0.5 mg/kg was given. Vital parameters were noted post induction. After 4 minutes of Positive Pressure Ventilation, Laryrgoscopy and intubation was done. Tracheal intubation was considered a failure if it could not be accomplished in three attempts. The time taken for laryngoscopy was recorded. The Cormack Lehane grading (CML). (figure.2) of laryngeal inlet was noted.[6]

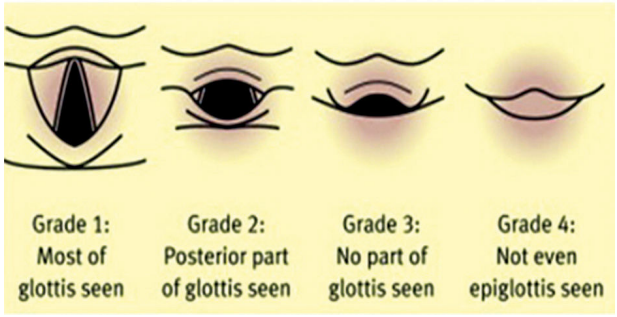

Fig. 2: Cormack Lehane grading.

In addition to clinical assessment tracheal intubation was confirmed by appearance of the capnograph wave form on the monitor.

The time to intubate – (T) was defined as the time taken from the time when the blade of the laryngoscope crosses the incisors and the anesthesiologist visually sees the tube passing through the glottis. This was divided into two parts (T1) the time from insertion of blade till the visualization of glottis and (T2) i.e. the time from visualization of glottis till the tube passes through the glottis.

The time taken for intubation was noted. Vital parameters were monitored at laryngoscopy and at 1, 3, 5 and 10 minutes post intubation. Numbers of intubation attempts were noted. Comfort of the anesthetist also Observed. A maximum number of 3 attempts were permitted with the selected laryngoscope. After failure even in 3 attempts with the assigned blade, laryngoscopy was performed using alternative blade.

After the airway was secured, anesthesia was maintained & at the end of surgery neuromuscular blockade was antagonized. After achieving adequate reversal, patients were extubated & shifted to recovery Area.

Statistical Analysis

Normally distributed data was compared using one –way analysis of variance (ANOVA). The non-parametric data were analyzed using Kruskal-Wallis analysis of variance. The comparisons of heart rate and blood pressure were made using repeated measures ANOVA. A pair-wise comparison of the mean values was performed by the paired t-test. A P<0.05 was assumed was statistically Significant.

Results

The Demographic characteristics (Table I) of the study patients including age, sex as well as preoperative examination results such as Mallampati score, neck girth measurement, and TMD (Table II) were comparable .No statistically significant difference was observed among the 3 groups, showing that the general characteristics of the 3 study groups were comparable.

The baseline HR, SPO2, SBP, DBP values were also comparable (p>0.05) in all 3 groups. The effect of laryngoscopy on HR showed a statistically Significant rise at the time of laryngoscopy and also at 1, 3, 5 minutes but settled by 10 minutes i.e. was not statistically significant (P=0.06).

Table 1*:* Basic characteristics of the patients.

Group (N=50)	Age [Mean(SD)]	Sex	
		M	F
Group M	38.64 (12.17)	25	25
Group MC	39.68 (12.50)	23	27
Group V	36.4 (11.21)	18	32

Table 2: Airway Assessment of patients.

Group - M			Group – MC			Group– V		
MPC	Number of patients	%	MPC	Number of patients	%	MPC	Number of patients	%
I	19	38%	I	19	38%	I	28	56%
II	22	44%	II	19	38%	II	10	20%
III	9	18%	III	12	24%	III	12	24%
Thyromental distance (cm)	Number of patients	%	Thyromental distance (cm)	Number of patients	%	Thyromental distance (cm)	Number of patients	%
6-6.5	21	42%	<6.5	29	58%	<6.5	32	64%
> 6.5	29	58%	> 6.5	21	42%	>6.5	18	36%

Table 3: Intubation Attempts in Each Group.

Group (n=50 each)	No. of Intubation Attempts		
	1 Attempts	2 Attempts	3Attempts
Group M	46	4	0
Group Mc	44	6	0
Group V	40	8	2

Table 4*:* Comparison of Laryngoscopy and Intubation Time.

Group		N	Mean	Std. Deviation	P Value
Time to view glottis opening (sec) (t1)	Group M	50	12.900	1.8323	<0.001
	Group Mc	50	15.240	3.0140	
Time to pass the tube through glottis (sec) (t2)	Group M	50	11.940	1.9630	<0.001
	Group Mc	50	10.300	1.2330	

Table continued ...

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Time to view glottis opening (sec) (t1)	Group Mc Group V	50 50	15.240 10.260	3.0140 1.2257	<0.001
Time to pass the tube through glottis (sec) (t2)	Group Mc Group V	50 50	10.30 0 19.860	1.2330 2.9967	<0.001
Time to view glottis opening (sec) (t1)	Group M Group V	50 50	12.900 10.260	1.8323 1.2257	0.004
Time to pass the tube through glottis (sec) (t2)	Group M Group V	50 50	11.940 19.860	1.9630 2.9967	0.001

The rise in HR was maximum in Macintosh group followed by McCoy group & was least in video-laryngoscope group.(Figure 3)

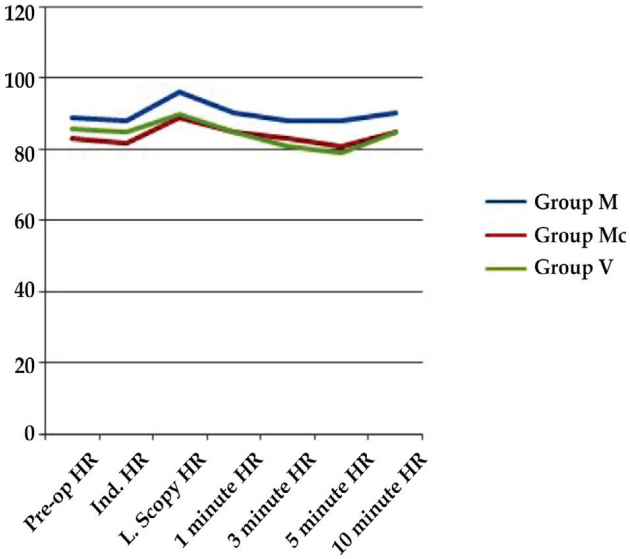

Fig. 3: Comparison of heart rate of three groups.

The SBP, DBP increased at laryngoscopy in all 3 groups but was not significant (Figure 4, 5). The pressor response was maximum in Macintosh group & was least in video-laryngoscope group.

The changes in HR, SBP, and DBP were transient & returned to baseline in 10 mins.

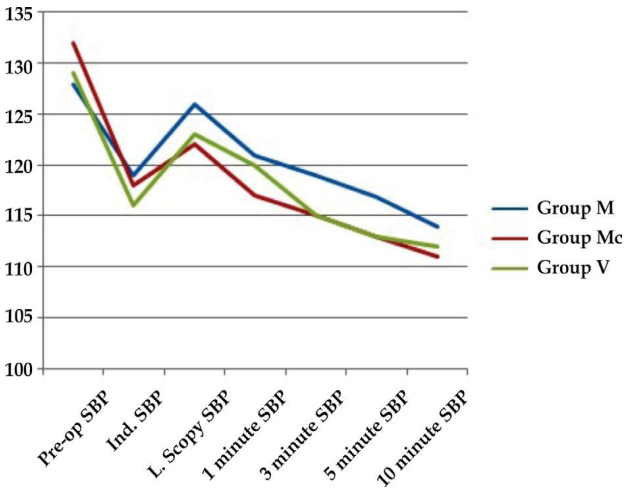

Fig. 4: Comparison of SBP of three groups..

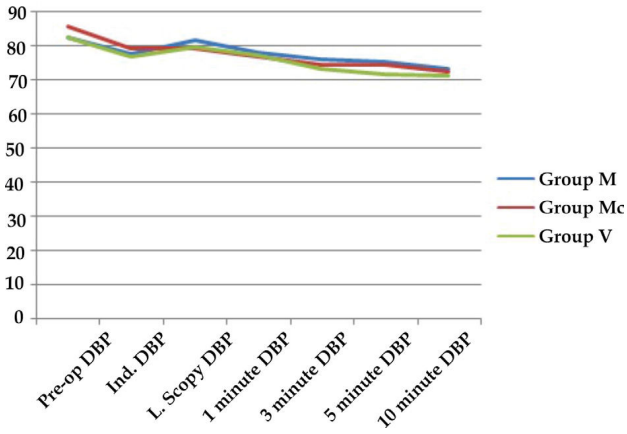

Fig. 5: Comparison of DBP of three groups.

The CML grading was noted. The difference among 3 blades was not statistically significant but grade I was seen in maximum in video-laryngoscope i.e. 60% & there was no grade III & grade IV in video-laryngoscope group.

There was no significant difference in the CML grade among all the 3 devices when compared with each other (P > 0.05) (figure 6).

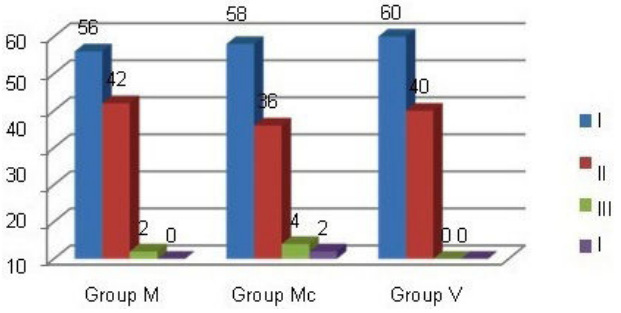

Fig. 6: Comparison of CML of three groups.

The number of advancements made by ETT toward the direction of the glottis was compared and it was found that 46 out of 50, 44 out of 50 and 40 out of 50 patients were intubated in the Ist advancement itself in the 3 group respectively. 4 patients in Macintosh group and 6 patients McCoy were intubated in II advancement while 8 patients in video-laryngoscope were intubated in II advancement and 2 were intubated in III advancement. (Table III).

The total time taken to intubate (T) was 24+2.65seconds, 25.54 + 3.64 seconds, 30.12 + 3.50 seconds, in groups Macintosh, McCoy & Video Laryngoscope respectively. Using one way anova test, there was a significant difference between the 3 groups (P< .001). (Table IV).

Discussion

In our study the hemodynamic response to intubation is less in McCoy when compared to Macintosh group similar results were seen with study done by Mccoy EP etal.[7,8]

The hemodynamic response with video-laryngoscope and Macintosh laryngoscope was comparable in most of the studies[9,10,11] but in our study hemodynamic response was least in video-laryngoscope. Probably as glottis visualization does not need any lifting force which is needed in Macintosh rather with video-laryngoscope the glottis visualization was easiest as video-laryngoscopescope incorporates a prism, which provides optical view of laryngeal inlet without having to align oral, pharyngeal and laryngeal axes hence CML is best without the need for external laryngeal manipulation as seen in study done by Dr. Atul P. et al.[12]

In our study Video-Laryngoscope provided best CML grading, stress response was least, however time taken to intubate was more with maximum number of second attempts.

Our results were similar to previous studies which had demonstrated that video laryngoscope improves laryngeal view when compared with Macintosh laryngoscope in patients with normal and also anticipated difficult airway.[13,14]

Difference between the time to view glottis opening was statistically significant among the 3 groups & was least in video-laryngoscope group however the time taken to intubate was maximum in video-laryngoscope & was statistically significant.

The number of advancements made by ETT toward the direction of the glottis was compared and it was found that 46 out of 50, 44 out of 50 and 40 out of 50 patients were intubated in the Ist advancement itself in the 3 group respectively. 4 patients in Macintosh group and 6 patients McCoy were intubated in II advancement while 8 patients in video-laryngoscope were intubated in II advancement and 2 were intubated in III advancement. These findings were similar to the study done by SUN et al.[15] Who also experienced more number of attempts though the CML grading was I & II when kings video-laryngoscope was used. This difficulty in advancing the tube in to the glottis even after a favorable vision has been obtained was probably due to difficulty in hand-eye coordination as one has to look into the camera, while advancing the tube which may resolve with increasing experience with device.

The main limitation of our study is observer bias since it is impossible to blind the anesthesiologist to the device.

Conclusion

Hence with our study we conclude that video-laryngoscope provides visualization of glottic opening as compared to Macintosh and McCoy with less stress response but being a newer device needs more expertise to intubate the patient.

References

1. Cheney FW, Posner KL, Caplan RA, Adverse respiratory events infrequently leading to malpractice suits. A closed analysis. Anesthesiology.1991;75:932-9.
2. Uchida T, Hikawa Y, Saito Y, Yasuda k. The McCoy levering laryngoscope in patients with limited neck extension. Can J Anaesth 1997;44:674-6 .
3. Komatsu R, Kamata K, Hoshi I, Sesseler DI, Ozaki M. Airway Scope and gum elastic bougie with Macintosh laryngoscope for tracheal intubation in patients with simulated restricted neck mobility. Br J Anaesth. 2008;101:863–9.
4. Bilgin H, Bozkurt M. Tracheal intubation using the ILMA, C-Trach or McCoy laryngoscope in patients with simulated cervical spine injury. Anesthesia. 2006;61:685–91.
5. Watts AD, Gelb AW, Bach DB, Pelz DM. Comparison of the Bullard and Macintosh laryngoscopes for endotracheal intubation of patients with a potential cervical spine injury. Anesthesiology. 1997;87:133542.
6. Cormack RS, Lehane J. Difficult tracheal intubation in obstetrics. Anesthesia 1991;75:932-9.
7. McCoy EP, Mirakhur RK, Rafferty C, Bunting H, Austin BA. A comparison of the forces exerted during laryngoscopy. The Macintosh versus the McCoy blade. Anaesthesia 1996;51: 912-5.
8. McCoy EP, Mirakhur RK, McCloskey BV. A comparison of the stress response to

laryngoscopy. The Macintosh versus the McCoy blade. Anaesthesia 1995;50:943-6.

9. Pournajafian AR, Ghodraty MR, Faiz SH, Rahimzadeh P, Goodarzynejad H, Dogmehchi E, et al. Comparing GlideScope video laryngoscope and Macintosh laryngoscope regarding hemodynamic responses during orotracheal intubation: A Randomized controlled trial. Iran Red Crescent Med J 2014;16:e12334.
10. Siddiqui N, Katznelson R, Friedman Z. Heart rate/blood pressure response and airway morbidity following tracheal intubation with direct laryngoscopy, GlideScope and trachlight: A randomized control trial. Eur J Anaesthesiol 2009;26:740-5.
11. Xue FS, Zhang GH, Li XY, Sun HT, Li P, Li CW, et al. Comparison of hemodynamic responses to orotracheal intubation with the GlideScopevideolaryngoscope and the Macintosh direct laryngoscope. J ClinAnesth 2007;19:245-50.
12. Kulkarni AP, Tirmanwar AS. Comparison of glotticvisualisation and ease of intubation with different laryngoscope blades. Indian J Anaesth. 2013 Mar;57(2):170-4.
13. GoelS,Ochroch AE, Sinha A. Improvement of Cormack Lehane scores via direct laryngoscope versus video laryngoscopy in morbidly obese patients undergoing elective weight loss surgery.ASEAN J Anaesth 2011;12:49-55.
14. Sherren PB, Kong ML, Chang S. Comparison of the Macintosh, McCoy, Airtraq laryngoscopes and the intubating laryngeal mask airway in a difficult airway with manual in-line stabilisation: A cross-over simulation-based study. Eur J Anaesthesiol 2013;30:544-9.
15. Sun DA, Warriner CB, Parsons DG, Klein R, Umedaly HS, Moult M, et al. The GlideScope video laryngoscope: Randomized clinical trial in 200 patients. Br J Anaesth 2005;94:381-4.