Original Research Article

Comparison of Truviewscope and C-Mac Video Laryngoscope with the Conventional Macintosh Laryngoscope in Improving the Glottic View during Endotracheal Intubation

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Abstract

Background: In anesthetic practice, the introduction of multiple novel laryngoscopes has simplified visualization of the vocal cords and has reduced the complications arising due to difficult or failed tracheal intubation. Both Truview scope and C-Mac video laryngoscope have been reported to provide a comparable or superior glottic view on comparison with conventional Macintosh laryngoscope.

Materials and methods: A randomized controlled study was conducted in 100 subjects scheduled for elective surgery equally divided into 2 groups. Conventional Macintosh laryngoscopy was done initially in all subjects enrolled for the study. For the Glottic view, One Group (n=50) underwent Truview laryngoscopy while the other (n=50) underwent C-Mac video laryngoscopy.

Results: The improvement in glottic view from original MCL (Modified Cormack & Lehane) grading obtained from Macintosh laryngoscope was 40% (n=23) in Truview compared to 46% (n=23) in C-Mac video laryngoscope while downgrading of view was observed in 10% (n=5) in group– T compared to none in C-Mac video laryngoscope. There were no statistically significant difference in Intubation Difficulty Scale (IDS) scores between the groups (P = 0.072). The mean duration of time

for endotracheal intubation with C-Mac video laryngoscope (23.10 seconds) was significantly shorter compared with Truview laryngoscope (31.26 seconds).

Conclusions: There was an improvement in view of the glottis in both Truview and C-Mac video laryngoscope from the initial Macintosh laryngoscope view. But C-Mac video laryngoscope offered better view improvement and also required a shorter time for intubation compared to Truview laryngoscope.

Key words

Truview laryngoscope, C-Mac laryngoscope, Conventional Macintosh laryngoscope, Glottic view, Modified Cormack and Lehane grading score, Intubation Difficulty Scale (IDS) score.

Introduction

Intubation is one of the basic procedures in anesthesia [1, 2]. In anesthetic practice, the leading causes of morbidity and mortality arise from the difficulties encountered in the management of the airway [3]. The most convenient method to secure the airway in patients during anesthesia management is through endotracheal intubation. Macintosh first described a curved laryngoscope blade in 1943 [4] which has been commonly used to facilitate endotracheal intubation and considered as a gold standard device. The foremost method of securing the airway is direct laryngoscopy (DL) [5]. Though the difficulty in intubation [6] can be estimated from preoperative measurements and scoring systems, obtaining direct access to the glottis during preoperative DL can be difficult [1] leading to serious complications. Management of the airway has come a long way since the development of endotracheal intubation. In the past few decades Video laryngoscopes working on the principles of indirect laryngoscopy have become popular in clinical practice providing a significantly better view of the larynx [7, 8]. These indirect laryngoscopes enable to visualize the vocal cords devoid of the need for aligning the oropharyngeal and tracheal axis [9] and have emerged as good substitutes for conventional direct laryngoscopy in difficult airway management [10]. Direct laryngoscopy which is done using Macintosh blade consumes a lot of time leading to trauma to adjacent structures and the ETT cuff may also be damaged. Another airway device which is similar to Macintosh blade but then in addition has a micro camera at the blade tip is C-MAC video laryngoscope, which also has the potential to be used as a direct laryngoscope in case of malfunctioned camera [5]. Truview EVO2 is a novel optical laryngoscope with modified blade [11] providing a wider laryngeal view with a channel for constant oxygen delivery to prevent the lens from fogging as well as to remove any secretions [12]. Recent studies worldwide have confirmed that video laryngoscopes might offer better views of the glottis and subsequent endotracheal intubation might be faster and successful when compared with direct laryngoscopy [1, 13, 14] but in Indian settings, there are only a very few studies comparing video laryngoscopy and direct laryngoscopy with regards to glottis opening. Therefore we undertook our study to compare Truview and C-MAC video laryngoscope with conventional Macintosh laryngoscope in improving glottic view during endotracheal intubation.

Aim and objectives

- To compare the efficacy of Truviewscope and C-Mac video laryngoscope in improving the glottic view from initial Macintosh scope view during endotracheal intubation.

Materials and methods

Study site: The study was conducted in the Department of Anesthesiology, Tertiary care teaching hospital.

Study design: Randomized controlled study.

Study subjects and sample size: 100 patients of both sexes scheduled for elective surgery.

Inclusion criteria: patients in the age group of 16 - 60 years, belonging to ASA - I and ASA - II with MPC – I and MPC - II.

Exclusion criteria: The following groups of patients were excluded from the study:

- Those who had a mouth opening less than 2 fingerbreadths.
- Patients with a cervical spine injury.
- Patients who required head and neck surgery.
- Patients who required rapid sequence induction.

Randomization: Fifty slips each for group-T and group-V were prepared and the patients assigned to the group as per the slip selected.

Methods

After a thorough pre-anesthetic checkup, we obtained informed consent from all the subjects participating in the study. All subjects were premedicated with oral Alprazolam 0.5 mg, Ranitidine 150 mg, and Metoclopramide 10 mg the night before and on the morning of surgery. Basic monitors such as electrocardiogram (ECG), pulse oximeter, end-tidal carbon dioxide (EtCO2) and an automated non-invasive blood pressure device (NIBP) were attached. After securing an intravenous line, patients were pre-oxygenated with 100% oxygen, and anesthesia was induced with Fentanyl 2mcg/kg and Propofol 2 mg/kg. Vecuronium bromide 0.1 mg/kg was given to facilitate intubation. Patients were mask ventilated for 4 minutes, and conventional Macintosh Laryngoscopy was performed. Then the patients were randomly divided into two equal groups to select the second laryngoscope.

Group T – In group – T, Truview laryngoscopy was performed after initial Macintosh laryngoscope.

Group V – In group – V, C-Mac video laryngoscopy was performed after initial Macintosh laryngoscope.

Each laryngoscopy was performed in their specific position. View of the larynx with both blades was recorded based on MCL (Modified Cormack & Lehane) grading. No laryngeal pressure was applied to improve this score. The trachea was intubated after the second laryngoscopy using an appropriate sized cuffed endotracheal tube preloaded with a stylet, and correct placement was confirmed by EtCO2 monitoring. The degree of difficulty in intubation was assessed based on the IDS (Intubation difficulty scale) score. Once the intubation was complete, anesthesia was maintained using nitrous oxide with oxygen, volatile agents and incremental doses of inj. Vecuronium. The primary endpoint was the IDS score and the time taken for successful intubation was also noted. In our study, the intubation duration was defined as the time taken from the insertion of the second blade between the teeth until the endotracheal tube (ETT) was placed through the vocal cords. Anesthesiologist visualizes and defines the Intubation time. If the endotracheal tube was not visualized passing through the vocal cords, the intubation attempt was not considered complete until the ETT was connected to the breathing circuit and evidence obtained of the presence of CO2 in the exhaled breath (capnograph). A failed intubation attempt was considered when the trachea was not intubated or the time required for the intubation was more than 120 seconds.

Intubation difficulty scale score

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

N1: Number of intubation attempts >1

N2: Number of operator >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)

Total IDS = sum of scores

IDS score Degree of difficulty

0 - easy

0 < 5 - slight difficulty

>5 - Moderate to major difficulty

IDS = infinity - Impossible intubation

Rules for calculating IDS score

N1 Every additional attempt adds 1 point
N2 Each additional operator adds 1 point
N3 Each alternative technique adds 1 point. Re-positioning or change of blade etc.
N4 Apply Cormack grade for a 1st oral attempt

Modified Cormack & lahane grading

Grade 1- Full view of the vocal cords.
Grade 2A - Partial view of the vocal cords.
Grade 2B - Only the arytenoids and epiglottis seen.
Grade 3 - Only epiglottis visible.
Grade 4 - Neither the epiglottis nor glottis seen.

Results

The mean age in group-T was 37.20 years with SD of 11.044 whereas the mean age in the group - V was 36.48 with SD of 10.672. However, the difference in mean age distribution among both the group was statistically insignificant as evidenced by the P value (0.741). The mean duration of intubation in group-T was 31.26 seconds with an SD of 10.962 whereas the mean duration in the group - V was 23.10 seconds with SD of 5.701. However, the difference in mean duration distribution among both the group was statistically significant as evidenced by the P value (0.000). Group T included 21 males and 29 females whereas group V included 27 males and 23 females. The difference was statistically insignificant as evidenced by P value (0.230). There were 36 ASA -1 and 14 ASA -2 patients in Group-T and 30 ASA -1 and 20 ASA -2 patients in Group V. The difference was statistically insignificant as the P value was 0.205. There were 15 MPC -1 and 35 MPC -2 patients in Group-T and 20 MPC -1 and 30 MPC -2 patients in Group V. The difference was statistically insignificant as the P value was 0.295. Initial Macintosh laryngoscopy revealed MCL grade 1 in 20 patients, MCL -2a in 18 patients and MCL -2b in 12 patients of Group - T. In Group – V, MCL -1 was observed in 19 patients, MCL -2a in 19 patients and MCL -2b in 12 patients. As can be seen from the P value (0.975), the difference in initial Macintosh scopy MCL grading among the groups was statistically insignificant. In Group - T Truviewscopy revealed MCL -1 in 30 patients, MCL -2a in 17 patients and MCL -2b in 3 patients. C-Mac video laryngoscopy in Group - V revealed MCL -1 in 36 patients and MCL -2a in 14 patients. The difference in MCL grading distribution was statistically insignificant after the second laryngoscopy in both the groups as Chi-Square test showed a P value of 0.691. Majority of the patients in Group - T had IDS of 0 and 1. Only one patient had IDS 2, and four patients had IDS 3. Whereas all the patients in Group - V had IDS score 0 and 1. But the difference was statistically insignificant as the P value was 0.072 (**Table – 1**).

When compared to True view laryngoscope and C-mac video laryngoscope findings correlated between with Macintosh laryngoscopy findings (**Table – 2**).

Improved MCL grading seen in group T and group V were 20 and 23 patients respectively from the initial Macintosh laryngoscope MCL grading. Their difference in efficacy of improving the glottic view from initial Macintosh laryngoscope is statistically significant with a P value of <0.001 (**Table – 3**).

The downgrading of the MCL -1 to MCL -2a was observed in 3 patients in the group –T whereas no such downgrading was observed in the group –V. This difference in the downgrading of MCL view is found out to be statistically significant with a P value of 0.000 (P < 0.05) as per **Table – 4**.

Discussion

The major responsibility of the anesthesiologist in airway management is securing a patent airway by providing adequate oxygenation and ventilation. Difficult intubation which is encountered can be in the form of the lack of the ability to visualize the larynx by a conventional blade, or it could also be in the form of difficulty in passing the tube into the trachea despite the visualisation of the vocal cords. Although

various types of laryngoscopes with different technical specifications and operational characteristics have been developed, Macintosh laryngoscopes remain the most widely used in anesthesiology [1]. Although the likelihood of difficult intubation can be estimated from preoperative measurements and scoring systems, obtaining direct access to the glottis during preoperative direct laryngoscopy can be difficult.

Table - 1: Comparison of baseline parameters between the two study groups.

	Group T	**Group V**	**P Value**
Age	37.2±11.044	36.48 ± 10.672	0.741
Duration	31.26 ± 10.962	23.10 ± 5.701	<0.001
Age group			
<20 years	1 (2%)	3 (6%)	0.328
21 to 30 years	15 (30%)	14 (28%)	
31 to 40 years	18 (36%)	13 (26%)	
41 to 50 years	9 (18%)	16 (32%)	
51 to 60 years	7 (14%)	4 (8%)	
Gender			
Male	21 (42%)	27 (54%)	0.23
Female	29 (58%)	23 (46%)	
Duration category			
<20 sec	7 (14%)	18 (36%)	<0.001
21 to 30 sec	20 (40%)	26 (52%)	
>30 sec	23 (46%)	6 (12%)	
ASA			
1	36 (72%)	30 (60%)	0.205
2	14 (28%)	20 (40%)	
MPC			
1	15 (30%)	20 (40%)	0.295
2	35 (70%)	30 (60%)	
C & L Macintosh			
1	20 (40%)	19 (38%)	0.974
2a	18 (36%)	19 (38%)	
2b	12 (24%)	12 (24%)	
C & L 2nd scope			
1	30 (60%)	36 (72%)	0.691
2	17 (34%)	14 (28%)	
3	3 (6%)	0 (0%)	
IDS			
0 &1	45 (90%)	50 (100%)	*
2	1 (2%)	0 (0%)	
3	4 (8%)	0 (0%)	

Table - 2: Comparison of Truview and C-mac video laryngoscope findings with Macintosh.

	Macintosh		
MCL grading	**Grade 1**	**Grade 2a**	**Grade 2b**
Trueview laryngoscope			
Grade 1	17 (85%)	9 (50.0%)	4 (33.3%)
Grade 2a	3 (15%)	7 (38.8%)	7 (58.3%)
Grade 2b	0 (0%)	2 (11.1%)	1 (8.3%)
C-mac video laryngoscope			
Grade 1	19 (100%)	11 (57.8%)	6 (50%)
Grade 2a	0 (0%)	8 (42.1%)	6 (50%)
Grade 2b	0 (0%)	0 (0%)	0 (0%)

Table - 3: Comparison of improvement in MCL grading between the two study groups.

	Group T (N=50)	**Group V**	**P Value**
Improved	20 (40%)	23 (46%)	<0.001
Not improved	30 (60%)	27 (54%)	

Table - 4: Comparison of MCL grading between the two study groups.

MCL grading	**Group T**	**Group V**	**P Value**
Grade 1	17 (85%)	19 (100%)	*
Grade 2a	3 (15%)	0 (0%)	

The reported incidence of difficult laryngoscopy and intubation by Prakash S, et al. [15] in Indian population was 9.7% and 4.5% respectively. Despite its popularity, with Macintosh laryngoscope failures during intubation are not uncommon especially in patients with unanticipated difficult airways, frequently leading to serious complications. Our study included 100 subjects. The improvement in glottic view obtained from C-Mac video laryngoscope was superior when compared with the Truviewscope in our study. Various studies in the literature have also demonstrated that video laryngoscopes might offer better views of the glottis and subsequent endotracheal intubation might be faster and successful when compared with direct laryngoscopy [1, 13, 14]. Our objectives and methodology were similar to that of Saxena A, et al. [16], Arora S, et al. [17], Tutuncu AC, et al. [1] and Singh I, et al. [18]. In our study, both the study groups were comparable in terms of age and sex distribution and other baseline characteristics such as mean age similar to that observed by Saxena A, et al. [16] and Arora S, et al. [17]. No statistically significant difference between the groups was noted in our study with respect to ASA status, MPC classification status, MCL grading with Macintosh. Our study only included patients belonging to ASA – I & II status with the majority belonging to ASA – I in both the groups. Similarly, Tutuncu AC, et al [1] in their study included patients only with ASA – I & II status. In our study in both the groups, patients with MPC - II outnumbered patients with MPC – I as reported by Arora S, et al. [17]. In our study IDS score was used to assess the difficulty in intubation. Majority (90%) of subjects in Group – T had IDS of 0 & 1 while in Group-V, all the subjects had IDS score of 0 &1. Intubation was quite easy with both the Truview and C-Mac video laryngoscope as the majority of the patient came under IDS score of 0 & 1. The mean duration of intubation was significantly higher in Truviewscope (31.26 secs) than the C-Mac video laryngoscope (23.10 secs). In a similar study, Li

JB, et al. [11] reported that with the Macintosh laryngoscope (34 s) , the mean time to intubate was significantly shorter compared with the Truview laryngoscope (51 s) ($p < 0.01$). In our study, the significant improvement was observed in CL grading - 1, i.e. Truview showed MCL – 1 in 30 patients whereas C-Mac video laryngoscope showed MCL – 1 in 36 patients. Similar to our study, Arora S, et al. [17] also observed improvement in the C & L grading with Truviewscope when compared with Macintosh scope. In their study Macintosh scope revealed MCL-1 in 78 patients whereas Truviewscope revealed MCL-1 in 105 patients. Singh I, et al. [18] also observed 92% improvement in glottic view visualisation by CL grading by 1 or 2 grades in Truview compared to Macintosh in anticipated difficult airways. In our study, Truview downgraded MCL glottic view in 5 patients from the original Macintosh glottic view while no such downgrade in glottic view was observed in C-Mac group. Kilicasian A, et al. [19] had also acknowledged the effectiveness of C-Mac in failed intubation with Macintosh scope during routine endotracheal intubation. The parameter used to assess the laryngoscopic view is MCL grading**.** In our study, as assessed by MCL grading scores, laryngoscopic view was better with both Truview and c-mac video laryngoscope in comparison with the Macintosh laryngoscope. 23 subjects in our study had improved glottis view with C-Mac video laryngoscope from the initial Macintosh glottic view compared to only 20 with Truviewscope. This difference was statistically significant in our study ($p<0.001$) as shown in **Table - 3**. But Singh R, et al. [20] in their study of pediatric subjects observed Truview was better than C-Mac laryngoscope. But contrary to their study, our population included only subjects in the age group of 16 to 60 years. The Truview EVO2 laryngoscope is designed to circumvent the problem of poor view at laryngoscopy. In Truview blade, there is a port which connects to the auxiliary oxygen flow meter of the anesthesia machine. This helps in prevention of misting besides clearing secretions from the lens and also providing continuous oxygen insufflation during intubation. The Eyepiece can also be connected to an endoscopic camera head with a monitor. Studies by previous authors had documented the superiority of MCL grading with Truviewscope compared to initial macintosh view [11, 17, 18] while several others had also documented the superiority of MCL grading with C-Mac video laryngoscope on comparison with initial macintosh view [19]. But studies comparing both C-Mac and Truview have been very rare in adults in the literature in the Indian settings. Our study adds further to the previous knowledge that the improvement in glottic view obtained from C-Mac video laryngoscope is superior when compared with the Truviewscope. Video laryngoscopes such as C-MAC video laryngoscopes with highly-curved or angulated blades allow an increased “look around the corner” to the glottic entrance and improve Cormack-Lehane (C-L) grading by 2 to 1 grade with easier intubation by providing both a direct laryngoscopic view and a small digital camera view that is displayed on the video screen, in contrast to many previous VLs [3].

Conclusion

Our study demonstrated that both Truview, as well as C-Mac video laryngoscope, enhanced the glottic view obtained from the initial Macintosh laryngoscope glottic view as described by CL scores. The improvement in glottic view obtained from C-Mac video laryngoscope is superior when compared with the Truview. In both the laryngoscopes, intubation was easy but the mean duration of endotracheal intubation was significantly longer with the Truview scope than the C-Mac video laryngoscope.

Limitations and Recommendations

Limitation of this study was that anesthesiologist could not be blinded to the type of device being used for the procedure. The study was limited to only a small sample size of fifty patients. In the selection of study subjects, there could have been introduction of bias with a poor initial laryngoscopy attempt and grading it as ‘difficult’. With the accepted role of VLs in

failed intubation, there should be the early introduction of video laryngoscopes in the training of young anesthesiologists.

References

1. Tutuncu AC, Kaya G, Tunali Y, Altintas F, Dilmen OK. A comparison of the TruView EVO2 and Macintosh laryngoscope blades. Clinics (Sao Paulo), 2011; 66(4): 709-11.
2. Ramkumar V. Preparation of the patient and the airway for awake intubation. Indian Journal of Anaesthesia, 2011; 55(5): 442-7.
3. Piepho T, Fortmueller K, Heid FM, Schmidtmann I, Werner C, Noppens RR. Performance of the C-MAC video laryngoscope in patients after a limited glottic view using Macintosh laryngoscopy. Anaesthesia, 2011; 66(12): 1101-5.
4. Macintosh RR. A NEW LARYNGOSCOPE. The Lancet, 1943; 241(6233): 205.
5. Goksu E, Kilic T, Yildiz G, Unal A, Kartal M. Comparison of the C-MAC video laryngoscope to the Macintosh laryngoscope for intubation of blunt trauma patients in the ED. Turk J Emerg Med., 2016; 16(2): 53-6.
6. Crosby ET, Cooper RM, Douglas MJ, Doyle DJ, Hung OR, Labrecque P, et al. The unanticipated difficult airway with recommendations for management. Can J Anaesth., 1998; 45(8): 757-76.
7. Bakshi SG, Vanjari VS, Divatia JV. A prospective, randomised, clinical study to compare the use of McGrath((R)), Truview((R)) and Macintosh laryngoscopes for endotracheal intubation by novice and experienced Anaesthesiologists. Indian J Anaesth., 2015; 59(7): 421-7.
8. Kaplan MB, Hagberg CA, Ward DS, Brambrink A, Chhibber AK, Heidegger T, et al. Comparison of direct and video-assisted views of the larynx during routine intubation. J Clin Anesth., 2006; 18(5): 357-62.
9. Maassen R, Lee R, Hermans B, Marcus M, van Zundert A. A comparison of three video laryngoscopes: the Macintosh laryngoscope blade reduces, but does not replace, routine stylet use for intubation in morbidly obese patients. Anesth Analg., 2009; 109(5): 1560-5.
10. Choi HY, Oh YM, Kang GH, Kang H, Jang YS, Kim W, et al. A Randomized Comparison Simulating Face to Face Endotracheal Intubation of Pentax Airway Scope, C-MAC Video Laryngoscope, Glidescope Video Laryngoscope, and Macintosh Laryngoscope. Biomed Res Int., 2015; 2015: 961782.
11. Li JB, Xiong YC, Wang XL, Fan XH, Li Y, Xu H, et al. An evaluation of the TruView EVO2 laryngoscope. Anaesthesia, 2007; 62(9): 940-3.
12. Gaszynska E, Gaszynski T. Truview EVO2 and standard Macintosh laryngoscope for tracheal intubation during cardiopulmonary resuscitation: a comparative randomised crossover study. Medicine (Baltimore), 2014; 93(14): e78.
13. Schuerner P, Grande B, Piegeler T, Schlaepfer M, Saager L, Hutcherson MT, et al. Hands-Off Time for Endotracheal Intubation during CPR Is Not Altered by the Use of the C-MAC Video-Laryngoscope Compared to Conventional Direct Laryngoscopy. A Randomized Crossover Manikin Study. PLoS One, 2016; 11(5): e0155997.
14. Aleksandrowicz D, Gaszynski T. Airway Management with Cervical Spine Immobilisation: A Comparison between the Macintosh Laryngoscope, Truview Evo2, and Total track VLM Used by Novices--A Manikin Study. Biomed Res Int., 2016; 2016: 1297527.
15. Prakash S, Kumar A, Bhandari S, Mullick P, Singh R, Gogia AR. Difficult laryngoscopy and intubation in the

Indian population: An assessment of anatomical and clinical risk factors. Indian Journal of Anaesthesia, 2013; 57(6): 569-75.

16. Saxena A, Madan M, Shrivastava U, Mittal A, Dwivedi Y, Agrawal A, et al. Role of the Truview EVO2 laryngoscope in the airway management of elective surgical patients: A comparison with the Macintosh laryngoscope. Indian J Anaesth., 2013; 57(3): 276-81.
17. Arora S, Sayeed H, Bhardwaj N. A comparison of Truview EVO2 laryngoscope with Macintosh laryngoscope in routine airway management: A randomised crossover clinical trial. Saudi J Anaesth., 2013; 7(3): 244-8.
18. Singh I, Khaund A, Gupta A. Evaluation of Truview evo2 Laryngoscope In Anticipated Difficult Intubation - A Comparison To Macintosh Laryngoscope. Indian J Anaesth., 2009; 53(2): 164-8.
19. Kilicaslan A, Topal A, Tavlan A, Erol A, Otelcioglu S. Effectiveness of the C-MAC video laryngoscope in the management of unexpected failed intubations. Braz J Anesthesiol., 2014; 64(1): 62-5.
20. Singh R, Kumar N, Jain A. A randomised trial to compare Truview PCD((R)), C-MAC((R)) and Macintosh laryngoscopes in paediatric airway management. Asian J Anesthesiol., 2017; 55(2): 41-4.