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Original Research Article

Comparison of Video Laryngoscope versus Mccoy Laryngoscope for Tracheal Intubation in Cervical Spine Surgeries

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Conflict of interest: Nil

Abstract:

Background: Video laryngoscopes are increasingly being used in potentially difficult airway. McCoy laryngoscope provides definitive advantage over conventional laryngoscopes in cervical spine patients. The present study was undertaken to compare the time taken for intubation, intubation difficulty scale (IDS) score and hemodynamic responses between McCoy and Truview video laryngoscope during tracheal intubation in cervical spine patients. ;

Method: A total 50 patients of ASA grade I and II, aged 20–50 years, posted for emergency and elective cervical spine surgeries under general anaesthesia were randomly allocated into Group V (Video-laryngoscope group, n=25) and Group C (McCoy group, n=25).

Results: Truview video laryngoscope required longer time (34.08seconds) for intubation as compared to McCoy laryngoscope (26.56seconds), which was statistically highly significant ($p<0.001$). Truview video laryngoscope provides better laryngoscopic view and makes intubation easy than McCoy laryngoscope. The number of cases in which the increased lifting force was required was significantly higher in McCoy group (56%) than Truview Video laryngoscope group (4%). More cases required external laryngeal pressure during intubation with McCoy laryngoscope (64%) as compared to Truview laryngoscope, (12%) ($p=0.0001$). Truview video laryngoscope makes lower IDS scores compared to McCoy laryngoscope. Hemodynamic responses during intubation were less with Truview video laryngoscope than McCoy laryngoscope. The complications encountered during laryngoscopy and intubation was similar and almost negligible in both groups.

Conclusion: Thus, in patients who are undergoing cervical spine surgeries the Truview video laryngoscope offers a better alternative to MacCoy and conventional direct laryngoscopy by improving laryngoscopic view with lower CL grading and ease of intubation with minimal hemodynamic responses.

Keywords: Video laryngoscopes; McCoy laryngoscope; cervical spine surgery; Intubation difficulty scale; Hemodynamic responses.

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Introduction

Airway management is the primary responsibility of anaesthesiologists. Endotracheal intubation is a necessary skill for all anaesthesiologists in order to provide safe general anaesthesia. Variety of methods are available for intubation [1] and laryngoscopes play an important role in securing airway in emergency conditions and in administration of general anaesthesia. Macintosh laryngoscope remains the most popularly used laryngoscope for endotracheal intubation in routine surgical patients under general anaesthesia. Despite its popularity, failures during intubation are not uncommon, especially in patients with unanticipated difficulty. Despite a number of factors and combinations of factors identified to predict difficult intubation preoperatively, none is capable of predicting all

difficult intubation [2]. Many different designs of laryngoscopes have been developed in an effort to reduce the incidence of this problem [3].

Video laryngoscopy (VL) has been recommended as an alternative during difficult conventional direct laryngoscopy, using the Macintosh blade (MAC). VLs are now included in the American Society of Anaesthesiologists (ASA) difficult airway algorithm, both as an initial approach in anticipated difficult airway, as well as in the non-emergency pathway as an alternate approach, following unsuccessful intubation attempt with MAC scope [4].

Several studies have compared the time to intubation, laryngoscopic view of video laryngoscopes, experience and ease to intubate with video laryngoscope with conventional laryngoscopy [5, 6]. However, many other studies claim better intubating conditions with Truview Laryngoscope in patients at low risk for difficult intubation, but at the cost of longer intubation time [7, 8]. On the other hand, some studies report its successful use as a rescue device in difficult airway situations where intubation attempts with Macintosh Laryngoscope fail. So, there is a conflict of views regarding the laryngoscopic view of glottis, ease of intubation and time for intubation between video laryngoscope and Macintosh laryngoscope [9]. Many video laryngoscopes are available in market like Glidescope, C-MAC, McGrath series 5, McGrath MAC, Airtraq, and Truview EVO2 etc. There are not many studies done in India comparing a McCoy blade and Video laryngoscope. Hence the present study was done to compare video laryngoscope versus McCoy laryngoscope for tracheal intubation in cervical spine surgeries.

Materials and Methods

After obtaining Institutional Ethical Committee approval and written informed consent from all the patients, this randomized controlled study was conducted in the Department of Anaesthesiology, at a tertiary care hospital during a period from January 2020 to October 2021. During the study period a total of 50 patients of age 20 to 60 years, ASA status 1 and 2, weight >50kg, Mallampatti classification (MPC) 1 and 2, scheduled for both emergency and elective cervical spine surgeries requiring endotracheal intubation were included in the study. Patients of ASA status 3 and 4, age <20 and >60 years, patients with hemodynamic and respiratory compromise, anticipated difficult airway, history of gastroesophageal reflux disease and patients with body mass index (BMI) more than 35 kg/m^2 were excluded from the study.

Pre-operative airway assessment was done in all patients by an anaesthetist blinded to group allocation of two groups (Group V- Video laryngoscope group and Group C- McCoy group) each with 25 patients using chit in a box method. Fifty chits, 25 labelled V and 25 labelled C, were put into a box and after mixing, one chit was picked by each subject and not replaced in the box. This simple method of randomization ensured equal allocation of cases to both the Truview and the McCoy groups. All patients were kept fasting for 8 hours prior to surgery. Oral alprazolam 0.25mg was given the night before and on the morning of surgery. Standard monitors including electrocardiography (ECG), non-invasive blood pressure (NIBP), pulse oximetry (SpO2) was attached, and baseline vitals were noted.

All patients were pre-medicated with Inj. Glycopyrrolate 0.2mg, Inj. midazolam 0.02 mg kg-1, Inj. Fentanyl-2 mcg/kg intravenously and pre-oxygenated with 100% oxygen for 3 minutes. Induction was done with intravenous propofol 2-3 mg/kg. After assessing the ability to ventilate with face mask, Inj. Atracurium 0.5 mg/kg intra venous was administered to facilitate endotracheal intubation. After 3 minutes of controlled ventilation, according to the group allocation laryngoscopy was done with either Truview PCDTM or McCoy laryngoscope and the best possible view of glottis was obtained. Glottis visualization was graded according to Cormack-Lehane grading.

Percentage of glottis opening (POGO) score (0 to100%; 100% = full view of glottis from anterior commissure to inter-arytenoid notch, 0 = even interarytenoid notch is not seen). Manipulations were performed as recommended in the instruction manual of the device if adequate glottis view was not visible. Cuffed polyvinyl endotracheal tube (ETT) was used for intubation (internal diameter 7 mm for females and 8 mm for males). Intubation with McCoy laryngoscope was done using the standard technique and its lever was activated during intubation if required. Truview PCDTM video laryngoscope series five was inserted in mouth along the midline of the tongue and the blade advanced until the larynx became visible on screen. Endotracheal tube loaded on a well lubricated truflex articulating stylet was advanced into the oropharynx till its tip is visible on screen. The lever on the proximal end of Truflex articulating stylet was then depressed resulting in anterior flexion of the endotracheal tube easing its passage through the glottis opening. Lever of the stylet was then released, and the stylet was removed. Endotracheal tube was further passed into the trachea till bilaterally equal and adequate air entry in the lungs was achieved. Anaesthesia was maintained with oxygen, nitrous oxide (40:60) and isoflurane along with maintenance doses of inj. vecuronium.

If the first intubation attempt failed, next intubation attempt was made after mask ventilation for 1 minute. Failure to intubate was defined as inability to intubate the patient's trachea in three intubation attempts. In that case intubation was accomplished

by the anaesthetist by the device of his/her choice. All intubations were performed by an anaesthetist with a previous experience of more than 20 successful intubations with each laryngoscope. The number of intubations attempts, and the intubation success rate was noted. The intubation difficulty scale score (IDS 0= easy, IDS 1-5= slight difficulty, IDS >5 = major difficulty in intubation) was calculated as the primary outcome. The incidence of oesophageal intubation, mucosal trauma and dental injury was recorded. The heart rate (HR), ECG, oxygen saturation (SpO2), and mean arterial pressure (MAP) was recorded at the baseline, post induction, just after tracheal intubation and at 1-, 3-, and 5-min post intubation. Any episode of hypotension (MAP <20% of baseline), bradycardia (HR <40 bpm), hypertension (MAP > 20% of baseline), hypoxemia (SpO2 <90%) and cardiac arrhythmia was noted.

Data analysis

The collected data was expressed as frequency and percentage for categorical data and means with their standard deviation for continuous data. Chi-square test for categorical data and t-test for continuous data was used for estimating statistical differences between the groups. Statistical analysis was done by using software SPSS 27.0 version and GraphPad Prism 7.0 version. A $p<0.05$ was considered as level of significance.

Results

A total of 50 patients posted for cervical spine surgeries under general anaesthesia were randomly allocated into 2 groups of 25 patients in each group. Both the groups were comparable and found no significant difference with respect to demographic profile of the patients, ($p>0.05$) as shown in table 1.

Table 1: Demographic data in group V and group C

Demographic data		Group V	Group C	p-value
Age in years	Mean	46.64±13.01	49.16±11.07	0.46
Gender	Male	21(84%)	18(72%)	0.30
	Female	4(16%)	7(28%)	
ASA Status	Grade I	13(52%)	17(68%)	0.24
	Grade II	12(48%)	8(32%)	
Mallampatti Classification	1	13(52)	17(68)	0.248
	2	12(48)	8(32)	
BMI (kg/m2)	Mean	24.20±0.76	24.55±1.31	0.25

McCoy laryngoscope requires lesser time for intubation compared to Truview video laryngoscope, ($p<0.001$). 32% of patients required an alternate technique for intubation with McCoy blade whereas none with Truview video laryngoscope, ($p=0.004$). 60% of patients in group C and 16% of patients in group V needed more than one operator, ($p=0.0005$). Truview Video laryngoscope improves the glottic exposure significantly during intubation and was better than McCoy laryngoscope. The number of cases in which increased lifting force was required was significantly higher in group C (56%) than group V (4%). More cases required external laryngeal pressure during intubation with McCoy laryngoscope (64%) as compared to Truview laryngoscope, (12%) ($p=0.0001$), (Table 2).

Table 2: Comparison of intubation characteristics in group V and group C

Intubation characteristics		Group V	Group C	p-value
Time taken for intubation (sec)	Mean	34.08±3.45	26.56±3.61	0.0001
Intubation attempts	1	24 (96%)	23 (92%)	0.5515
	≥2	01 (4%)	02 (8%)	
Alternate technique required for intubation	Yes	00 (0%)	08 (32%)	0.004
	No	25 (100%)	17 (68%)	
Number of operators required for intubation	1	21 (84%)	09 (40%)	0.0005
	2	04 (16%)	16 (60%)	
Cormack and Lehane grading	1	16 (64%)	01 (4%)	0.00001
	2	08 (32%)	13 (52%)	
	≥3	01 (4%)	11 (44%)	
Lifting force required	Increased	01 (4%)	16 (56%)	<0.00001
	Normal	24 (96%)	09 (44%)	
External laryngeal pressure during intubation	Applied	3(12%)	16 (64%)	0.0001
	Not applied	22(88%)	9 (36%)	

Figure 1 shows the percentage of Glottis Opening (POGO) score. There was significant difference between the groups with respect to POGO Score ($p=0.015$).

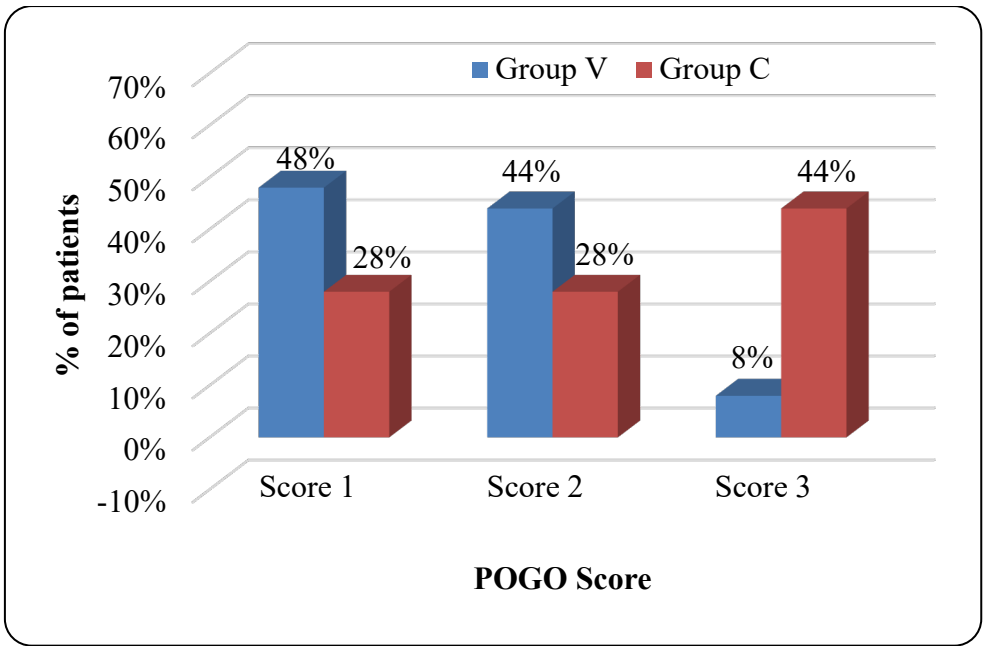

Figure 1: Comparison of POGO score in group V and group C

From figure 2 it is observed that there was significant difference between the groups with respect to intubation difficulty score, that is ease of intubation (p=0.037).

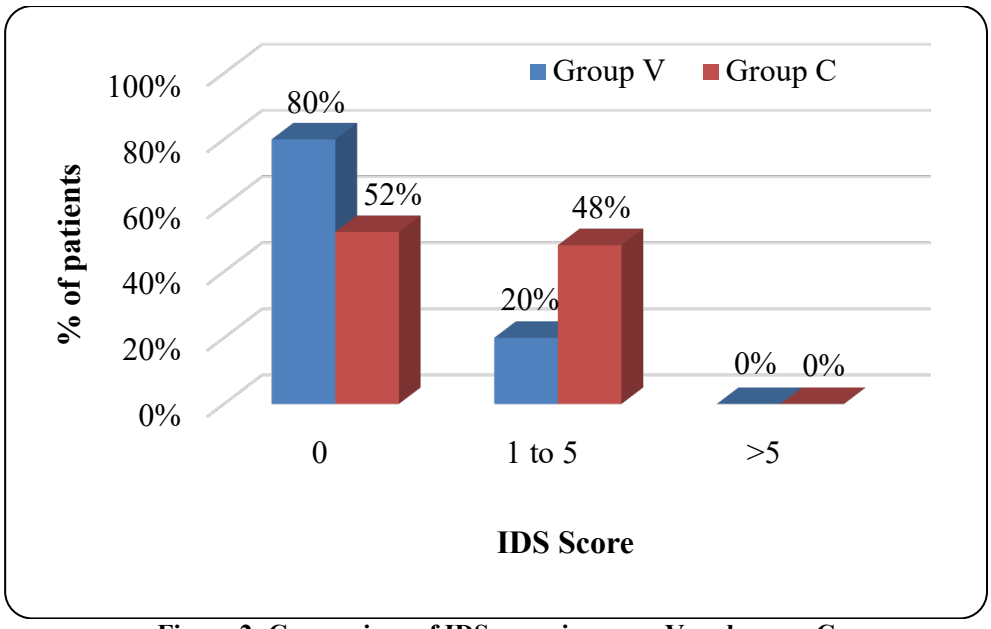

Figure 2: Comparison of IDS score in group V and group C

Hemodynamic responses during intubation were less with Truview video laryngoscope than McCoy laryngoscope.

There was significant difference between the groups with regard to basal, after induction MAP and just after tracheal intubation and at 1st ,3rd,5th, min after intubation with p values (<0.05). There was no statistically significant difference regarding the HR between Group V and Group C at basal, after induction, at 3rd and 5th min after intubation in both groups, (p>0.05) while heart rate variation between the groups just after tracheal intubation and 1st min of intubation were statistically significant. (P<0.05). Statistically there was no significant difference in SPO2 at baseline, after induction, just after tracheal intubation and after 1st ,3rd, and 5th min of intubation among the two groups (p>0.05), (Figure 3).

Complications were very less in both the groups. There was no significant difference between the groups. (p =1). Mucosal Trauma observed in 2(8%) patients in each group.

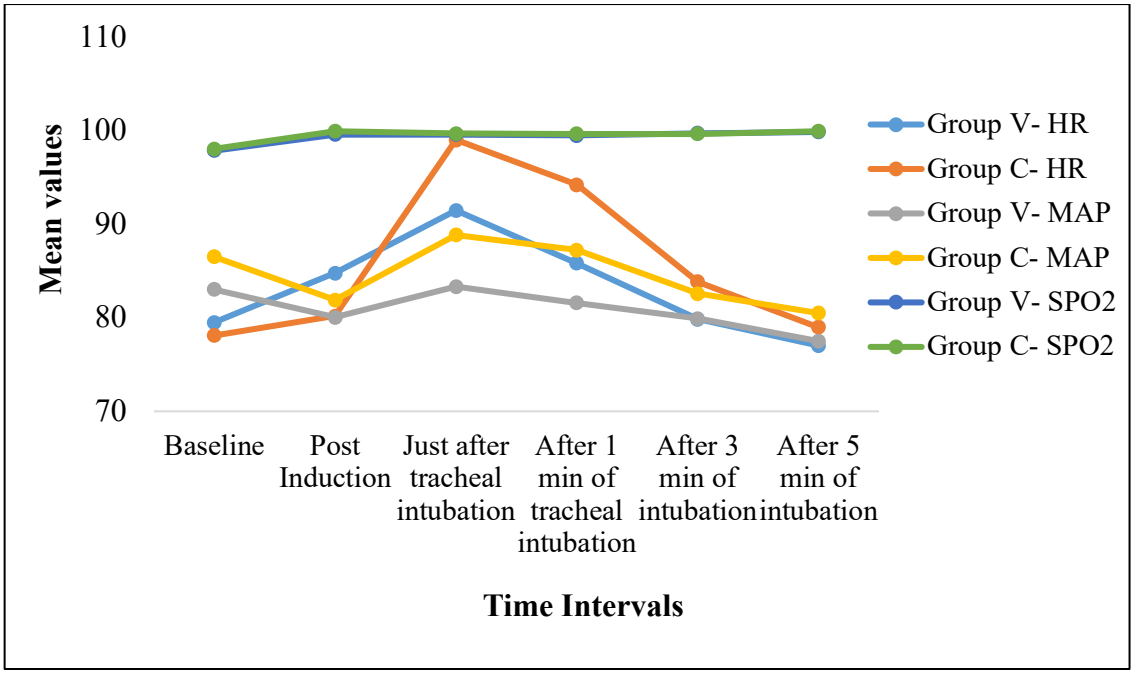

Figure 3: Comparison of hemodynamic changes during intubation in group V and group C

Discussion

In the present study, Truview video laryngoscope required more time (34.08seconds) for intubation when compared with McCoy laryngoscope (26.56 seconds) with a significant p value (0.0001) which is comparable with the study done by Saxena et al [10], Joseph et al [11] and Malik et al [12]. The difficulty in advancing the tube via the lateral side of the patient's mouth is the primary cause for the extended duration of tracheal intubation using TruView, which was also reported by Malik et al [12] and Barak et al [13]. Another problem with TruView is fogging, which hinders the visualization of the cords. Several measures were used to reduce lens fogging including insufflation of oxygen from the side port, warming pf blade with hot water [12]. To overcome the fogging problem, we have used Oxygen at the flow rate of 6 L/min.

When compared IDS score between the Truview video laryngoscope and McCoy laryngoscope we found that 80% of patients in Truview group has score 0 and 20% were having the score in between 1-5, whereas in McCoy group 52% of patients has IDS score of 0 and 48% were having the score between 1-5 and none with score more than 5 in both groups. Lower IDS scores were observed in Truview group compared to McCoy group with significant p value of 0.037. As per IDS score glottic exposure was measured as Cormack and Lehane grade minus one. The best glottis exposure thus measured was Cormack and Lehane grade 1 in 64% of cases with Truview video laryngoscope and 4% with McCoy laryngpscope. The Cormack Lehane grade 3 or more was present in 4% with Truview group whereas 44% in McCoy group with p value of <0.05 which was statistically significant. Thus, the Truview video laryngoscope provides better glottic exposure and lesser Cormack and Lehane grading and less POGO score compared to McCoy laryngoscopeas in cervical spine surgeries as seen in other similar studies [10-12, 14, 15]. The lifting force for intubation was required more for McCoy laryngoscope (56%) than the Truview laryngoscope (4%) with a significant p value of 0.0001. Similar conclusions were seen in Joseph et al [11] and Barak et al study [13].

During intubation 64% of cases done by McCoy laryngoscope required laryngeal pressure whereas it was seen that only 12% done by Truview video laryngoscope required external laryngeal pressure for tracheal intubation in cervical spine surgeries. Similar results were found in study by Malik et al [12] and Li et al [16]. More than one attempts at intubation was required in 8% of patients by McCoy laryngoscope and 4% by Truview video laryngoscope. However, the number of attempts with each blade at intubation was not found to be statistically significant. Similar results were reported in the study by Barak et al [13]. The number of cases requiring more than one number of alternate techniques for successful intubation was 32% in McCoy group and none in Truview group which was statistically significant with p value of 0.004.

These findings are in accordance with the previous studies [12, 15]. When we compared each laryngoscope for the number of operators required while performing tracheal intubation McCoy required more than one operator in 60% of the cases and 16% in Truview video laryngoscope group. 92% of patients in Truview group has POGO score

1 and 2 whereas in McCoy group only 56% of patients have score of 1 and 2. Only 8% in Truview group has a score of 3 and 44% in McCoy group with a p value of 0.015 which was statistically significant. Similar results were found in a study by Saxena et al [10], Malik et al [12] and Bharti N et al [17].

The significant difference existed between baseline, post induction heart rate and just after tracheal intubation and 1 minute after tracheal intubation. The mean heart rate in Truview group pre intubation was 84.80 seconds and in McCoy group were 80.20 which were not significant. But the mean heart rate post induction in Truview group was 91.52 seconds and 99.08 seconds in McCoy group which was statistically significant. Also, significant difference was noted between pre intubation and post intubation mean arterial pressure (MAP). Mean MAP in Truview group was 80.83mmhg and McCoy group was 81.92mmhg before induction. Mean MAP in Truview group just after tracheal intubation was 83.36mmhg and 88.88mmhg in McCoy group which was statistically significant. There was no significant difference between spo2 in both groups. Thus, the overall intubation response was less with Truview video laryngoscope compared with McCoy laryngoscope. The anteriorly placed structures like epiglottis and the glottis are triggering sites for hemodynamic responses during laryngoscopy.

Truview video laryngoscope requires minimal lifting force for intubation compared to McCoy laryngoscope and hence it significantly reduces the hemodynamic stress response to laryngoscopy. The above findings of hemodynamic responses are comparable with the other studies conducted by Saxena et al [10], Joseph et al [11], Bharti N et al [17], Singh I et al [18] and Khan RM et al [19]. The frequency of complications encountered due to laryngoscopy with each blade was similar and almost negligible in current study with statistically insignificant difference which is in accordance with the study done by Malik et al [12]. The main limitation of present study that it is not possible to blind the anaesthetist to the laryngoscope device being used and hence, there is possibility of observer bias. IDS score was therefore added to have a comprehensive assessment of the ease of intubation through multiple indices.

Conclusion

From the findings of present study it can be concluded that in patients who are undergoing cervical spine surgeries the Truview video laryngoscope offers a better alternative to conventional direct laryngoscopy by providing better glottic visualization with lower IDS, improved C-L grade, and POGO score thereby, facilitates oral intubations with minimal hemodynamic responses and without significant complications but takes longer time for intubation than McCoy laryngoscope.

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