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Truview PCD™ Video Laryngoscope versus McCOY Laryngoscope for Tracheal Intubation: A Comparative Study.

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ABSTRACT

Background: McCoy laryngoscope and video laryngoscopes are being increasingly used and have a definitive advantage over conventional laryngoscopes in management of potentially difficult airways. The aim of our study was to compare relative effectiveness of McCoy laryngoscope and True view PCD™ video laryngoscope in patients undergoing oral tracheal intubation. **Methods:** Fifty patients of American Society of Anaesthesiologists (ASA) grade I and II, aged 20 – 50 years, posted for elective surgery under general anaesthesia were randomly allocated into Group T (Truview group, n=25) and Group M (McCoy group, n=25). The two groups were compared for demographic data, intubation difficulty score (IDS), Cormack-Lehane (CL) grade, POGO score, time to intubation, number of intubation attempts and haemodynamic parameters. **Results:** The demographic data and ASA status was comparable in both the groups. Group T had a significantly less IDS score as compared to Group M ($p < 0.001$). Seventeen patients in Group T and 8 patients in Group M had IDS = 0. The CL grade and POGO scores were better in Group T than in Group M. Intubation was successful in the first attempt in 94% patients in Group T and 88% patients in Group M. There was a transient increase in HR and NIBP after intubation in both the groups which returned back to the baseline within 5 minutes. No incidence of hypoxia and airway trauma was noted in the two groups.**Conclusion:** Truview PCD™ video laryngoscope resulted in better glottic visualization with lower IDS than McCoy laryngoscope in patients undergoing oral tracheal intubation.

Keywords: McCoy laryngoscope, Truview PCD™ video laryngoscope, tracheal intubation.

INTRODUCTION

Cases of difficult and failed intubation are the leading causes of anaesthesia related morbidity and mortality. Recent advances in airway management have resulted in the advent of various optical and video laryngoscopes. McCoy laryngoscope has a hinged tip that improves the CL laryngoscopic view by I grade in comparison to the conventional Macintosh blade in patients with cervical spine injury.[1-3]

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Truview PCD™ video laryngoscope with Truflex articulating stylet enables difficult oral and nasal intubations to be performed using a minimal amount of force and causing a reduced rate of patient side effects such as sore throat or soft tissue damage. It consists of reusable stainless steel blades, a view tube, an oxygen insufflations port, a camera head that attaches to proximal part of view tube, a handle that provides the light source and a portable (5.5" battery powered) monitor [Figure 1, 2]. Distal end of its blade contains a prism with a 47 degree anterior view that refracts the line of vision and improves the C-L grade. The proximal lens magnifies the acquired image. An oxygen jet spray delivered via a unique injector, across the blade lenses during intubation procedure serves to slow the rate of desaturation; prevent misting and remove secretions on the lenses thereby ensuring a clear visual picture throughout the entire intubation procedure.[4]

Figure 1: Truphatek Truview PCD™ Video laryngoscope.

Figure 2: Video laryngoscope blades and handle with Truflex articulating stylet.

We conducted this prospective randomised study to compare the efficacy of McCoy laryngoscope with Truview PCD™ video laryngoscope for oral intubation in patients posted for elective surgery.

MATERIALS AND METHODS

The study was conducted in our institute from January 2016 to April 2016, after getting approval from the concerned authorities. Fifty patients of ASA grade I and II, aged 20 – 50 years, posted for elective surgery under general anaesthesia requiring oral endotracheal intubation were included in the study after obtaining an informed written consent. Patients with haemodynamic and respiratory compromise, anticipated difficult airway, history of gastroesophageal reflux disease and body mass index (BMI)≥ 35 kg m^{-2} were excluded from the study.

Preoperative airway assessment was done by an anaesthetist blinded to group allocation. 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 (SpO_2) were attached and baseline vitals were noted.

The patients were randomly allocated into Group T (Truview group, n=25) and Group M (McCoy group, n=25) using sealed envelope technique. All patients were pre-medicated with Inj. Glycopyrrolate 0.2mg, Inj. midazolam 0.02 mg kg^{-1}, Inj. Fentany l-2 mcg kg^{-1} intravenously and pre-oxygenated with 100% oxygen for 3 minutes. Induction was done with intravenous propofol 2-3 mg kg^{-1}. After assessing the ability to ventilate with face mask, Inj. vecuronium 0.1 mg kg^{-1}i.v. was administered to facilitate endotracheal intubation. After 3 minutes of controlled ventilation, according to the group allocation laryngoscopy was done with either Truview PCD™ or McCoy laryngoscope and the best possible view of glottis was obtained. Glottis visualization was graded according to Cormack-Lehane grading.[5]

The Cormack-Lehane grading of glottic view

Grade 1	Visualization of the entire glottic aperture
Grade 2a	Visualization of parts of the laryngeal aperture
Grade 2b	Visualization of only the arytenoids or at least parts of the laryngeal aperture
Grade 3	Visualization of the tip of the epiglottis
Grade 4	No visualization of the epiglottis or larynx

Percentage of glottis opening (POGO) score (0 to 100%; 100% = full view of glottis from anterior commissure to inter-arytenoid notch, 0 = even inter-arytenoid 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 PCD™ video laryngoscope series five was inserted in mouth along the midline of the tongue and the blade was 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 was 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 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 intubation attempts and the intubation success rate were noted. The intubation difficulty score[6] (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 (SpO_2), and mean arterial pressure (MAP) were 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 (SpO_2 <90%) and cardiac arrhythmia was noted.

RESULTS

The demographic data and ASA status was comparable in both the groups [Table-1]. Group T had a significantly less IDS score as compared to Group M ($p < 0.001$). Seventeen patients in Group T and 8 patients in Group M had IDS = 0 [Figure 3]. The CL grade and POGO scores were better in Group T than in Group M [Figure 4,5]. Intubation was successful in the first attempt in 94% patients in Group T and 88% patients in Group M [Table-2].
There was a transient increase in HR and NIBP after intubation in both the groups which returned back to the baseline within 5 minutes. No incidence of hypoxia and airway trauma was noted in the two groups.

Table 1: Demographic parameters.

Parameter	Group T (n=25)	Group M (n=25)	p-value
Age (yrs)	35.4±11.2	38.2±10.7	0.371
Weight (kg)	73.6±8.6	71.5±9.1	0.406
Height (cm)	174.4±10.6	168.5±11.4	0.064
Gender (male: female)	15:10	16:9	
ASA grade (I:II)	17:8	15:10	

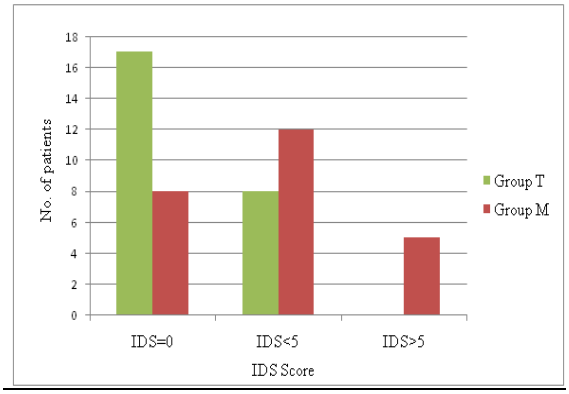

Figure 3: Comparison of IDS score between the two groups.

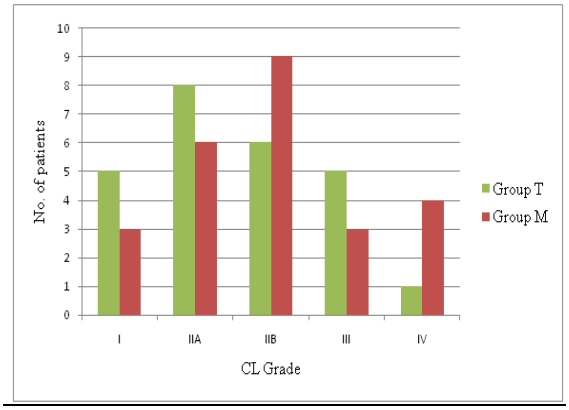

Figure 4: Comparison of CL Grade between the two groups.

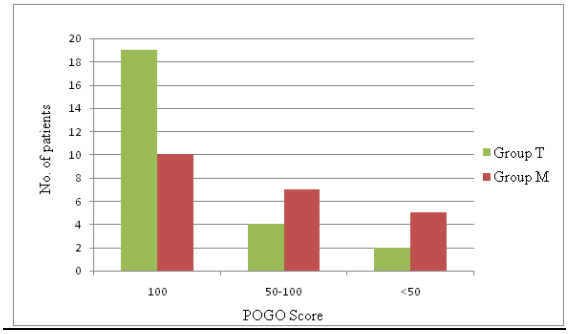

Figure 5: Comparison of POGO score between the two groups.

Table 2: Comparison of different parameters between the two groups.

Parameter	Group T	Group M
CL grade		
I	5	3
IIa	8	6
IIb	6	9
III	5	3
IV	1	4
Successful Intubation; n(%)	25 (100%)	25 (100%)
1st attempt intubation rate	23(94%)	22(88%)
2nd attempt intubation rate	2	3
No. of attempts 1/2/3	23/2/0	22/3/0
Total intubation time (sec)	35.4±6.4	30.3±5.7

DISCUSSION

The Truview PCD™ video laryngoscope was designed to improve the view of the larynx in patients where a traditional laryngoscope provides a poor view. It applies the optical principle of light refraction to provide a more anterior view of larynx and thus allow intubation to be performed under direct visualisation more frequently than is possible with a conventional laryngoscope.[4]Previous studies have demonstrated that Truview improves the laryngeal view when compared with the Macintosh laryngoscope in patients with normal and anticipated difficult airways.[7,8]Truview has been used successfully in patients with difficult airways in whom laryngoscopy with the Macintosh laryngoscope failed.[9]Truview laryngoscope required less number of optimization maneuvers and had reduced intubation difficulty scores. In a recent study, Joseph et al also reported low intubation difficulty scores with the Truview laryngoscope than with the McCoy laryngoscope in patients with cervical spine immobilization.[10]
In our study we noted a reduced IDS score with Truview PCD™ video laryngoscope as compared to McCoy laryngoscope. Also the first attempt intubation rate was higher in Group T than Group M. Bharti et al in their study comparing McCoy,

Truview and Macintosh laryngoscopes for tracheal intubation in patients with immobilized cervical spine also observed a significantly reduced IDS score in Truview group as compared with other groups ($p < 0.001$). The Cormack-Lehaneglottic view and the POGO scores were better with Truview and McCoy laryngoscopes as compared with the Macintosh laryngoscope andthe first attempt success rate was 95% in the Truview laryngoscope group while 84% in the Macintosh group and 91% in the McCoy group. However, the overall success rate and incidence of complications was comparable between the groups.[11]

Bhamidipati et al compared McCoy laryngoscope with McGrath video laryngoscope for tracheal intubation in patients with immobilised cervical spine and concluded that McGrath video laryngoscope is superior to McCoy laryngoscope in terms of providing better intubating conditions with significant prolongation of effective laryngoscopy time (13.34±1.88 sec vs 10.45±0.96 sec, $p = 0.000$).[12]

Jain et al in their study to compare the effectiveness of McCoy laryngoscope and CMAC video laryngoscope in simulated cervical spine injuries observed that IDS score was significantly less in the CMAC group compared to the McCoy group (median [interquartile range (IQR)], 1 [0-1] vs 4 [3-6], $p < 0.05$). CMAC video laryngoscope required significantly less time for glottis visualization with median IQR, 5 (5-7) vs 14 (18-15), $p = 0.000$ in McCoy laryngoscope, 29 (96.7%) patients in the CMAC group had Modified CL Grade I compared with 16 (53.3%) patients in McCoy group. The haemodynamic variables, number of optimising maneuvers and incidence of side effects were comparable in the two groups. They conclude that CMAC video laryngoscope forms an effective tool for airway management of cervical spine patients with a cervical collar.[13]

The main limitation of our 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. Also, more comparative studies are needed to assess the relative efficacy of these laryngoscopes with other devices like intubating laryngeal mask airway, Airtraq, McGrath and CMAC video laryngoscope.

CONCLUSION

Truview PCD^{TM} video laryngoscope resulted in better glottic visualization with lower IDS, improved C-L grade and POGO score than McCoy laryngoscope thereby, facilitates oral intubations without significant complications. Truflex articulating stylet prevented the impaction of the endotracheal tube on posterior pharyngeal wall. Therefore, video laryngoscope is a promising device in situations of predicted difficult laryngoscopy and intubation.

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