COMPARISON OF LARYNGOSCOPIC VIEW USING TRUVIEW AND MACINTOSH LARYNGOSCOPE FOR INTUBATION IN CERVICAL IN-LINE POSITION UNDER GENERAL ANAESTHESIA

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ABSTRACT

BACKGROUND

The laryngoscopic manoeuvre by Macintosh laryngoscope (M) causes maximum movement of the cervical spine which may be hazardous in patients with suspected/confirmed cervical spine injury carrying risk of neurological deterioration. The Truview PCD laryngoscope (T) is a modified laryngoscope blade which provides a good vision of the larynx in patients with limited neck extension.

AIMS

The present study was planned to determine whether Truview Laryngoscope can be used routinely for endotracheal intubation in place of Macintosh Laryngoscope in patients with normal distribution of airway characteristics in cervical in-line position.

MATERIAL AND METHOD

The study was conducted in 174 patients of age group of 18-60 years of either sex, of ASA I and II scheduled for elective surgery under general anaesthesia. The patients were randomly divided in two groups, i.e. group M and group T according to laryngoscope used. Intubation was performed in cervical in-line position, laryngoscopic view using Cormack and Lehane grading and subjective intubation difficulty score (IDS) was recorded.

RESULTS

The Truview laryngoscope provides a better laryngoscopic view as suggested by improved Cormack and Lehane grading. Intubation difficulty score was lower in Truview (1.56±0.69) as compared to Macintosh (3.14±0.95).

CONCLUSION

In view of better Cormack and Lehane grading and less intubation difficulty score, Truview is a better option for intubation in cervical in-line position.

KEYWORDS

Truview Laryngoscope, Macintosh Laryngoscope, Cervical In-Line Position.

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INTRODUCTION

Securing the airway with cuffed endotracheal tube in the trachea is still one of the most important skills in anaesthesia. Failures during intubation are not uncommon, especially in patients with unanticipated difficulty (1.5-8.5% of all general anaesthesia).[1] Complications arising from difficult or failed intubation remain a leading cause of anaesthesia related morbidity and mortality.[2-3] The curved laryngoscope blade described by Macintosh in 1943 is the most popular device used to facilitate orotracheal intubation and constitutes a gold standard.[4] Direct laryngoscopy with Macintosh laryngoscope causes maximum movement of the cervical spine which may be hazardous in patients with suspected/confirmed cervical spine injury carrying risk of neurological deterioration.[5] Failure to adequately immobilise the neck during tracheal intubation in patients with cervical spine injuries can result in devastating neurological outcomes. Anatomic studies that mimic complete C4–5 ligamentous injury demonstrate that manual in-line stabilisation (MILS) reduces segmental angular rotation and distraction.[6] It has been found that cervical movement is greatest with Macintosh, Followed by McCoy, and is least with Bullard laryngoscope.[7] These issues have prompted, in part, the development of a number of alternatives to the Macintosh laryngoscope, including modifications to the Macintosh, such as the Truview PCD laryngoscope blade. The Truview PCD laryngoscope is a modified laryngoscope blade incorporating an unmagnified optic side port.

The optical apparatus provides a 48-degree angled deflection view through a 15 mm eyepiece and this provides a

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good vision of the larynx in patients with limited neck extension. Truview PCD laryngoscope improves Cormack and Lehane grading by one or more grades without much difference in time required for negotiation of the endotracheal tube when compared with Macintosh Laryngoscope in patients with anticipated difficult airway.[8,9] The present study was planned to determine the usefulness of Truview laryngoscope for intubation in cervical in-line position in ASA grade I&II patients. For this purpose, we considered view of glottic exposure using the Cormack and Lehane grading as primary aim and time taken to intubation, ease of intubation and haemodynamic changes to laryngoscopy and intubation as secondary aim. So that its usefulness can be defined in patients suspected of cervical trauma in emergency room or in operation theatre.

MATERIAL AND METHODS

This proposed observational study was done in patients admitted for routine surgery, general anaesthesia at Nehru Hospital in BRD Medical College, Gorakhpur. After obtaining approval from ethical committee, the study was done on 174 adult patients of either sex. Informed and written consent to participate in this study was taken from all patients on a separate consent form. Patients were selected randomly from the list of cases posted for routine surgery of that day and distributed in two groups.

Macintosh group (M) - In which laryngoscopy done by the Macintosh laryngoscope (n= 96). Truview group (T) - In which laryngoscopy done by the Truview laryngoscope (n= 78).

The exclusion criteria were of patients of ASA ≥III, Mallampati grading ≥II, TMJ ankylosis, Body mass index (BMI) ≥35 kg/m^2, Coagulopathy or history of anticoagulant use, Cervical spine injury, Raised intracranial pressure, and patients with risk factors for pulmonary aspiration of gastric contents (full stomach, emergency surgery and pregnant patients). All laryngoscopy and intubations in the study patients were done by expert consultant anaesthetists. A stylet was inserted into the appropriate-sized cuffed endotracheal tube for intubation with the Truview and Macintosh laryngoscope. A standard anaesthesia technique was used in all patients. Laryngoscopic view of study patients was observed according to Cormack and Lehane (CL) classification in cervical in-line position during laryngoscopy by either of the two laryngoscopes (Macintosh or Truview). If the view after laryngoscopy was more than Cormack and Lehane Grade 2, then external laryngeal manipulation was carried out in the form of backward, upward, rightward pressure (BURP) to facilitate tracheal intubation.

The need for External Laryngeal Manipulation was classified as

- **Grade 1:** No requirement of external laryngeal manipulations.
- **Grade 2:** Requirement of external laryngeal manipulation.

After intubation, the anaesthetist was enquired about ease of intubation on a subjective basis as easy, moderately difficult or very difficult. Intubation difficulty was also scored on a seven-point scoring system (intubation difficulty score) as devised by Adnet et al (1997).[10]

The duration of the first tracheal intubation attempt and of the subsequent successful attempt in case that the first attempt is not successful was recorded. A maximum of three intubation attempts were permitted. A failed intubation attempt was defined as an attempt in which the trachea was not intubated or which required >60 seconds to perform.

Continuous ECG, HR, NIBP and SPO_2 were recorded throughout perioperative period. Data of above monitoring was collected before induction, after induction and after intubation for tabulation and calculation. The student's "t" test and Chi-square with Yates' correction test (X^2) were used to determine the statistical significance of parametric data and categorical data respectively.

OBSERVATION

Groups	Grade 1	Grade 2	Grade 3
Macintosh (M)	0	45 (46.87%)	51 (53.12%)
Truview (T)	43 (53.13%)	33 (42.31%)	2 (2.56%)
Statistical Comparison applied between Grade 2 and Grade 3	X^2= 23, df=1	P<0.001	
None of the patients in both the groups had Grade 4 Glottic Visualisation			

Table 1: Comparison of Glottic Visualisation (Cormack and Lehane Grading)

P value: >0.05 not significant, <0.05 significant, <0.001 highly significant.

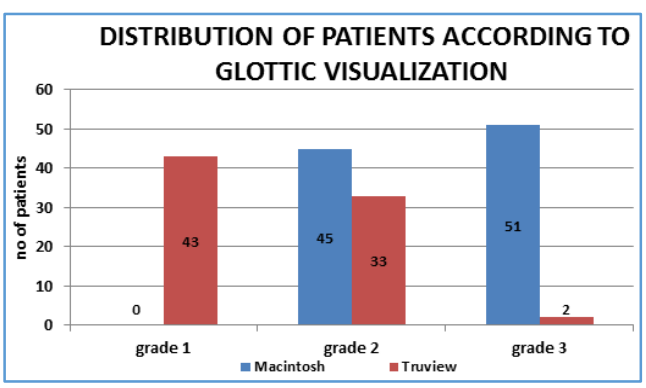

Fig. 1

Bar diagram showing distribution of patients according to glottic visualisation

Groups	Mean	SD	'P' Value	'T' Value
Macintosh (M)	15.42	1.67	<0.001	26.979
Truview (T)	22.67	1.87		

Table 2: Statistical Comparison of Mean time taken for Intubation (in seconds) in both the Groups

P value: >0.05 not significant, <0.05 significant, <0.001 highly significant.

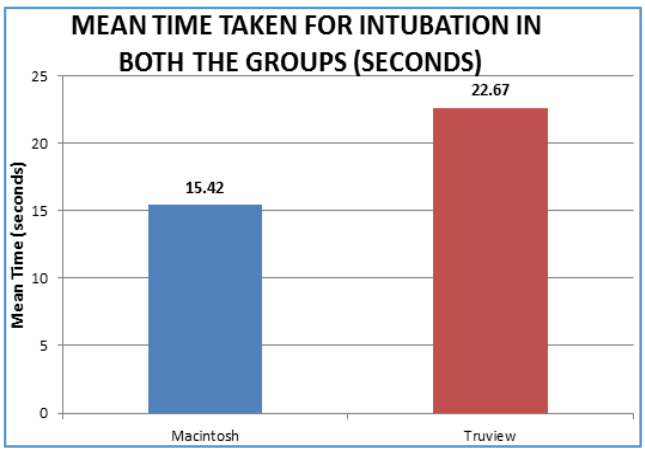

Fig. 2

Bar diagram showing mean time taken for intubation in both the groups (Seconds).

IDS SCORE		1	2	3	4
No. of Patients	Macintosh Group	0	37	8	51
	Truview Group	41	32	3	2
None of the patients in both the groups have IDS score 0 or more than 4.					

Table 3: Table showing Distribution of Patients according to Intubation Difficulty Score (IDS)

- IDS =0 (Easy intubation)
- IDS = 1-5 (Moderately difficult intubation)
- IDS = 6-15 (Very difficult to impossible)

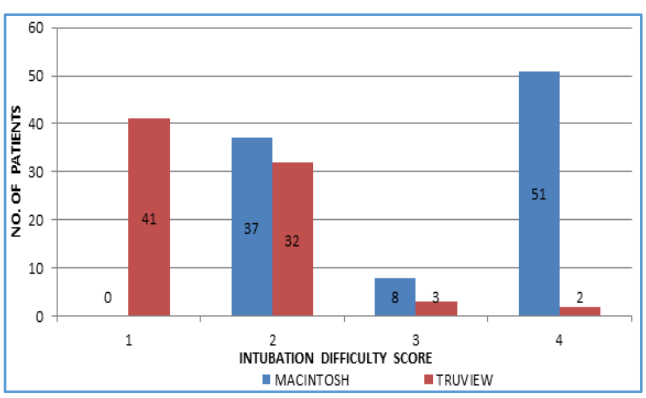

Fig. 3: Distribution of Patients According to IDS Score in each Group

Bar diagram showing distribution of patients according to IDS score in each Group.

Groups	Mean	SD	'P' Value	'T' Value
Macintosh (M)	3.14	0.95	<0.001	12.264
Truview (T)	1.56	0.69		

Table 4: Statistical Comparison of Mean Intubation Difficulty Score in both the Groups

P value: >0.05 not significant, <0.05 significant, <0.001 highly significant.

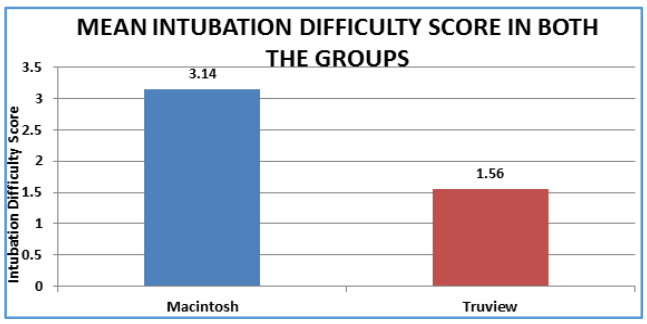

Fig. 4

Bar diagram showing mean intubation difficulty score in both the groups.

Groups	Easy	Moderately Difficult	Very Difficult
Macintosh (M)	0	96	0
Truview (T)	0	78	0

Table 5: Subjective Assessment of Intubation by Intubating Anaesthesiologist in both the groups based on IDS Scoring

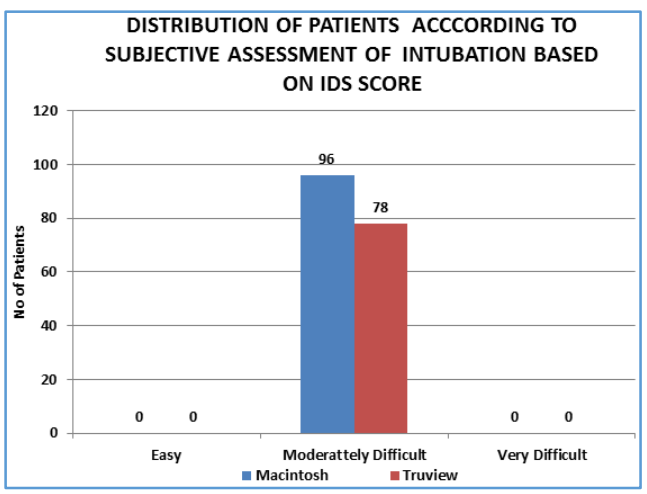

Fig. 5

Bar diagram showing distribution of patients according to subjective assessment of intubation based on IDS score.

Groups	Yes (%)	No (%)	
Macintosh (M)	51(53.13%)	45(46.87%)	X^2= 51.9 df=1 P<0.001
Truview (T)	2(2.63%)	76(97.37%)	

Table 6: Table showing Statistical Comparison of Patients requiring External Laryngeal Manipulation (BURP) in both the Groups

P value: >0.05 not significant, <0.05 significant, <0.001 highly significant.

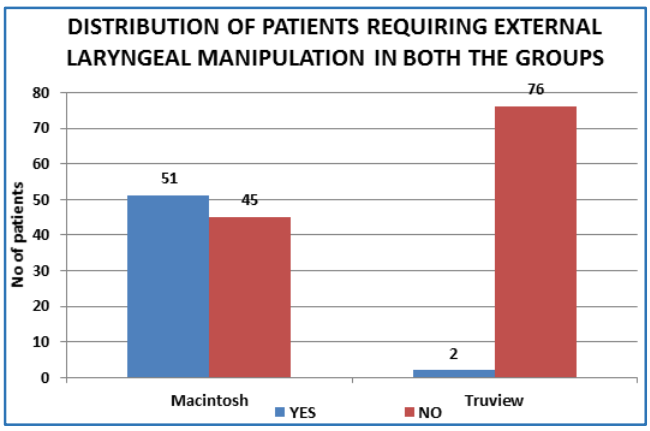

Fig. 6

Bar diagram showing distribution of patients requiring external laryngeal manipulation in both the groups.

Complication	Macintosh Group (M)		Truview Group (T)		Test
	Yes	No	Yes	No	
Blood on laryngoscope blade	11 (11.45%)	85 (88.55%)	5 (6.42%)	73 (93.58%)	X^2=1.31 df=1 p=0.252
Minor laceration	6 (6.25%)	90 (93.75%)	2 (2.63%)	76 (97.37%)	X^2=1.33 df=1 p=0.248
Dental or other airway trauma	0	0	0	0	

Table 7: Statistical Comparison in Incidence of Complication in both the Groups

P value: >0.05 not significant, <0.05 significant, <0.001 highly significant.

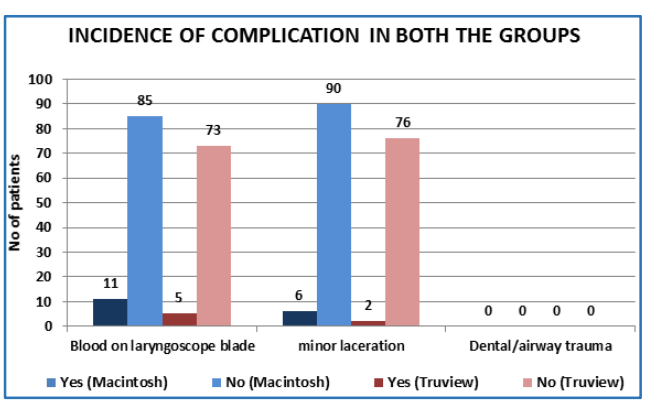

Fig. 7

Bar diagram showing incidence of complication in both the groups.

DISCUSSION

Securing the airway in cervical injury patients is always a challenge for an anaesthesiologist. A patient has to be intubated in cervical in-line position to avoid movement at cervical joint.

There are many modifications in laryngoscope to combat this difficulty and video laryngoscope is one of them. To know the best in it, in this study we have compared Macintosh and video laryngoscope in cervical in-line position.

Both the groups were comparable demographically. While comparing the Cormack and Lehane grading in both the groups, it was found that grade 1 glottic visualisation has been observed by only Truview laryngoscope (51.12%). None of the patients in Macintosh group had Grade-1 glottic visualisation. Grade 2 and Grade 3 glottic visualisation has been observed by both Macintosh and Truview laryngoscope, but the proportion of Grade 2 glottic visualisation was found to be higher (42.30%) in Truview group as compared to Macintosh group (46.87%) while most of the patients of Macintosh group come in Grade 3 glottic visualisation (53.12%) (Table 1). So, it shows that the Truview laryngoscope produces better glottic view than Macintosh laryngoscope.

M. Barak et al (2007) & J. B. Li et al (2007) conducted a study and found that Cormack and Lehane grading was significantly lower in Truview group as compared to the Macintosh group.[11,12] A study conducted by M.A. Malik et al (2008) found that the GlideScope, Airwayscope, and Truview Laryngoscope each improved the Cormack and Lehane glottic view as compared with the Macintosh laryngoscope.[13] Ishwar Singh et al (2009), Arpita Saxena et al (2013) & Sourav Kr Bag et al (2014) observed that the Truview Laryngoscope improved laryngeal view of Cormack and Lehane grade as compared to Macintosh laryngoscope.[8,9,14] We did the study with cervical in-line stabilisation and found the same result. None of the patients had Grade-1 glottic visualisation in Macintosh group, the reason may be explained due to poor laryngoscopic view of glottis in cervical in–line position.

The mean time taken for intubation was higher in Truview group (22.67±1.87) as compared to Macintosh group (15.42±1.67). On statistical evaluation, this difference was found highly significant (p<0.001). So we can say that the time taken for intubation was more with Truview laryngoscope as compared to Macintosh laryngoscope.

J. B. Li et al (2007), M.A. Malik et al (2008) & Ramesh T Timanaykar et al (2011) in their study found that the mean time to intubation was significantly shorter with the Macintosh laryngoscope than the Truview laryngoscope.[12,13,15] Thus, the result in our study was comparable to the above study. We experienced considerable difficulties in advancing the tracheal tube towards the view of the digital camera, a finding again previously reported by other investigators.[11]

To compare the intubation difficulty score (Table 3), none of the patients in both the groups have IDS score 0 because of preformed mounting of endotracheal tube with stylet in both the groups. In Truview group, 41 patients had IDS score 1. The rest of 32 and 3 patients had IDS score 2 and 3 respectively, only 2 patients had IDS score 4 which is the maximum score found in our study. While in Macintosh group, no patients had IDS score 1 while 37, 8 and 51 patients had IDS score 2, 3 and 4 respectively. Table 4 shows the comparison of Intubation Difficulty Scores in both the groups and it was higher in Macintosh group (3.14±0.95) as compared to Truview group (1.56±0.69). On statistical evaluation, this difference was found highly significant (p<0.001). So we can say that the Intubation Difficulty Score was less with Truview laryngoscope as compared to Macintosh laryngoscope.

M.A. Malik et al (2008), Atul P Kulkarni et al (2013) & Arpita Saxena et al (2013) also found lower intubation difficulty scores by Truview laryngoscope as compared to the Macintosh laryngoscope.[9,13,16] Thus, the result in our study was comparable to the above study. Table 5 shows subjective assessment of intubation in both the groups on the basis of Intubation Difficulty Score. None of the patients of both the groups had easy intubation as we used the preformed mounting of the endotracheal tube with Stylet in all the patients. All patients in both groups were in the category of moderately difficult intubation (IDS=1-5), but all patients were intubated in a single attempt. After comparison of the need for external laryngeal manipulation (Table 6) in the form of backward, upward, rightward pressure (BURP) in both groups, it was found that in Truview group only in 2.63% patients (Cormack and Lehane Grade-3) require external laryngeal manipulation and no need in 97.37% patients, while in Macintosh group 53.13% (Cormack and Lehane Grade-3), patients required external laryngeal manipulation and no need in 46.87% patients.

We did external laryngeal manipulation in two patients in Truview group as we have planned cervical in-line position for laryngoscopy and intubation. On statistical evaluation, this difference was found highly significant ($p<0.001$). From the analysis of above data, we can say that the need for external laryngeal manipulation (BURP) was less with Truview than Macintosh laryngoscope. This is because of unique blade of Truview laryngoscope with better optical view than Macintosh blade. Atul P Kulkarni et al (2013) found that external laryngeal manipulation was more often needed with Macintosh blade as compared to Miller blade and almost not required with Truview laryngoscope.[16] In our study, there was no incidence of dental or more severe airway laceration with any laryngoscope (table 7), same as the study done by M.A. Malik et al (2008)[13]& Suman Arora et al (2013)[17]

LIMITATIONS OF THE STUDY: There were some limitations of our study. Firstly, the anaesthetist performing the intubation was not blinded to the study group due to the unfeasibility of blinding and the possibility of bias existed. Secondly, the experience of the anaesthetist with the Macintosh laryngoscope was far more and better than that with the Truview laryngoscope. Thirdly, this study was carried out in experienced users of each device. The results seen may differ in the hands of less experienced users. Finally, the relative efficacies of these devices in comparison with other promising devices such as the Airtraq, McCoy, McGrath, Bonfils, intubating Laryngeal Mask Airway, or Bullard laryngoscopes have not been determined. Further comparative studies are needed to determine the relative efficacies of these devices. Lastly, the study group was small and with relatively less difficult intubation scenario; however, large multicentric study is needed in diverse population and situation (e.g. obese, etc.) to support our findings.

CONCLUSION

So, in our study, Truview laryngoscope proved to be a better tool in cervical in-line position as there is definite improvement in laryngoscopic view with less difficulty. As we did this study in cervical in-line position, we can say that in actual scenario of trauma patients with suspected cervical injury, Truview laryngoscope can be a better option than conventional Macintosh laryngoscope. It should be added in emergency cart in all trauma care units.

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