Original Research Article

Assessment of laryngoscopy and intubation using Macintosh direct laryngoscope and Video laryngoscope for nasotracheal intubation in maxillofacial surgeries

Nidhi Pandey[1], Priyanka Jaiswal[1], Tintu Jacob[2], Mukund Pandey[2*], Leena Jain[3]

[1] Senior Resident, Department of Anesthesiology, Shyam Shah Medical College, Rewa, Madhya Pradesh, India
[2]Assistant Professor, Department of Surgery, Shyam Shah Medical College, Rewa, Madhya Pradesh, India
[3]Prof & Head, Department of ENT, SMBT Institute of Medical Sciences & Research Centre, Igatpuri, Nashik, Maharashtra, India

Received: 15-10-2021 / Revised: 25-12-2021 / Accepted: 06-01-2022

Abstract

Background and Aims: Surgeries for maxillofacial fractures or removal of oral tumors we need nasotracheal intubation because it provides uninterrupted view for the surgery. To make nasotracheal intubation easier in cases of maxillofacial trauma, different types of video laryngoscopes have been developed. we compared the efficacy of the Truview EVO2 video laryngoscope and the Macintosh laryngoscope in patients with maxillofacial surgeries. Considering the Cormack and Lehane grading, Intubation Difficulty Scale (IDS) score and total time taken for intubation. **Metarials and Methods** : Randomized controlled trial was conducted in sixty patients of ASA grade I and II ,posted for orofacial and ENT surgeries were randomly allocated into two groups,in order to find better laryngoscope require for nasotrachel intubation for elective surgery undergoing in general anesthesia. **Results**: Laryngoscopy with Truview EVO2 video laryngoscope showed better intubating conditions during intubation in comparision with Macintosh laryngoscope. **Conclusion**: For nasotracheal intubation, Truview EVO2 video laryngoscope provides better layngoscopic view as compared to Macintosh laryngoscope.

Keywords: Nasotracheal Intubtion, Macintosh, Truview EVO2 Video laryngoscope , Orofacial surgeries .

Introduction

Orotracheal intubation is the most common method used to secure and maintain airway, but there are certain surgeries such as surgeries for maxillofacial fractures or removal of oral tumors where we need nasotracheal intubation because it provides uninterrupted view for the surgery. Conventionally, nasotracheal intubation is done using the Macintosh laryngoscope. It is the standard laryngoscope. As nasotracheal intubation is considered difficult in cases of maxillofacial trauma, it may require long duration of laryngoscopy, where the Macintosh laryngoscope may not help and may even result in hypoxia. So to make nasotracheal intubation easier in cases of maxillofacial trauma, different types of video laryngoscopes have been developed.

Video laryngoscopes provides glottic visualization without the need for the alignment of oral, pharyngeal and laryngeal axes and therefore, can be used in anticipated difficult airway larynx. It thus allows intubation to be performed under direct visualization, even in cases of difficult intubation.

There are many methods described for assessing difficult intubation like Cormack and Lehane grading and total time for intubation. Unfortunately, none of these methods can individually predict difficult intubation. Therefore, a new objective scoring system has been proposed by Adnet et al. in 1997 as Intubation Difficulty Scale (IDS) score which is a function of seven parameters including Cormack and Lehane grade[1].

This gives a better evaluation of difficult intubation and a better way of selecting appropriate laryngoscope for difficult intubation in various conditions.

*Correspondence
Dr. Mukund Pandey
Assistant Professor, Department of Surgery Shyam Shah Medical College, Rewa, Madhya Pradesh, India.
E-mail: pandeymukund25@gmail.com

Endotracheal intubation was being practiced since its inception into anesthetic practice by Rowbotham and Magill in 1921[2,3].

Different types of laryngoscopes have been introduced to provide better glottic visualization. Many studies have been done to find a better laryngoscope for performing nasotracheal intubation.

Li et al. (2007)[4] performed a study in which the Truview EVO2 laryngoscope was compared with the traditional Macintosh laryngoscope in 200 patients who required tracheal intubation for elective surgery. They found that the mean time to intubation was significantly shorter with the Macintosh laryngoscope than with the Truview EVO2 laryngoscope but The view of the larynx was better with the Truview EVO2 laryngoscope.

Jones et al. (2008)[5] performed a study in which they compared the effectiveness of direct laryngoscope (DL) and the Glidescope® video laryngoscope (GVL) in 70 adult patients requiring nasotracheal intubation for elective dental or maxillofacial surgery, using different parameters, and found that compared to DL, the median time to intubation was faster, nasotracheal intubation was easier and glottic exposure was significantly better with GVL group. Shrestha S et al. (2015)[6] studied the comparison of Truview EVO2 with the classic Macintosh laryngoscope in 42 patients with maxillofacial trauma and found that compared to the Macintosh group, the Truview EVO2 group had significantly less IDS score, required significantly less time for glottic visualization and provided a significantly better laryngoscopic In order to find a better laryngoscope for nasotracheal intubation, we decided to perform a study in which we compared the efficacy of the Truview EVO2 video laryngoscope and the Macintosh laryngoscope in patients with maxillofacial surgeries. For this purpose, we considered the Cormack and Lehane grading, Intubation Difficulty Scale (IDS) score, total time taken for intubation.

Materials and Methods

The present study was conducted with prospective randomized controlled study design at Shyam Shah Medical College & associated Sanjay Gandhi Memorial Hospital, Rewa (M.P.) from july, 2016 to june 2017. In which, 60 adult patients of age 18-55 years of either sex

and with ASA grade I and II, posted for maxillofacial surgeries under general anesthesia were included .an approval from institution's ethical and research committee was taken. Patient refusal, with modified Mallampatti grades III & IV**,** Mouth opening < 2 fingers**,** Inter-incisor distance <3.5 cm**,** Thyromental distance < 6 cm**,** History of basal skull fracture (CSF rhinorrhea)**,**History of frequent episodes of epistaxis were excluded from the study.

A detailed history was taken from all the patients posted for maxillofacial surgeries. A thorough pre-anaesthetic examination along with airway assessment was done. A written informed consent was obtained from each patient for the procedure in his understanding language.

patients were randomly allocated into into two groups of 30 each. Random allocatiobn was perfomed with a randomization code with sealed envelop.Randomised procedure was applied by individual independent of the study where odd number case was assigned to Group 1(n=50) using macintosh laryngoscope and Group 2 (n=50) using Truview EVO2 video laryngoscope.

All patients were kept nil by mouth for at least 6 hours prior to surgery. After shifting them to the operating theatre, monitors were attached and baseline parameters (heart rate, systolic and diastolic blood pressure, mean arterial pressure, SpO_2 and $ETCO_2$ values) were recorded. Intravenous access was secured. All patients werepremedicated with Inj.Glycopyrrolate 0.01mg/kg body weight IV, Inj. Midazolam 0.03mg/kg body weight IV and Inj.Fentanyl 2mcg/kg body weight IV.Nasal patency test was performed and Xylometazoline nasal drops were instilled in both the nostrils 10 minutes before nasotracheal intubation. Preoxygenation was done with 100% $O_2$for 3 minutes and all patients were induced with Inj. Propofol 2.5 mg/kg body weight IV and Inj. Succinylcholine 1.5 mg/kg body weight IV. After one minute of giving Succinylcholine, lubricated nasotracheal tube was inserted through the most patent nostril until its tip lies in the pharynx. Then laryngoscopy was performed by the laryngoscope according to the group of the patient, and a view of laryngeal opening was obtained. Initially attempt was made to pass the endotracheal tube through the vocal cords. If difficulty was encountered, external manipulation of the laryngeal view was done by giving BURP (Backward, Upward and Rightward Pressure.Magill's forcep was used to position and guide the tube if the previous maneuvers failed. If all attempts failed, oral intubation was performed and that candidate was excluded from the study.Correct placement of endotracheal tube was confirmed by auscultation and end tidal carbon dioxide ($ETCO_2$) values.

Based on the laryngoscopic view and intubation, Cormack and Lehane (CL) grading and total time for intubation (TTI) were noted,and Intubation Difficulty Scale (IDS) score was calculated for each patient.

At the end of the surgery, residual neuromuscular blockade was reversed with Inj. Neostigmine 0.05 mg/kg body weightIV and Inj. Glycopyrrolate 0.01mg/kg body weight IV and the patient was extubated. Complications like hypertension, hypotension, bradycardia, dysrhythmia if occurred intraoperatively, was managed accordingly and was noted in the preformed proforma.

Statistical analysis

At the end of the study, the observations were recorded, tabulated and statistically analysed using 'Graph Pad Instat'. Chi-square test, Fischer's exact test and unpaired t-test were used wherever applicable. For comparison, p-value < 0.05 was considered as statistically significant & p < 0.001 as highly significant.

Results

Table 1: Demographic characteristics

Parameters	Group 1	Group 2	p-value
Total no. of patients	30	30	-
Age in years (Mean ± SD*)	33.96 ± 11.99	32.43 ± 12.74	0.6330
Weight in kgs (Mean ± SD*)	55.57 ± 7.53	54.63 ± 8.62	0.6567
Sex ratio (M:F)	21:09	22:08	1.0000

* SD – Standard deviation

Table 1 shows that the difference of age group, weight and sex ratio between Group 1 and Group 2 is statistically not significant.. Patients of Group 1 and Group 2 are comparable with respect to demographic characteristics like age, weight and sex ratio.

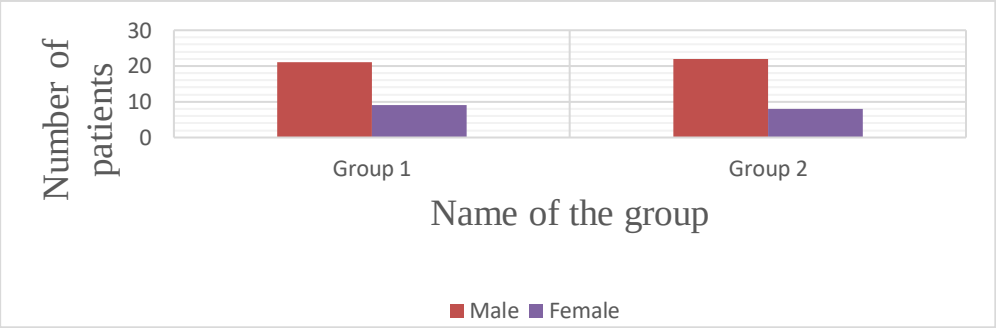

Fig 1:Gender comparison between the groups

Table 2: Comparison of Modified Mallampatti Grading (MMG)

Groups	No. of patients of MMG - I	No. of patients of MMG - II	Total no. of patients	p-value
Group 1	11	19	30	0.9640
Group 2	10	20	30	

Table 2 shows that the difference of modified Mallampatti Grade (MMG) between Group 1 and Group 2 is statistically not significant (p = 0.9640). Among 30 group I patients, 11 had MMG grade I and 19 had MMG grade II. Among 30 group II patients, 10 had MMG grade I and 20 had MMG grade II.

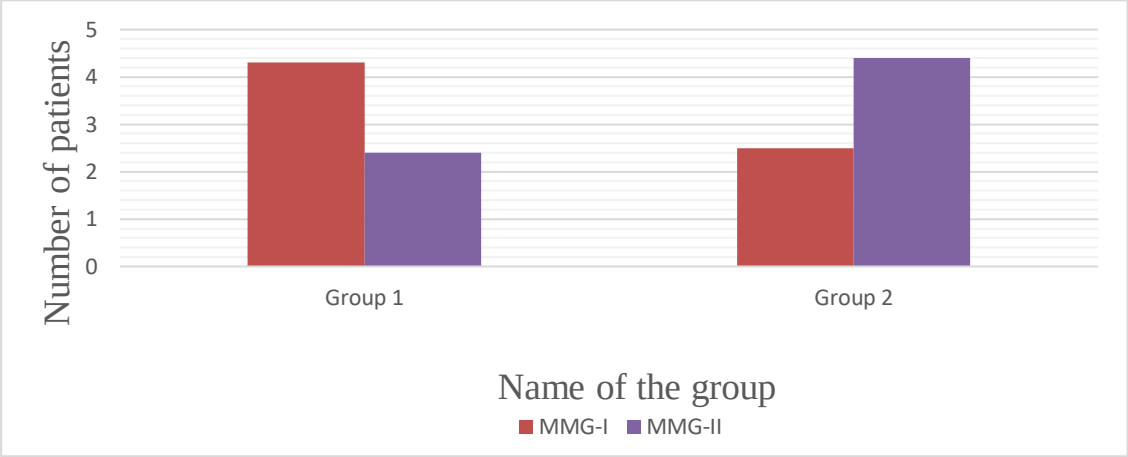

Fig 2:Comparison of MMG between the groups

Table 3 : Comparison of Cormack and Lehane grading between the groups		
Cormack and Lehane (CL) Grade	**Group 1**	**Group 2**
CL Grade 1	8	19
CL Grade 2	12	11
CL Grade 3	10	0
CL Grade 4	0	0
Total no. of patients in the group	30	30

Table 3 shows that on laryngoscopy with Macintosh laryngoscope in Group 1, we found 27% (8 out of 30 patients), 40% (12 out of 30 patients) and 33% (10 out of 30 patients) patients showing CL grade 1, CL grade 2 and CL grade 3 respectively. None was found with CL grade 4 in Group 1.

On laryngoscopy with Truview EVO2 videolaryngoscope in Group 2, we found 63% (19 out of 30 patients) and 37% (11 out of 30 patients) patients with CL grade 1 and CL grade 2 respectively. There was no case of CL grades 3 and 4 reported in Group 2. Laryngoscopy with Truview EVO2 videolaryngoscope in Group 2 showed improved Cormack and Lehane grading.

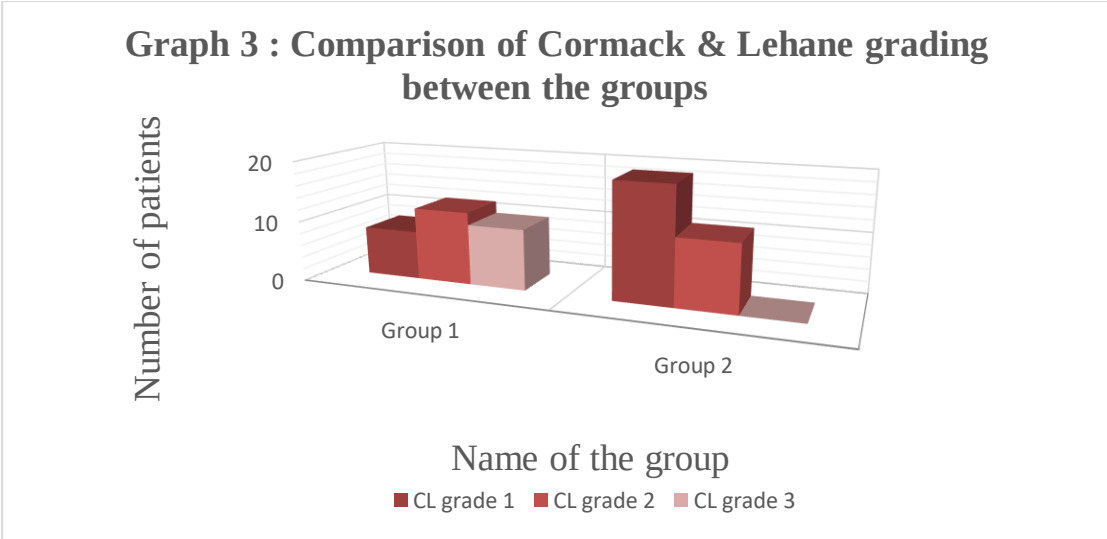

Table 4: Comparison of Intubation Difficulty Scale Score (IDS) between the groups			
IDS Score	**Group 1**	**Group 2**	**p-value**
Mean ± SD*	3.23± 1.63	0.73± 0.94	**< 0.0001**

*SD – Standard Deviation

Table 4 shows that the difference of IDS score between Group 1 and Group 2 is statistically Highly significant (p<0.0001). IDS score was found to be lower in Group 2 as compared to Group 1.

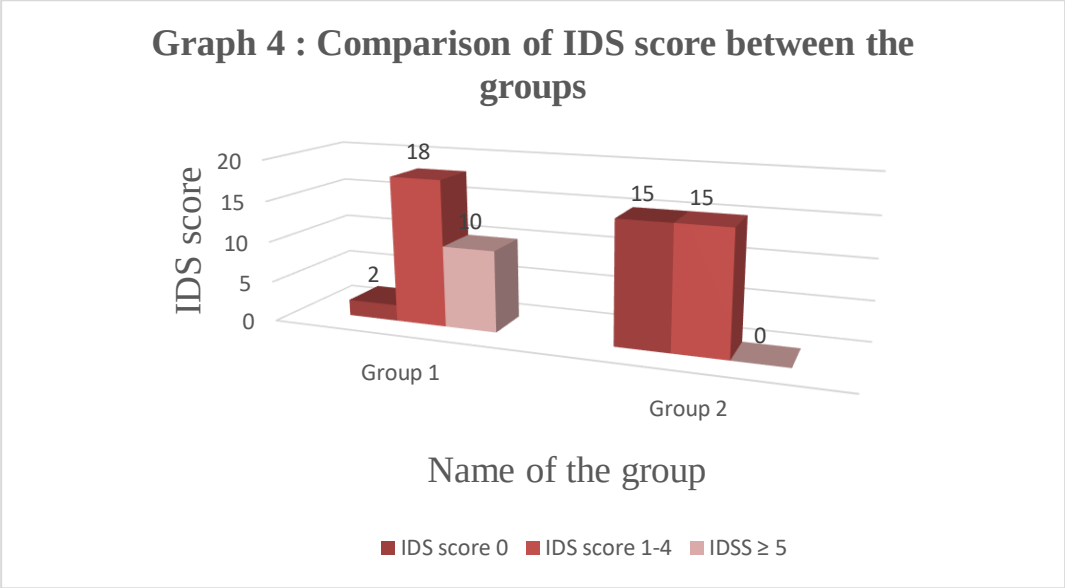

Table 5: Comparison of Total Time for Intubation (TTI) between the groups			
TTI (seconds)	**Group 1**	**Group 2**	**p-value**
Mean TTI ± *SD	84.96± 19.36	97.53± 21.75	**0.0215**

*SD – Standard Deviation

Table 5 shows that the mean TTI was 84.96 sec in Group 1 and 97.53 sec in Group 2.The difference of total time for intubation (TTI) between Group 1 and Group 2 is statistically significant (p = 0.0215). Total time for intubation (TTI) was longer in Group 2 as compared to that in Group 1.

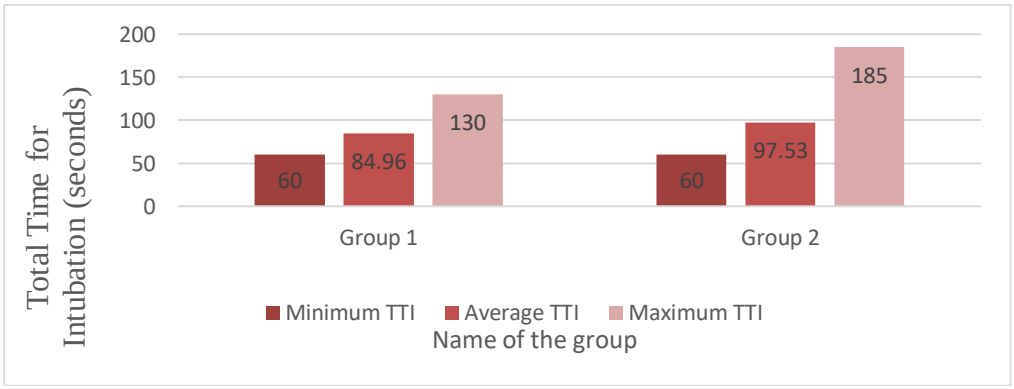

Fig 5:Comparison of total time for incubation between the groups

Discussion

IDS score and Cormack and Lehane grading

The result of the present study demonstrated 100% success rate of intubation with both the laryngoscopes. The IDS score was lower with Truview EVO2 video laryngoscope as compared to Macintosh laryngoscope. The mean IDS score was 0.73 ± 0.94 with Truview EVO2 video laryngoscope and 3.23 ± 1.63 with Macintosh laryngoscope. This difference of IDS score was statistically extremely significant (p <0.0001) (Table 4).The Cormack and Lehane (CL) grading of laryngoscopic glottic view was better with Truview EVO2 video laryngoscope as compared to Macintosh laryngoscope. In the Truview EVO2, 63% patients had CL grade 1 and 37% patients had CL grade 2; none of the patients had CL grade 3 or 4. While in the Macintosh group, 27% patients had CL grade 1, 40% patients had CL grade 2 and 33% patients had CL grade 3; none of the patients had CL grade 4 (Table 3).

In addition to higher CL grading, frequent use of Magill forceps, increased lifting force during laryngoscopy and need for application for external laryngeal pressure made IDS score of the patients in the Macintosh group higher as compared to those in the Truview EVO2 group.A study was conducted by Jones et al. (2008)[5] where they compared the effectiveness of direct laryngoscope (DL) and the Glidescope® video laryngoscope (GVL) in patients requiring nasotracheal intubation for elective surgery. They found that nasotracheal intubation was easier with the GVL than with DL (Visual Analog Scale 10 mm vs 20 mm, p = 0.0041). Glottic exposure was significantly better with the GVL. The need for use of Magill forceps was seen 49% of the time in the DL group, but not a single time in GVL group (p < 0.0001). We found results almost similar to this study.Aziz MF et al. (2011)[7] compared the success rate of tracheal intubation with C-MAC® video laryngoscope and conventional direct laryngoscope in patients with predicted difficult airway and found that Cormack-Lehane laryngeal view was graded 1 or 2 in 139/149 of C-MAC® attempts versus 119/147 in direct laryngoscopy attempts . The use of a gum-elastic bougie and/or external laryngeal manipulation were required less often in the C-

MAC® intubations compared with direct laryngoscopy. Similar results were found in our study. Ruediger R Noppens et al. (2012)[8] conducted a comparative study between C-MAC® and Macintosh laryngoscope (ML) in critically ill patients requiring endotracheal intubation and found that in patients with at least one predictor for difficult intubation, the C-MAC® resulted in more successful intubations on first attempt compared with ML (79% vs. 55%; p = 0.03). The Cormack and Lehane (CL) grading was higher using ML (20%, CL grade 3 and 4) compared with the C-MAC® (7%, CL grade 3 and 4) (p < 0.0001). Similar results were found in the present study. Shrestha S et al. (2015)[6] also compared Truview EVO2 and Macintosh laryngoscope in patients with maxillofacial trauma. The Intubation Difficulty Scale score was significantly less in the Truview EVO2 group compared with the Macintosh group (mean ± standard deviation, 0.30 ± 0.7 vs 1.70 ± 1.8; p = 0.002). Similar results were found in the present study.

Kuang-Yi Tseng et al. (2017)[9] in their study comparing video laryngoscope (Glidescope and Pentax Airway scope) and Macintosh laryngoscope for nasotracheal intubation in patients scheduled for elective oro-maxillofacial surgery, also observed significantly lower IDS score in the Glidescope and the Pentax Airway scope groups as compared to the Macintosh group (P = 0.037). Using Glidescope, intubation was successful at the first attempt in 80% patients whereas only 65% and 72.5% with the Pentax and Macintosh respectively (p = 0.02). Similar results were found in the present study.

However, a study was conducted in the past by Kim et al. (2011)[10] where they compared Glidescope® video laryngoscopy (GV) and direct laryngoscope (DL) for nasotracheal intubation in pediatric patients of age < 10 years posted for elective dental or facial surgery. They did not find any significant difference in glottic view grade, frequency of Magill forceps use, and degree of difficulty in intubation between the two groups. The difference in the study population would have contributed to the difference in the outcome between the two studies. The difference in the types of video laryngoscope used in these studies may also account for the different results.

Total Time for intubation (TTI)

In the present study we noted that nasotracheal intubation using Truview EVO2 video laryngoscope required longer time to intubation when compared to that using Macintosh laryngoscope. The mean time to intubation was 97.53 sec ± 21.75 in the Truview EVO2 group and 84.96 sec ± 19.36 in the Macintosh group. This difference was statistically significant (p = 0.0215) (Table 5).

The study done by Li et al. (2007)[4] who compared Truview EVO2 laryngoscope with Macintosh laryngoscope in patients requiring tracheal intubation for elective surgery found that the mean time to intubation was significantly shorter with the Macintosh laryngoscope (34 sec) than with the Truview EVO2 laryngoscope (51 sec), but the view of the larynx was better with the TruviewEVO2 laryngoscope than with the Macintosh laryngoscope in patients with a Cormack and Lehane grade greater than 1 (p < 0.0001). The results of the present study were similar to this study.The study done by Aziz MF et al. (2011)[7] also observed that the laryngoscopy time was shorter in the direct laryngoscopy group (33 sec) as compared to that in the C-MAC® group (46 sec). Similar results were found in the present study.Arpit Saxena et al. (2013)[11] compared the Truview EVO2 video laryngoscope and Macintosh laryngoscope (ML) in patients requiring general anaesthesia and intubation. They found improved Cormack and Lehane grades with the Truview EVO2 blade, but time for intubation was longer with the Truview EVO2 blade than with the Macintosh blade (34.1 vs. 22.4 s), i.e. an improved view at the cost of longer mean intubation time. Similar results were found in the present study.There are many previous studies which show dissimilar results. Jones et al. (2008)[5] compared the effectiveness of direct laryngoscope (DL) and the Glidescope® video laryngoscope (GVL) in 70 adult patients requiring nasotracheal intubation for elective dental or maxillofacial surgery and found shorter time to intubation with GVL group as compared to DL group. The reason behind this difference of TTI may be the use of different types of video laryngoscopes in these studies.Kim et al. (2011)[10] compared Glidescope® video laryngoscope (GV) and direct laryngoscope (DL) for nasotracheal intubation in 80 pediatric patients of age < 10 years posted for elective dental or facial surgery and found that the median TTI was similar between the groups. The difference of the study population can be a reason behind the different TTI between this study and the present study.**Arora S et al. (2013)**[12] studied the comparison of Truview EVO2 laryngoscope with Macintosh laryngoscope in 110 adult patients scheduled for elective surgery that required general anesthesia with oral endotracheal intubation. They observed that the duration of intubation was comparable between Truview and Macintosh laryngoscopes (12.1 sec ± 3.8 vs. 10.9 sec ± 2.1).

Limitation

Our study did not conducted in known cases of difficult airway scenario.

Conclusion

This study has concluded that In cases of nasotracheal intubation, Truview EVO2 video laryngoscope provides better intubating conditions as compared to Macintosh laryngoscope, suggested by lower IDS score and improved CL grading. Despite of longer time to intubation, Truview EVO2 is safer for nasal intubation.

References

1. Adnet F, Borron SW, Racine SX, et al. The intubation difficulty scale (IDS): proposal and evaluation of a new score characterizing the complexity of endotracheal intubation. Anesthesiology 1997;87:1290-7.
2. King BD, Harris LC, Greifenstein FE, Elder JD, Dripps RD. Reflex circulatory responses to direct laryngoscopy and tracheal intubation performed during general anesthesia. Anesthesiology. 1951;12(5):556-66.
3. Derbyshire DR, Smith G. Sympathoadrenal responses to anaesthesia and surgery. Br J of Anaesth1984;56:725-739.
4. Li JB, Xiong YC, Wang XL, Fan XH, Li Y, Xu H, et al. An evaluation of the Truview EVO2 laryngoscope. Anaesthesia 2007;62:940-3.
5. Jones PM, Armstrong KP, Armstrong PM, et al. A comparison of glidescopevideolaryngoscopy to direct laryngoscopy for nasotracheal intubation. AnesthAnalg. 2008;107(1):144-8.
6. Shrestha S, Rattan V, Sharma RK. Truview EVO2 Laryngoscope Reduces Intubation Difficulty in Maxillofacial Surgeries. J Oral Maxillofac Surg. 2015;73(10):1919.e1-8.
7. Aziz MF, Healy D, Kheterpal S, Fu RF, Dillman D, Brambrink AM. Routine clinical practice effectiveness of the Glidescope in difficult airway management: an analysis of 2,004 Glidescope intubations, complications, and failures from two institutions. Anesthesiology. 2011;114(1):34-41.
8. Noppens RR, Geimer S, Eisel N, David M, Piepho T. Endotracheal intubation using the C-MAC® video laryngoscope or the Macintosh laryngoscope: A prospective, comparative study in the ICU. Critical Care. 2012;16(3):R103.
9. Tseng KY, Lu IC, Shen YC, Lin CH, Chen PN, Cheng KI. A comparison of the video laryngoscopes with Macintosh laryngoscope for nasotracheal intubation. Asian J Anesthesiol. 2017;55(1):17-21.
10. Kim HJ, Kim SD. A comparison of GlideScope(®) videolaryngoscopy and direct laryngoscopy for nasotracheal intubation in children. PaediatrAnaesth. 2011;21(4):417-21.
11. Saxena A, Madan M, Shrivastava U, et al. Role of the Truview EVO2 laryngoscope in the airway management of elective surgical patients: A comparison with the Macintosh laryngoscope. Indian Journal of Anaesthesia. 2013;57(3):276-281.
12. Arora S, Sayeed H, Bhardwaj N. A comparison of Truview EVO2 laryngoscope with Macintosh laryngoscope in routine airway management: A randomized crossover clinical trial. Saudi Journal of Anaesthesia. 2013;7(3):244-248.

Conflict of Interest: Nil Source of support: Nil