MEDDOCS Open Access Publisher

Annals of Anesthesia and Pain Medicine

Open Access | Research Article

True view video laryngoscope offers better laryngoscopic view and intubation in patients anticipated for difficult Intubation

***Corresponding Author(s): Upasna Bhatia & Vandana Shah**

Department of Anaesthesia, AMC MET medical college LG hospital, Ahmedabad, Gujarat, India

Tel: +91-884-9449-103;

Email: upasna90@gmail.com

Received: Jun 17, 2019

Accepted: Aug 23, 2019

Published Online: Aug 27, 2019

Journal: Annals of Anesthesia and Pain Medicine

Publisher: MedDocs Publishers LLC

Online edition: http://meddocsonline.org/

Copyright: © Bhatia U & Shah V (2019). *This Article is distributed under the terms of Creative Commons Attribution 4.0 International License*

Keywords: Anticipated difficult airway; Macintosh laryngoscope; True view PCD laryngoscope; Tracheal intubations

Abstract

Background: It is difficult to align the oropharyngolaryngeal axes to facilitate intubation in patients anticipated with difficult intubation by conventional laryngoscopy using macintosh blade, which leads to failed intubation. The True view PCD laryngoscope is a device with a unique blade that provides a magnified laryngeal view at 42° anterior reflected view facilitating visualization of the glottis without alignment of oropharyngotracheal axes. We compared the view obtained during laryngoscopy, intubating conditions and hemodynamic parameters of True view with Macintosh blade.

Method: This is a prospective, randomized and controlled study of 50 patients of ASA I and II of either sex (18–60 years) of Mallampatti Grading II, III and IV posted for elective surgery, fulfilling the criterion for difficult intubation assigned to undergo intubation using a TruView or Macintosh laryngoscope. Visualization of the vocal cord, time taken for intubation, number of attempts, and hemodynamic parameters were evaluated.

Results: True view obtained a better glottic view as compared to Macintosh blade (as per Cormack Lehane grading) when both the groups were subjected to a similar difficulty level with use of less assisting maneuvers', though the time taken for intubation with True view (22.03 ± 3.4 seconds) was more than with Macintosh blade (18 ± 2.9 seconds). Hemodynamic parameters increased after tracheal intubation from the pre-intubation values in the macintosh group.

Conclusion: Tracheal intubation in patients with anticipated difficult airway using True view blade provided significantly improved laryngeal view as compared to Macintosh blade without the need to align oropharyngeal and laryngeal axes, with less attempts and almost no change in hemodynamics. However, the time taken for intubation was more.

Cite this article: Bhatia U, Shah V. True view video laryngoscope offers better laryngoscopic view and intubation in patients anticipated for difficult Intubation. Ann Anesth Pain Med. 2019: 2(1); 1005.

Introduction

The curved Macintosh laryngoscope requires alignment of oropharyngo laryngeal axes for visualization of vocal cords along with head and neck positioning to successfully intubate the trachea [1].

Although there are many predictors of difficult airway, but sometimes difficult intubations are realized only after anesthesia induction. None of these predictors whether single or in combinations, are capable of predicting difficult intubation. Hence these difficult intubations or failed intubations could result in anesthesia related morbidity and mortality [2].

An essential feature of any new device should be to facilitate glottis visibility without alignment of oropharyngo and laryngeal axes. True view PCD video laryngoscope is one such device with a unique blade that provides an optical view around the corner and allows viewing of glottis via a prismatic lens without the need of aligning of oropharyngo - laryngeal axes. It confirms the positioning of endotracheal tube and records its entry into the glottis, which can be used for research and archiving.

Video laryngoscopes are also included in the American society of anesthesiologists' difficult airway algorithm since 2013 both as an initial approach in an anticipated difficult airway and as an alternative approach, in the non emergency pathway, following an unsuccessful intubation attempt with the MAC scope [3].

We conducted this study to compare and contrast the efficacy of True View PCD Video Laryngoscope against the rigid Macintosh Laryngoscope in an unanticipated difficult airway in 50 patients undergoing elective surgeries. The best glottic view obtained, time to intubation, number of attempts used to intubate, optimizing maneuvers used, hemodynamic parameters and incidence of complications were compared between the two laryngoscopes.

Method

The present study was carried out after getting approval by the Institutional review board Committee (Ethical committee). Patients posted for various elective surgeries in General surgery, ENT, Plastic surgery and orthopedic surgery under general anesthesia, were included to participate in the study after taking the informed consent. The duration of study was from year 2016 to 2018. It was a prospective randomized and controlled clinical study which was double blinded. Patients were randomly allocated into 2 equal groups of 25 each with the help of picking up chits.

I. Group VL: To be intubated with True view PCD laryngoscope

II. Group ML: To be intubated with Macintosh laryngoscope.

All intubations were performed by an anesthesiologist with at least 5 years of experience and minimum of twenty intubations using True view laryngoscope (to justify time to intubation).

Inclusion criteria

i. Adults aged 18–60 years of either gender.

ii. ASA Grade I and II patients

iii. MallamPatti Grade (MPT) : II, III and IV

iv. Patients with restricted neck mobility, e.g., post-burn contracture neck, cervical spine injury

v. Patients with a history of difficult intubation.

Exclusion criteria

i. Patients with ASA grades III–V

ii. Age <18 years and >60 years

iii. Undergoing rapid sequence intubation

iv. Emergency patients

v. Not NBM

vi. Mouth opening less than 4 cm

vii. Patients with difficult mask ventilation and at risk for aspiration

Pre-operative assessment was done one day before the surgery. Any significant past, family and personal history were taken. General physical examination was done, vitals (heart rate, blood pressure) and investigations were noted. Patients were kept NBM for 6 hours prior to surgery. Written informed consent was taken from each patient. Detailed airway assessment was done and intubation difficulty level was noted for each patient. It included:

a. Inter Inscissor Gap : Opening of the mouth (normal ≥ 3 cm or restricted),

b. Thyromental distance (normal ≥ 6.5 cm or abnormal if shorter)

c. Buck Teeth or protruded teeth (yes (>0.5 cm) / no)

d. Condition of teeth (normal, loose or denture)

e. Temporomandibular joint mobility (normal or restricted)

f. Neck movement : (>90°) normal or restricted

g. Mandibular size (normal or micrognathia or retrognathia or prognathia)

h. Mallampati grading (MMT) [4]

On arrival in the operating room, all the patients were monitored for continuous ECG, heart rate (HR), noninvasive blood pressure (NIBP), SpO_2 and $EtCO_2$. Intravenous access was secured with 20G cannula and Ringer's lactate solution at 2 ml kg-1 was started. All patients in the study were premedicated with intravenous glycopyrrolate 0.004 mg kg-1, fentanyl 2µg kg-1, midazolam 0.02 mg kg-1, ranitidine 1 mg kg-1 and ondansetron 0.08 mg kg-1. After preoxygenation with 100% oxygen for 3 minutes using circle absorber system with capnograph attached, anesthesia was induced with intravenous Propofol 2 mg kg-1 till loss of eyelash reflex. Neuromuscular blockade was achieved with intravenous suxamethonium 1.5 mg kg-1. Laryngoscopy was then performed after 60 seconds with one of the laryngoscopes as per study group. In the ML group, conventional laryngoscopy was performed using Macintosh laryngoscope in supine, "sniffing morning air" position, with the blade size as either 3 or 4 as per the discretion of the anesthesiologist. In the VL group, laryngoscopy was performed using True view PCD (Video) laryngoscope (adult size) with the patient's head in neutral position, using a digital camera with 4-5 liters oxygen flow attached to the laryngoscope to prevent fogging till visualization of epiglottis. Then a caudal pressure or external manipu-

lation was applied towards the lower jaw to bring the larynx in the view. A tracheal tube was inserted with a stylet in a J like shape until laryngoscopic view was obtained on the camera screen and the intubation was done. The following parameters were noted:

i. Time to Intubation required for laryngoscopy (defined as the time from taking Off the face mask till an optimum laryngoscopic view of the glottis is obtained and intubation is done)

ii. Best glottic view (graded as per Cormack-Lehane grading scale [5]**:** grade 1- most of the glottis is visible, grade 2- only the posterior extremity of the glottis is visible, grade 3- only the epiglottis is visible, grade 4- not even the epiglottis is seen)

iii. Presence of External laryngeal manipulation (required to obtain satisfactory glottic view) and use of bougie

iv. Number of Attempts to successful Intubation (recorded by an independent observer, OT Anesthesia Assistant) in case of a failure, an alternate method to maintain the airway was employed

The above data was noted along with the assessed difficulty level (Mallampatti grades, mouth opening, buck teeth, etc.) in the preoperative visit and airway evaluation was done with each group.

After successful intubation, the patients were mechanically ventilated for the surgical procedure and anesthesia was maintained with Sevoflurane, nitrous oxide and oxygen and intravenous Atracurium. During the tracheal intubation, continuous ECG, HR, NIBP and SpO_2 were monitored and recorded every 1 minute during induction and intubation and there after every 5 minutes for 15 minutes during the post-intubation period. Subsequent management of anesthesia and reversal was left to the anesthesiologist providing care for the patient.

Postoperatively, the patient was evaluated for the symptoms of the following:

i. sore throat

ii. broken teeth

iii. soft tissue edema

iv. bleeding from gums or lips

v. stridor or hoarseness and any other complication.

Data analysis was done with the help of SPSS version 16.0. Continuous variables were tested using paired and unpaired t- test for within and between group comparisons respectively. Categorical variables were tested using Pearson's Chi square test. Continuous data are presented in terms of their mean and standard deviation (SD) and categorical data are presented as frequencies. Floral statistical comparisons in this study, $p < 0.05$ was taken as significant.

Results

The Demographic data in both the groups were comparable with respect to mean age, gender ratio, mean BMI and ASA physical status I : II (Table 1).

Both the groups had similar patient distribution with respect to difficulty level. In the group VL, 4 % had a history of difficult intubation in comparison to none in the ML group. 44% of the patients in VL group had limited neck extension <90° as compared to 36% in ML group.

Exhibition of Mallampatti Grade II/III/IV in the VL Group was in 4/68/28 % patients which was comparable to 12/64/ 24 **%** patients of ML group respectively (Table 2).

Intubation variables with difficulty levels are summarized in table 2 and 3. Better glottis view was obtained in the VL group with 80 % having Cormack Lehane grade I and 20 % grade II as compared to 8 % having Cormack Lehane grade I, 28 % grade II and 64% Grade III in the ML group (Table3). One patient who had restricted neck extension(<90°) came for the second time for his recurrent surgery (H/O difficult intubation) and patients with limited neck extension also exhibited Mallampatti grade II/III - so there were overlapping of difficulty levels . (Table 2) 68 % of patients in VL group and 60 % in ML group had protruded (buck) teeth with protrusion > 0.5cm, which was similar in both the groups.

External laryngeal manipulation (ELM) was exhibited to get a satisfactory laryngeal view in 8 % of patients in the VL Group in comparison to 64 % in the ML group. In the VL group ELM was provided to further improve the grading or centralize the view to facilitate tracheal intubation

Time taken for laryngoscopy was significantly longer in the VL group and so it took clinically longer time for resuming effective ventilation (Table 5).

Since Intubation was difficult without the J shaped stylet in our pilot study with True view VL, so all 25 patients in the VL group were intubated by Endotracheal tube railroaded on a J shaped appropriate numbered stylet while none was being used in the ML group. Instead 80 % intubation needed bougie guided intubation in the ML group (Table 4).

92% of patients could be intubated in First attempt in the VL group, in comparison to 36 % in the ML group which is a significant difference. 8 % patients required a second attempt in the VL group while 64% needed a second attempt in the ML group (Table 5).

Hemodynamic preoperative and baseline readings of pulse rate and mean arterial blood pressure were comparable in both the groups. After intubation and 3 minutes after intubation, pulse rate and mean arterial blood pressure increased in the ML group while there wasn't any in the VL group - the difference in both the group is significant (Figure 1 & 2).

12 % from both the groups had a minor lip bleeding which subsided by itself and 16% patients from the VL Group and 12% from the ML group complained of sore throat post operatively which subsided after few hours following supplementation of humidified oxygen by facemask (Table 6).

Figures

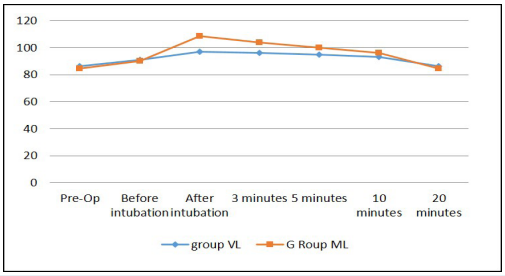

Figure 1: Mean Pulse rate.

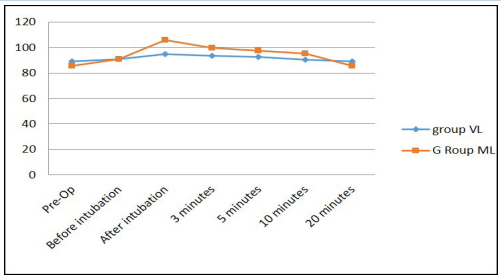

Figure 2: Mean Arterial Blood Pressure.

Tables

Table 1: Demographic Profile

Criteria	VL Group N=25	ML Group N=25	P value
Age (years)	41.20 ± 13.11	37.61 ±17.30	>0.05
Gender M: F	13:12 (52%: 48%)	12: 13 (48% : 52%)	
BMI kg/cm^2	23.51 ± 4.81	21.81 ± 3.10	>0.05
ASA I: II	14:11 (56 % : 44 %)	15: 10 (60 % : 40 %)	

Table 2: Distribution of patients with respect to difficulty level.

Difficulty level		Group VL	Group ML
H/O difficult intubation		1 (4%)	0 (0%)
Limited neck extension		11 (44%)	9 (36%)
Mallam Patti Grade	II	1(4%)	3(12%)
	III	17(68%)	16(64%)
	IV	7 (28%)	6(24%)
Buck Teeth	Yes	17 (68%)	15(60%)
	No	8 (32%)	5 (40%)

Table 3: Comparison of patients with respect to Cormack lehane grade .

Grade	Group VL		Group ML	
	N=25	%	N=25	%
I	20	80	2	8
II	5	20	7	28
III	0	0	16	64
IV	0	0	0	0
Total	25	100	25	100

Table 3b: Comparison with respect to median Cormack lehane grade in groups.

Group	Median Cormack lehane grade	P value
VL	I	< 0.001
ML	III	

Table 4: Assisting Maneuvers' for Intubation.

	Group VL		Group ML	
External laryngeal Manipulation	2	8%	16	64%
Use of stylet	25	100%	0	0
Use of bougie	0	0	20	80 %

Table 5: Laryngoscopy Time and Number.

		Group VL	Group ML	
Time taken for laryngoscopy		22.03 ±3.4	18 ±2.9	P <0.0001
Number of attempts of Intubation	1	23(92%)	9 (36%)	significant
	2	2(8%)	16 (64%)	significant

Table 6: Complications.

	Group VL		Group ML	
Soft Tissue Injury	0	0	0	0
Bleeding from gums / Lips	3	12%	3	12%
Teeth injury	0	0	0	0
Sore throat	4	16%	3	12%

Discussion

The most important role of an anesthesiologist in an operation theatre is to secure the airway during general anesthesia. The True view video laryngoscope has been reported to provide a better laryngeal appearance due to its optical system, which provides a 42° deflection view through a 15-mm eyepiece. It applies the principle of refraction of light to provide a more anterior view of the larynx, aiming to provide a better glottic view, expressed by the Cormack-Lehane grade in a greater proportion of patients, thus allowing intubation to be performed under direct vision more frequently than is possible with a conventional laryngoscope, with the added advantage of reduced intubation time. True view video laryngoscope also reduces the problems associated with lens blurring by using a continuous O2 flow system (4–5 L/min) attached to the laryngoscope thus making video laryngoscope more successful for endotracheal intubation in patients with normal airway as well as suspected difficult airways [6-8, 10].

In our study, True view PCD video laryngoscope and Macintosh blade laryngoscopes were compared by noting the Cormack–Lehane grades during laryngoscopy. Better glottis view was obtained in the VL group with 80 % patients having

Cormack Lehane grade I and 20 % having grade II as compared to 8 % patients having Cormack Lehane grade I, 28 % grade II and 64% Grade III in the ML group respectively. This is was with study of Barak et al [6]. who reported that the True view blade provided a better laryngoscopic view than the Macintosh blade. They stated that Cormack–Lehane grade I was exhibited in 100% patients, in the True view Group whereas Cormack Lehane I, II and III were exhibited respectively in 14.2%, 28.5% and 57.14% patients in the Macintosh Group. Our observations are also consistent with the findings of Timanaykar et al. [7] where they found that the patients with MPG III exhibited Cormack–Lehane Grade I in 68.48% cases in True view PCD group and in 22.22% cases in the Macintosh blade group. Our results are also similar to the study of Li et al. [8] who reported that the Mallampatti grading determined prior to laryngoscopy plays a significant role in relation to the glottic view for both the Groups. Tutuncu et al. [9] found that only 3.3% of the patients in the True view Group had Cormack–Lehane Grade III, whereas 33.3% of the patients in Macintosh Group had Cormack–Lehane Grade III which is again, similar to our study.

We observed that the median of Cormack– Lehane grades in Group VL was grade I, whereas in Group ML, it was grade III. This difference is statistically significant implying that TruView PCD improves the glottic view by two Cormack–Lehane grades as compared to the Macintosh blade. Singh et al. [10] stated that 93.75% of the patients showed improvement in the glottic view by one Cormack–Lehane grade, whereas 76.47% of the patients showed improvement by two grades. Li et al. [8] found that 52.5% of the patients showed improvement by 1 or 2 Cormack–Lehane grades. Tutunku et al. [9] found that median Cormack– Lehane grade in the Macintosh Group was II while it was I in the True view Group, which is yet again similar to our study.

Conventional laryngoscopes require the alignment of oral and pharyngeal axes to view the glottis opening. This skill has to be acquired and well maintained. True view laryngoscope is a modified Macintosh blade with an exaggerated distal curvature and a viewing lens. It gives a view of the glottis without the need to align the oropharyngo tracheal axes and therefore simplifies intubation [6-11]. In our study, TTI was noted from the insertion of the laryngoscope in the patients' mouth till the inflation of the cuff, which was noted by an independent observer (OT Anesthesia Assistant) in both the groups. It was 22.03± 3.4 seconds in the VL group which was significantly longer than the ML group, where it was 18±2.9 seconds, and therefore we presume that it should take longer for resuming effective ventilation. Findings of our study correlated with Li et al. [8] where TTI in the True view group was 51 seconds as compared to 34 seconds in the Macintosh group. Similar findings were seen in the study by Ramesh Timanayakar et al. [7] where TTI was reported to be 23.11 seconds in the Macintosh Group and 33.62 seconds in the TruView Group. Delay in Intubation with True view VL as compared to the macintosh laryngoscope can be attributed to the fact that there has been enough experience for the latter while not so much for the former. The Anesthesiologists may probably be in the early stages of the learning curve but with repeated use should get a firm grip on True views' usage.

We put strict constraints on how the attempts were counted. If the anesthesiologist had to change the blade or even reintroduce it, it was counted as an attempt. If the patient could not be intubated after three attempts, it was considered as a failure. In our study 92% of patients could be intubated in the first attempt in the VL group in comparison to 36 % in the ML group which is quite a significant difference. Jungbauer et al. [11] found that 99% of the patients were intubated in the first attempt with video laryngoscopy, whereas 92% patients were intubated with Macintosh in the first attempt. The findings of this study are not in agreement with ours. Our observations did not match with the studies by Malik et al [12]. Torun et al [13]. Barak et al. [6] and Timnayakar Ramesh et al. [7] as well, where there was no significant difference in the number of attempts with both the techniques.

There is less hemodynamic response to laryngoscopy and intubation with True view laryngoscope than the Macintosh laryngoscope. There was a statistically significant increase in the mean pulse rate per minute from the baseline value of 90.26±10.74 before intubation to 108.53±12.04 after intubation in ML, and from 91.06±10.22 to 96.86±9.13 in the VL. The mean arterial pressure (in mm of hg) increased from the baseline value of 90.94±5.67 before intubation to 105.72±10.19 after intubation with ML, and from 91.02±7.78 to 94.77±8.49 in VL. This reduced hemodynamic response observed with True view may be due to a lesser force applied to the base of tongue by True view VL. The lifting force is very minimal with True view when compared to Macintosh [7].

Complications like soft tissue injury bleeding, and teeth injuries were less with use of True view PCD laryngoscope than with Macintosh laryngoscope, but they were not statistically significant.

Limitations

The First limitation of our study was that we couldn't use both the devices in the same patient. The second limitation was that POGO score was not included in our study. POGO score is a better indicator of laryngeal view, but it does not distinguish between Cormack Lehane grade III (epiglottis) and IV (tongue) as each would have a score of 0. We thus did not include the POGO score, not aware, at the start of our study as to how many patients would exhibit Cormack Lehane grade of III or IV.

Conclusion

It can be concluded that the True view PCD laryngoscopy offered a better glottic view by 1–2 Cormack–Lehane grades as compared to the Macintosh blade laryngoscopy in patients with anticipated difficult airway. Also, True view PCD requires reduced number of attempts and assisted maneuvers. Hence, we recommend the use of True view in patients with anticipated difficult airway. Adequate experience with the device may help in reducing the time to Intubation.

References

1. Macintosh RR. A new laryngoscope. Lancet. 1943; 241- 205.
2. Tse JK, Rimm EB, Hussain A. Predicting difficult endotracheal intubation in surgical patients scheduled for general anesthesia: A prospective double blind study. Anesth Analg. 1995; 81: 254-258.
3. Apfelbaum JL, Hagberg CA, Caplan RA, Blitt CD, Connis RT, et al. Practice guidelines for management of the difficult airway: An updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiology. 2013; 118: 251-270.
4. Samsoon GL, Young JR. Difficult tracheal intubation: A retrospective study. Anaesthesia. 1987; 42: 487-490.

5. Cormack RS, Lehane J. Difficult tracheal intubation in obstetrics. Anesthesia. 1984; 39: 1105-1111.

6. Barak M, Philipchuck P, Abecassis P, Katz Y. A comparison of the True view blade with the Macintosh blade in adult patients. Anesthesia. 2007; 62: 827-831.

7. Timanayakar RT, Anand LK, PaltaS. A randomized controlled study to evaluate and compare TruView blade with Macintosh blade for laryngoscopy and intubation under general anesthesia. J Anaesthesiol Clin Pharmacol. 2011; 27: 199-204.

8. Li JB, Xiong YC, Wang XL, Fan XH, Li Y, et al. An evaluation of the True view EVO2 laryngoscope. Anesthesia. 2007; 62: 940-943.

9. Tutuncu AC, Kaya G, Tunali Y, Altintas F, Dilmen OK. A comparison of the True view EVO2 and macintosh laryngoscope blades. Clinics. 2011; 66: 709-711.

10. Singh I, Khaund A, Gupta A. Evaluation of True view EVO2 laryngoscope in anticipated difficult intubation - A comparison to Macintosh laryngoscope.Indian J Anaesth. 2009; 53: 164-168.

11. Jungbauer A, Schumann M, Brunkhorst V, Börgers A, Groeben H. Expected difficult tracheal intubation: A prospective comparison of direct laryngoscopy and video laryngoscopy in 200 patients. British journal of anesthesia. 2009; 102: 546-50.

12. Malik MA, Maharaj CH, Harte BH, Laffey JG. Comparison of Macintosh, True view EVO2, Glidescopew, and Airwayscope laryngoscope use in patients with cervical spine immobilization.Br J Anaesth. 2008; 101: 723-730.

13. Torun AC, Tur A, Ozkan F, Kelsaka E, Karakaya D, et al. Assesment of Macintosh laryngoscope and True view EVO2 video-laryngoscope with respect to hemodynamic and intubation quality in patients with presumptive difficult intubation. J Exp Clin Med. 2011; 28: 4-7.