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Comparison of Two Video Laryngoscopes: Guide Channel and Optical Laryngoscopes In Patients Undergoing Tracheal Intubation With Cervical Spine Pathology Prospective, Randomized, Comparative Study

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Abstract

Background: In patients with cervical spine pathology, manual in line stabilization for cervical spine immobilization may leads to obscured laryngeal view on conventional laryngoscopy leading to difficulty in intubation. Truview® EVO2 has been shown to ease the intubation in patients with normal and difficult airway. King Vision® video laryngoscope is a newly introduced intubating device with an attached screen to ease the intubation.

Aims: To compare the ease of intubation using Truview® EVO2 and King Vision® video laryngoscope in patients with immobilized cervical spine.

Settings and Design: Prospective Randomized comparative study.

Methods and Material: Sixty ASA I-II patients with elective cervical spine surgery were recruited for the study. Patients were randomly allocated by computer generated random number table into two groups comprising of 30 patients each. Following induction of anaesthesia, laryngoscopy was performed using the allocated study device and the tracheal intubation was done. Parameters of IDS score, time taken for intubation were recorded. Post intubation haemodynamic changes and airway related complications were also noted

Statistical analysis: Conducted using SPSS 17.0 version.

Results: Success rate of intubation with both devices was 100%.However no statistical significance difference between mean IDS score between the two devices has been found. The time taken for intubation was less with King Vision® when compared to Truview®. Hemodynamic parameters during intubation and post intubation were comparable and no major complication in both groups.

Conclusion: Both video laryngoscopes are reliable in case of cervical spine surgery patients using manual in line stabilization with 100% success rate and good glottic view.

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Keywords: Truview® EVO2, King Vision® video laryngoscope, cervical spine immobilization; IDS score, ease of intubation.

Abbreviations: MAP: Mean arterial blood pressure; MILS: Manual in line stabilization; ECG: Electrocardiogram; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; MAP: Mean arterial blood pressure; HR: Heart rate.

Key Messages

Both types of laryngoscopes are safe and efficient for intubation in patients with cervical spine immobilization.

Introduction

In cervical spine surgery patients, cervical spine immobilization is necessary. These patients are more prone to neurological damage related to neck movement, thus manual in line stabilization (MILS) of cervical spine is widely used in clinical practice in order to reduce the risk of cord injury during tracheal intubation [1]. Such immobilization can render intubation under direct laryngoscopy more difficult [2,3]. Difficult laryngoscopy and failed tracheal intubation are among the major cause of mortality and morbidity associated with anaesthesia. In addition to the low success rates of multiple intubation attempts, complications such as airway trauma, hypoxia, tachycardia, increase in blood pressure, intracranial and intraocular pressure, aspiration and cardiac arrest may arise [4].

To overcome this difficulty, various types of laryngoscope blades and visualization methods are devised and modified over time. Optical (Truview® EVO2) laryngoscope is one such device, developed by Truphatek International, Israel. It has an integrated optical lens, unique 42˚ refraction angle and a view through a 15 mm eyepiece making difficult cases easy to intubate [5].

It is used for endotracheal intubation where there is difficulty in visualization of laryngeal inlet especially in cases with limited neck extension [6,7]. Multiple sizes are available and each blade is equipped with an integrated oxygen jet, cleaning and insufflation system.

This allows continuous oxygen flow at rate of up to 10 liters per minute, extending the time available for intubation while also clearing airway secretions and preventing fogging [8,9].

The blade itself is angulated, proximal two thirds being straight with the final third having steep upward angle and flat tip. Guide channel (King Vision®) video laryngoscope (King System, Nobleville, IN, USA) is a new video laryngoscope which provides indirect view of glottis. It consists of reusable anti- reflective display and a single use blade/handle. Currently there are two available blade designs: disposable size 3 channeled blade and disposable size 3 standard blades. The distal lens has an anti- fog coating [10]. These two devices have been evaluated individually as intubating device but have not been compared to the best of our knowledge. The present study is designed to compare King Vision® video laryngoscope and Truview® EVO2 laryngoscope with regards to ease of intubation, time taken for intubation, impact on hemodynamic variables and complications if any, in patients posted for cervical spine surgery.

Objects and Methods

The Prospective, randomized, comparative study was conducted after Ethical Committee clearance and obtaining written informed consent. Sixty ASA1 -11 patients of elective cervical spine surgery between age group of 18-65 years of either sex undergoing tracheal intubation with Mallampati class 1-111 were included in the study. While patients with anticipated difficult airway (Mallampati class IV, thyromental distance <6 cm, inter-incisor gap <3.5 cm), risk factor for gastric aspiration like pregnancy, uncontrolled hypertension and diabetes, cardiac disease, hepatic and renal impairment and obese patients and oral pathology and CNS disorder patients were excluded from study. Patients meeting inclusion criteria were randomly allocated to either group by computer generated random number table to one of two groups comprising of thirty patients each. In one group of patients King Vision® video laryngoscope was used for aiding intubation (Group K) and in other group of patients, Truview EVO2® was used (Group T).On the day of surgery, before patient is wheeled into the operation room, anaesthesia workstation and resuscitation equipment was checked as per standard protocol. A single use cuffed flexometallic endotracheal tube 7.5 mm for females and 8 mm for males was used.

A hockey shaped stylet was used with Truview® EVO2 and channeled no. 3 blade King Vision® laryngoscope with

the endotracheal tube loaded on it, was kept ready. Then patient was shifted to operation room and connected to multichannel monitor for recording various baseline parameters like electrocardiogram (ECG), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial blood pressure (MAP), heart rate (HR), SpO2. Vitals parameters were continuously monitored.After preoxygenation for 3 minutes, anaesthesia was induced using Inj Fentanyl 2 mcg/kg and Inj Propofol 2-3 mg/kg titrated according to loss of verbal response. Bag and mask ventilation was assessed.

When bag and mask ventilation was possible, neuromuscular blocking agent Inj Vecuronium 0.1 mg/kg was given to the patient. Then the patient is manually ventilated by bag and mask for 3 minutes with 100% oxygen with 1% Isoflurane. Three minutes after the administration of muscle relaxant, neck is immobilized using manual in line stabilization applied by an experienced anaesthetist holding the sides of neck and the mastoid process, thus preventing flexion, extension or rotational movement of head and neck.

Intubation was performed with 7.5 mm flexometallic endotracheal tube in females and 8.0 mm flexometallic endotracheal tube in males, by an experienced anaesthesiologist using either King Vision® and Truview EVO2® laryngoscope as per randomly allocated group K and group T. In group T (Truview® EVO2), a flow 10 liter was used for oxygen insufflation from the side port to reduce fogging of the distal lens. In group K (King Vision®), the tracheal tube was loaded on channeled blade no. 3 for intubation The Cormack and Lehane grade obtained was noted.

Assessment

During and after laryngoscopy, the following parameters were recorded as per the Intubation Difficulty Scale (IDS) Table (1) and Intubation difficulty score (0=easy intubation, 1-5=moderate difficult,>5 very difficult)

Parameter	Score
No. of attempts (N1)	One attempt = 0Two attempts = 1 Three attempts = 2
No. of operators (N2)	One operator = 0 Two operators = 1 Three operators = 2
No. of alternative techniques (N3)	No alternative technique used = 0 Alternative technique used = 1
Glottic exposure- Cormack and Lehane grade of laryngoscopy (N4)	CL grade I = 0 CL grade II = 1 CL grade III = 2
Lifting force required (N5)	Normal = 0 Increase = 1
Necessity of external laryngeal pressure (N6)	Not applied = 0 Applied = 1
Position of vocal cords at intubation (N7)	Abduction = 0 Adduction = 1

Table 1: Intubation Difficulty Scale.

Haemodynamic monitoring included heart rate, non-invasive arterial blood pressure (NIBP), ECG, SpO2 and ETCO2 (ETCO2 started with the preoxygenation and till airway was intubated). The baseline value (0* time) of HR, NIBP and SpO2 were recorded as soon as the device insertion has just begun. Once the intubation was completed and confirmed (0 time) the parameters (HR, MAP, SpO2 and ETCO2) were recorded. The parameters were recorded after 1 minute, 3 minute and 5 minute post intubation. At the end of the surgical procedure, the neuromuscular blockade was reversed and the trachea was extubated. On extubation, the teeth and oral cavity were examined for trauma and the tracheal tube inspected for any blood staining. Post operatively, patient was assessed for sore throat and hoarseness of voice. The primary outcome was the ease of intubation based on intubation difficulty scale (IDS) score .Which is seven point scoring system that describes the degree of difficulty in intubation based on several parameters as described above. Secondary end points included time taken for intubation, impact on hemodynamic variables and complications, if any.

The time taken for intubation was defined as the time taken from when the anaesthetist inserted the blade into the mouth till the tracheal tube was placed between vocal cords as determined by the appearance of the capnographic trace following connection to anaesthetic circuit. If necessary, the anaesthetist assistant will allow to apply external pressure or to do laryngeal manipulation to assist intubation. Number of attempts will be noted. Patient was ventilated with 100 % oxygen between attempts at laryngoscopy and intubation so that no patient was allowed to desaturate below 95 %. After 3 attempts at intubation and intubation requiring more than 120 seconds with the assigned blade, patient was intubated with Macintosh blade and was considered as failed intubation.

Statistical Analysis

For a prospective study design, the sample size required can be calculated according to the following formula:

$$n = z\alpha^2 \times p(1-p)/m^2$$

Description:
n = required sample size
Zα = confidence level at 95% (standard value of 1.96)
p = estimated prevalence
m = margin of error at 7 % (standard value of 0.07)

Calculation

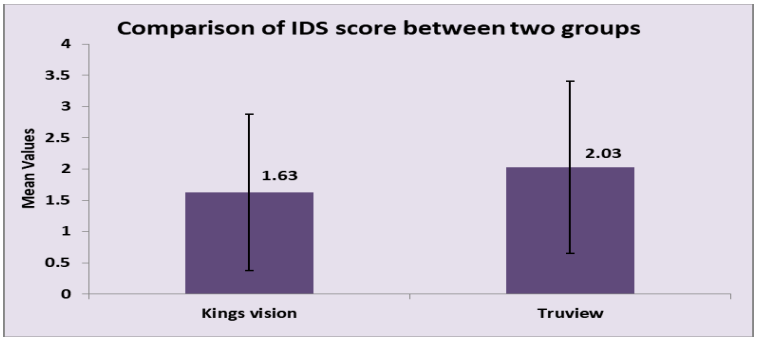
For our prospective randomized study we have 9 % estimated prevalence at 95 % confidence level (the standard value of z is 1.96) and we have 7 % margin of error. After putting these values in above formula we get the sample size of 60. Statistical testing was conducted with the statistical package for the social science system version SPSS 17.0. Continuous variables are presented as mean ± SD, and categorical variables are presented as absolute numbers and percentage. The comparison of normally distributed continuous variables between the groups was performed using Student's t test. Nominal categorical data between the groups were compared using Chi-square test or Fisher's exact test as appropriate. P<0.05 was considered statistically significant.

Results

Both groups were comparable as for as demographic data like age weight, BMI are concerned as shown in table 2. Mean IDS score of King Vision® group (1.63 ± 1.25) and Truview EVO2® group (2.03 ± 1.38) was not statistically significant (p= 0.243) as shown in Figure 1. All individual parameters of IDS like number of attempts, number of operators, use of alternative technique, CL grade, external pressure required and position of vocal cord were also not statistical significance except lifting force which has statistically significant result as described in Table 3.

Parameters	Kings vision	Truview	P Value
	Mean ± SD	Mean ± SD	
Age	51.67 ± 9.85	51.47 ± 10.58	0.940
Height	167.67 ± 8.28	166.40 ± 8.73	0.566
Weight	76.20 ± 13.98	76.03 ± 13.59	0.963
BMI	27.02 ± 4.06	27.35 ± 3.72	0.749

Table 2: Demographic parameters.



(* p<0.05, statistically significant)
Figure1: Mean IDS score.

Intubation Difficulty Scale		Device		P Value
		Kings vision (n=30)	Truview (n=30)	
N1	0	26 (86.7%)	25 (83.3%)	1.000
	1	4 (13.3%)	5 (16.7%)	
N2	0	27 (90.0%	28 (93.3%)	1.000
	1	3 (10.0%)	2 (6.7%)	
N3	0	29 (96.7%)	27 (90.0%)	0.612
	1	1 (3.3%)	3 (10.0%)	
N4	0	20 (66.7%)	20 (66.7%)	1.000
	1	10 (33.3%)	10 (33.3%)	
N5	0	13 (43.3%)	4 (13.3%)	0.020*
	1	17 (56.7%)	26 (86.7%)	
N6	0	16 (53.3%)	15 (50.0%)	0.796
	1	14 (46.7%)	15 (50.0%)	
N7	0	30 (100.0%)	30 (100.0%)	—

Table 3: (* p<0.05, statistically significant), Parameters of IDS.

Intubation difficulty scale

- **N1:** Out of 30 patients in each group, 4 patients (13.3%) in King Vision® group and 5 patients (16.7%) in Truview EVO2® group required second attempt for intubation. Difference in two groups is not statistically significant. On subgroup analysis of patients requiring more than one attempt in both group, there was positive correlation with BMI (p=1.000).
- **N2:** Twenty seven patients (90.0%) in King Vision® and 28(93.3%) in Truview EVO2® required only one operator for intubation. Three patients in King Vision® group and 2 patients Truview EVO2® group required one additional operator (score 1).
- **N3:** In King Vision® group 29(96.7%) and 27(90%) patients were intubated without using any alternative technique. Only one patient in King Vision® group required alternate intubation technique, bougie was used. In Truview EVO2® group 3 patients required alternate intubation technique. Two patients required bougand one patient required repositioning of the patient and optimization of blade position during reinsertion in the oral cavity.
- **N4:** Cormack Lehane grade was I in two third patients, i.e. glottic exposure was good with both King Vision® and Truview EVO2®. Ten (33.3%) patients in each group has Cormack Lehane grade II.
- **N5:** Lifting force required for laryngoscopy is a subjective assessment criteria. In our study more than half patients in King Vision® group required lifting force, in contrast to 86.7% in Truview EVO2® group. Difference of lifting force in two groups was statistically significant.
- **N6:** Nearly half of the patients in each group required external laryngeal pressure for endotracheal tube advancement. Difference in two groups was not statistically significant.
- **N7:** Vocal cords were found in abduction position in all patients. None of the patient found vocal cords in adduction position.

Intubation difficulty scale (IDS) score

Six (20%) patients in King Vision® group and 4 (13.3%) patients in Truview EVO2® group were in easy intubation group having IDS score of 0. Rest 24(80%) patients in King Vision® group and 26(86.7%) in Truview EVO2® group were in slightly difficult group having IDS score of 1 to 5. In our study none of the patient was in moderate to major difficulty group. On subgroup analysis nearly 70% of patients were falling in IDS score of 1 to3 in both King Vision® and Truview EVO2® group (Figure 2).

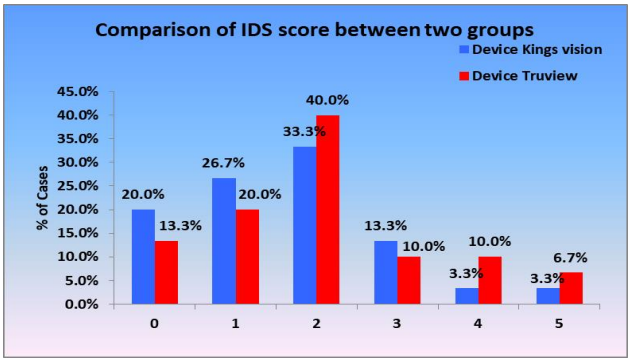


Figure 2: IDS score.

Time taken for intubation

Mean, median and range of time taken for intubation for two groups is shown in table 4 . Mean time taken for intubation was more in Truview EVO2® group. Time difference in two groups was statistically significant (p=0.010).

	Kings vision			Truview			P Value
	Mean ± SD	Median	Min - Max	Mean ± SD	Median	Min - Max	
TTI	38.87± 19.05	35.00	20 - 110	54.83 ± 26.87	47.00	10 - 106	0.010*

Table 4: Time of intubation* p= 0.010 (Statistically significant).

Hemodynamic parameters

As per physiologically expected response, mean heart rate and blood pressure were increased at time of intubation in both the groups. Mean heart rate peak was at one minute after intubation and returned to baseline levels nearly 5 minutes after intubation. Difference in two groups was not statistically significant. Also, mean arterial pressure was slightly lower in King Vision® group as compared to Truview EVO2® group and corresponding difference was not statistically significant. Likewise Mean SpO2 level and complications rate in two groups at corresponding time was statistically non-significant.

Discussion

In this study, we aimed to compare the King Vision® video laryngoscope and Truview EVO2® laryngoscope while performing tracheal intubation in patients posted for cervical spine surgery using MILS. Literature documented advantage of video laryngoscope is mainly in suspected/confirmed cervical injury patients. Patients with suspected/confirmed cervical injury require MILS to avoid movement at cervical level. The two groups in our study were similar demographically in terms of age, gender, weight, height, BMI, ASA physical status and baseline airway parameters (MPG, ID, TMD and SMD).

Therefore we can say that results obtained from this study were purely due to characteristics attributable to devices rather than any bias associated to the sample selected. These video laryngoscopes were assessed and compared on the basis of intubation difficulty scale (IDS) score, duration of intubation and haemodynamic variation.

Truview® Evo2 (Optical laryngosscope)

The Truview® EVO2 is developed by Truphatek International, Israel. It has an integrated optical lens, a unique 42˚ refraction angle and a view through a 15 mm eyepiece, making difficult cases easy to intubate. It is used for endotracheal intubation where there is difficulty in visualization of laryngeal inlet, especially in cases with limited neck movement. Multiple sizes are available and each blade is equipped with an integrated oxygen jet cleaning and insufflation system. This allows continuous oxygen flow at a rate of up to 10 liters per minute, extending the time available for intubation while also clearing airway secretions and preventing fogging. The blade itself is angulated, the proximal two thirds being straight with the final third having a steep upward angle and flat tip (Figure 3,4).

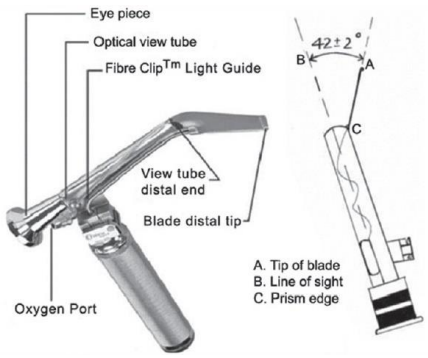


Figure 3: Truview EVO2® (Optical Laryngoscope).

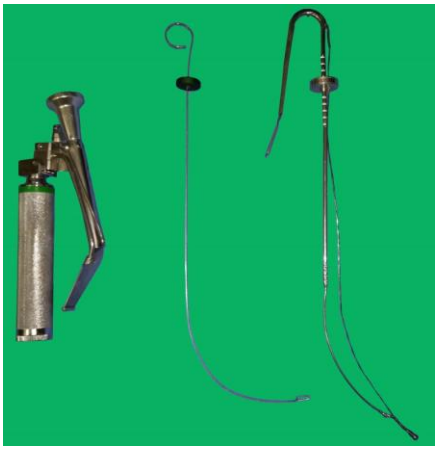


Figure 4: Truview EVO2® with hockey stick J curvature shaped Stylet.

King Vision® video laryngoscope (Guide channel video laryngoscope)

King Vision® video laryngoscope, which is the latest in the series of video laryngoscopes, consists of two detachable pieces. It has a reusable monitor that attaches to a disposable blade (Figure 5).

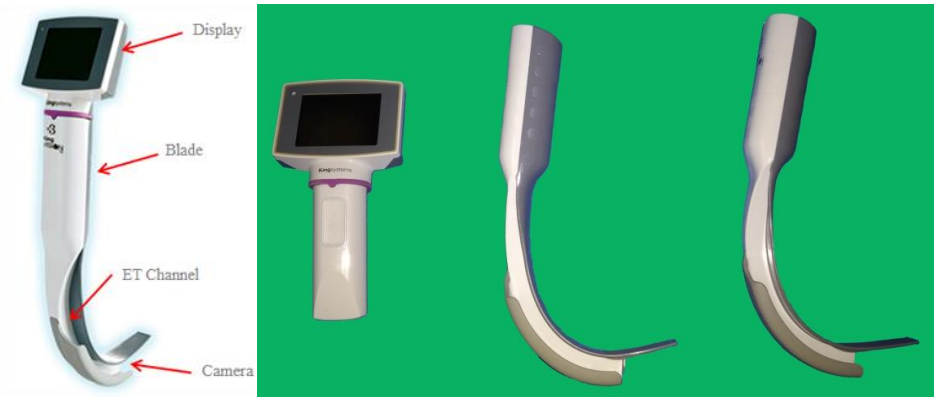


Figure 5: King Vision Video Laryngoscope with channeled blade

The two pieces simply come together by sliding them on each other. The King Vision® blades are available as channeled and non-channeled (standard blade). The channeled blade acts as a conduit for the tube. The display is on an OLED (Organic Light Emission Device) design, with surprisingly good clarity and resolution. It creates clear image viewing in a 160° panoramic field and can be turned on with a single power button on the back side and switched off by pressing it for 3 sec. There is a mini USB port for video output. The lead light on the blade tip has a very good intensity with pale white illumination.

The device is powered by standard AAA size batteries. Insofar as the King Vision® laryngoscope with curved blade has an especially designed blade curvature and a video system, it needs minimal manipulation or even extension of the head at the atlantooccipital joint, requires less effort for blade introduction into the oral cavity and to push the tube into the trachea through the inbuilt conduit. A minimum mouth opening of 13mm is required for a standard non – channeled blade and 18 mm mouth opening is required for the channeled blade of the King Vision laryngoscope, making it usable for majority of adults. It has been found that video laryngoscopes yield better glottis visualization, higher success rate for difficult airways and faster learning curve, resulting in higher success rates for intubations by novice physicians.

In cervical spine patients performing manual in line stabilization during intubation, both the laryngoscopes provided similar laryngoscopic views (Cormack Lehane grade I or II glottic view) in all the cases signifying good glottic exposure. As already mentioned, there have been no studies directly comparing these two devices, although many studies comparing these two individual devices with conventional laryngoscopes have been reported. Murphy LD et al. Found in manikin studies that in difficult airway scenario using head movement restriction or cervical spine collar, King Vision® offered a lower Cormack Lehane grade and higher percentage of glottic opening with the King Vision® compared to direct laryngoscope.[11] They explained that with a direct laryngoscope it is necessary to obtain a line of sight from maxillary teeth to the glottis, which is difficult to obtain using cervical spine immobilization technique. Whereas in King Vision® laryngoscope with curved blade has an especially designed blade curvature and a video system, it needs minimal manipulation or even extension of the head at the atlantooccipital joint, requires less effort for blade introduction into the oral cavity and to push the tube into the trachea through the inbuilt conduit. Similarly, Malik et al concluded that laryngoscopic views in manikins with cervical spine immobilsation obtained by Truview® EVO2 was significantly ($p<0.05$) better than Macintosh laryngoscope because it uses an optical system, which provides a 42° deflection view without the need for alignment of oral, pharyngeal and laryngeal axis [12].

Difficulty in intubation despite good glottis visualization is a problem reported in most video laryngoscopes. Most video laryngoscopes can achieve a better view of the glottis and have a similar success rate. In our study, we

found that visualization of vocal cords is excellent, but faced difficulties in advancing the flexometallic endotracheal tube towards the glottis. We think that with sufficient experience in using these devices this problem can be easily overcome. In 33% cases (CL grade II) in each group we used maneuvers like external laryngeal manipulation, slight withdrawal of video laryngoscopes blade, manipulation and redirection of endotracheal tube after rotation so that it enters the glottis, in cases where it was directed towards the pyriform fossa.

These resulted in a successful intubation in first attempt. We have also used the hockey stick J curvature at the end of the tracheal tube for Truview® EVO2 as described by Sun and colleagues [13] which helps to maneuver the endotracheal tube into glottis. Those patients who required a second attempt in both the groups in spite of all the above maneuvers (13.3% in group K and 16.7% in group T), we used optimization of blade position and use of bougie during reinsertion in oral cavity. Our observations in the present study show that the King Vision® video laryngoscope seems to provide better intubating conditions as compared to the Truview® EVO2 laryngoscope, resulting in less consumption of time to secure the airway and less amount of lifting force is required to achieve successful intubation. Although, it should be confirmed with a larger sample of patients. Our mean TTI was 38.87 seconds for King Vision® and 54.8 seconds for Truview® EVO2. In the study conducted by Li et al. [14] the mean time to intubate with Truview® EVO2 was significantly prolonged (51 seconds) compared to Macintosh laryngoscope (34 seconds).

The main reason for increased duration of tracheal intubation with Truview® EVO2 is the difficulty in advancing the tube through the lateral side of the patients mouth which was also reported by Malik et al. [12] and Barak et al. [7]. Secondly while using Truview® EVO2, the anaesthesiologist initially focuses on the glottic opening, viewing it through the lens, consequently the initial manoeuvring of the tracheal tube is blind, later, the tube is passed into the glottis while viewing through the lens which provides deflection of 42˚. Negotiating tracheal tube through the indirect view provided by Truview® EVO2 was also difficult. This fact has been reported by other investigators [7,12].

Whereas King Vision® has a OLED screen which gives a clear image of the vocal cords and the surrounding anatomy with a larger field if vision as compared to Truview® EVO2 gives a smaller field of vision. Another problem with the Truview® EVO2 is fogging, which hinders the visualization of the vocal cords. To overcome this, we have used oxygen at the flow rate of 8-10 litre/min. A study comparing Macintosh and King Vision® showed overall median (range) intubation time (sec) was 16.9 (8.0-60.0) with the Macintosh and 20.5 (7.2-60.0) with the King Vision®. Success rate with the Macintosh was 91.4% and King Vision® 86.6 %. Esophageal intubation with the Macintosh occurred in 18 of 186 attempts, whereas no incidents of esophageal intubation occurred with the King Vision®.

The authors concluded that the King Vision® facilitated intubation by novice personnel without incidence of esophageal intubation. However, intubation times and success rates were similar to the values obtained with the macintosh [15]. In our study esophageal intubation did not occur. Barak et al [11] and Nasim et al [16] found that Truview® EVO2 took significantly longer time ($p< 0.05$) for intubation than Macintosh laryngoscope when used in cervical spine rigidity scenarios in manikins. In another study in patients with cervical spine immobilization [12], the time for intubation was significantly more when using Truview® EVO2 than Macintosh laryngoscope. Our study demonstrated that intubation difficulty score was slightly less for King Vision® video laryngoscope (1.63±1.25) as compared to Truview (2.03±1.38). But the difference between the two groups was not statistically significant ($p= 0.800$). Twenty percent patients in King Vision® group and 13.3% in Truview® EVO2 group were in easy intubation group having IDS score of 0. Rest 80 % in King Vision® and 86.7% in Truview® EVO2 group were in slightly difficult group having IDS score of 1-5.

No patients in our study had IDS score > 5 suggesting moderate to major difficulty. IDS score is a quantitative scale incorporating multiple indices of intubation difficulty that objectively quantifies the complexity of tracheal intubations. The major contributors of IDS score which cause statistically significant difference in our study is N5 (lifting force required), it is a subjective parameter. However, after the learning curve, this parameter can be comparable. In our study, 86.7% patients in Truview® EVO2 group and 56.7% in King Vision® group required increased lifting force. Similarly, Pappu Ameya et al. [17] found in their study of Truview® EVO2, CMAC D-Blade and videoendoscpe with Macintosh laryngoscope in difficult airway scenario, that 46.7% patients required an increased lifting force, in contrast only 6.7% and 10% patients in CMAC and video endoscope groups.

Moreover, 46.7% patients in King Vision® and 50% patients in Truview® EVO2 required external laryngeal pressure to improve the glottic view. Similar observations

were also made in study done by Pappu Ameya et al. [17]. Where 56.7% patients required laryngeal pressure to facilitate tracheal intubation. There was no difference in post intubation hemodynamic parameters and arterial oxygen saturation amongst the two groups. Airway related complications (oral mucosa breach, blood on the tube following extubation) were comparable among the two groups. Success rate in both the groups was found to be 100% indicating good overall performance which correlated with the previous studies. In a manikin study by Barak et al Truview® EVO2 had a success rate of 100% and that of Macintosh laryngoscope was 90% in a scenario with decreased cervical spine motion [7].

Conclusion

Both video laryngoscopes are reliable in case of cervical spine surgery patients using manual in line stabilization with 100% success rate and good glottic view. Both type of laryngoscopes are safe and efficient for intubation in patients with cervical spine immobilization considering high overall success rate and no significant trauma involved. Intubation with King Vision® video laryngoscope required lesser time than using Truview® EVO2 laryngoscope

Limitations

After analysis of study, there are few limitations in this study. Firstly, the potential observer bias cannot be ruled out, as it is not possible to blind the anesthesiologist intubating with the device for data collection. Secondly, subjective parameters can have an operator bias. To reduce operator bias intubation was done by single operator in our study. As we took patients with Mallampati grade upto III, results of our study can't be directly extrapolated in difficult intubation patients. To overcome these limitations, a study with more number of patients including anticipated difficult airway patients should be planned.

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