Original Research Article

A comparative study of different types of video laryngoscopes in viewing ease and time of Intubation and laryngoscopic response

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Abstract

Background: and objectives: With the progress in the technology, many new rescue devices have developed in the field of Intubation too in the form of video laryngoscopes. Their customary use is still not very common. This study was done to evaluate the effectiveness of Kings Vision Video Laryngoscope (KVVL) in comparison to Truview Video Laryngoscope(TVVL) in patients in routine airway management. **Methods:** We studied 60 adult patients who required orotracheal intubation during General anaesthesia posted for elective surgeries. They were randomly assigned into two groups with 30 patients in each group, one group using Kings vision and the other group using Truview video laryngoscope. We compared time to intubation (TTI), number of attempts to intubate, optimizing maneuvers used and incidence of complications in two groups. **Results:** Both the groups had comparable outcomes except the time to intubation and used external maneuvers which were significantly less in kings Vision group. **Conclusions:** Both KVVL and TVVL provides better laryngoscopic view in routine airway management but KVVL offers extra advantageous performance over TVVL with respect to TTI

Keywords: kings vision; trueview; Video laryngoscopes; Airway management: orotracheal Intubation

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INTRODUCTION

The prime responsibility of an anaesthesiologist is to secure and maintain a patent airway. Complications like hypoxic brain damage could happen from delayed intubation, misplaced tracheal tube or airway trauma.[1, 2] There are surfeit devices involved in airway management asserted as rescue equipments which can be utilized after failed direct laryngoscopy for endotracheal intubation. [(3)] Availability, setup and skills of the operator are major drawbacks using fiberopic laryngoscopy in routine use. Video laryngoscopes are one of such devices which come as rescue tool in elective and emergency patients with anticipated or unanticipated difficult airways. They are easy to use and the skills involved are easy to master.[4] Factors like poor portability high cost and use without special preparation prevented video laryngoscopes for being available for difficult airways and avoid airway catastrophe. This was overcome by Kings Vision and Truview Video laryngoscopes. They have camera and light source on the tip of their blades which provide indirect glottic view on screen without the need of alignment of oral- pharyngeal-tracheal axis thus allowing only little tissue damage during laryngoscopy.[5-7] We conducted this study to compare and contrast the efficacy of Kings Vision

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against TruView Video laryngoscopes in 50 patients posted for elective Sugeries under General Anaesthesia who needs intubation. We compared time to intubation, number of attempts used to intubate, Optimizing maneuvers used, hemodynamic parameters and incidence of complications.

METHODS

Present study was carried out after getting an approval from the Ethics Committee (Institutional review board). 60 patients posted for various elective surgeries in General surgery, ENT, Gynaecological surgery under General Anaesthesia were included to participate in this study. All intubations to be performed by Anaesthesiologists who had done minimum of 20 such using both video laryngoscopes to justify time to intubation. Adults Patients of 18-50 yrs of age (> 55 yrs can have absent upper teeth which can additional factor to difficult intubation) , belonging to physical status ASA grade I and II and Undergoing elective surgeries were **included** for the study. Patients having anticipated difficult airway, Mallampatti grade III and IV, Thyromental distance < 6cm, Inter incisor distance < 3cm , Cervical spine injury, BMI > 30kg m^2, Patients with difficult mask ventilation with risk of aspiration and posted for emergency operations were **excluded** from the study.

Our study is a prospective double blinded randomized and controlled. Patients were allocated into 2 groups of 30 each by computer generated random number table.

Group KV: to be intubated with Kings Vision Video laryngoscope

Group TV: to be intubated with Truview PCD Video laryngoscope

Preoperative assessment was done with History, physical examination and Investigations, a day prior to the surgery. Patients were prescribed tablet 0.5mg Alprazolam and tablet Ranitidine 150mg 1 HS and were kept Nill by mouth overnight. On arrival in the operating room, all the patients were monitored for continuous ECG, heart rate (HR), noninvasive blood pressure (NIBP) and SpO2. 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. A 'J' shaped stylet for endotracheal tube was used in Truview and Channeled kings vision blade no 3 Loaded endotracheal tube was kept ready. After preoxygenation with 100% oxygen for 3 minutes using circle absorber system with capnograph attached, anaesthesia was induced with intravenous Propofol 2 mg kg-1 till loss of eyelash reflex. Orotracheal facilitation was achieved with intravenous suxamethonium 1.5 mg kg-1 after 60 seconds with one of the laryngoscopes as per study group in neutral position using a digital camera. 4-5 liters oxygen flow was attached to the TV PCD laryngoscope to prevent fogging till visualization of epiglottis. Then a caudal pressure or external manipulation if applied towards the lower jaw to bring the larynx in the view was noted. Endotracheal tube if inserted with a bougie was also noted and the intubation was done.

The following parameters were noted:

1. 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)
2. Presence of External laryngeal manipulation (required to obtain satisfactory glottic view)
3. Use of bougie or stylet
4. Number of Attempts to successful Intubation (recorded by an independent observer) During the tracheal intubation, continuous ECG, HR, NIBP and SpO2 were monitored and recorded every 1 minute during induction and intubation and there after till 5 minutes during the post-intubation period.
5. Postoperatively, the patient was observed and noted for the symptoms of the sore throat, broken teeth, soft tissue edema, bleeding from gums or lips stridor or hoarseness and any other complication.

In case of a failure, an alternate method to maintain the airway was employed.

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. Subsequent management of anesthesia and reversal was left to the anesthesiologist providing care for the patient.

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

60 patients were enrolled in the study. 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).

Table 1: Demographic data

Criteria	KV Gp n=30	TV Gp n=30	P value
Age (yrs)	37.6 ± 17.30	41.20 ± 13.11	> 0.05
Gender (M:F)	14: 16	15: 15	
BMI (kg /m^2)	21.81 ± 3.10	23.51 ± 4.81	>0.05
ASA I:II	18: 12	17:13	

Both the groups had similar patient distribution with respect to difficulty level. In the KV Gp 13 % had buck teeth in comparison to 20% in the TV Gp. (Cormack Lehane) CL –I grading was 75% and 80 % and CL-II grading was 25% and 20% in KV Gp and TV Gp respectively which was comparable. Mean Thyromental and Inter incisor distance both were comparable in both the groups. (Table 2)

Table 2: Distribution of patients with respect to difficulty level

Criteria	KV Gp n=30	TV Gp n=30	P value
Mallampatti grade I : II	15:15	17: 13	
Cormack Lehane grade I:II	23:7	24: 6	
Buck Teeth	4 (13.3%)	6 (20%)	
Mean Thyromental distance (cm)± SD	6.295 ± 1.20	6.365±1.80	0.036 (ns)
Mean Inter incisors Distance (cm)± SD	3.54 ±1.98	3.48 ±1.4	0.8483 (ns)

3.33% in KV Gp and 13.3% in TV Gp required External laryngeal manipulation to visualize the glottic opening during laryngoscopy**.** Since we were using channelized blade in KV Gp none required the stylet for intubation but100% patient required the 'J' shaped stylet in TV Gp**.** There was use of 4-5 liters of Oxygen used in all the patients of TV Gp as it prevented the fogging of lens**.** (Table 3)

Table 3: Assisting Maneuvers for Intubation

Criteria	KV Gp n=30	TV Gp n=30
External laryngeal Manipulation	1 (3.33%)	4 (13.3%)
Use of stylet	0 (0)	30 (100%)
Use of Oxygen	0 (0)	30(100)

Success rate was 100% in intubation in both the groups. Patients were intubated in first attempt in 96.6% in KV Gp and 76.6% in TV Gp whereas in second attempt it was 3% in KV Gp and 7% in TV Gp. Time to Intubation was 22.03 ±3.4 sec in TV Gp and 11±2.9 sec in KV Gp which was highly significant finding. (Table 4)

Table 4: Laryngoscopy Time and attempt

Criteria	KV Gp n=30	TV Gp n=30	P value
Time taken for laryngoscopy (seconds)	11 ± 2.9	22.03 ± 3.4	<0.0001
No of attempts	29(96.6%)	23 (76.6)	
1^{st}			
2^{nd}	1(3%)	7 (23.3%)	

3 patients had gum injury and1 patient complained of sore throat in TV Gp in contrast to none in KV Gp (Table 5)

Table 5: Complications

Criteria	KV Gp n=30	TV Gp n=30
Soft tissue injury	0	0
Bleeding from gums	0	3 (9.9%)
Teeth injury	0	0
Sore throat	0	1(3.33%)

Increase in Heart Rate and Mean Blood pressure during laryngoscopy in both the groups were not statistically significant. (Table 6 and 7)

Table 6: Mean Heart rate(min) with relation to laryngoscopy

Criteria	KV Gp n=30	TV Gp n=30	P value
T Baseline	89.3 ± 9.18	86.33±9.87	0.0905 (ns)
T 1 min after insertion	90.83 ± 10.74	91.06±10.22	0.9046 (ns)
T2 min after insertion	90.66 ± 9.8	96.86±9.13	0.0005 (s)
T 3 min after insertion	90.10 ±6.64	96.16±7.39	0.0001 (HS)

T 5 min after insertion	89.6 ± 5.45	94.8±6.61	0.0001 (HS)

Table 7: Mean Arterial blood pressure (mm of Hg) with relation to laryngoscopy

Criteria	KV Gp n=30	TV Gp n=30	P value
T Baseline	89.12±7.69	85.56±17.63	0.153 (ns)
T 1 min after insertion	90.02±7.78	90.94±5.67	0.510(ns)
T2 min after insertion	91.77±8.49	105.72±10.19	0.0001 (HS)
T 3 min after insertion	90.45±7.49	99.86±8.94	0.0001 (HS)
T 5 min after insertion	90.5±7.05	97.23±6.75	0.001 (S)

DISCUSSION

Video laryngoscopy is the major technological revolution that endeavours to produce a view of the laryngeal inlet which is independent of the line of sight and improves success of tracheal intubation. As it precludes the need to align the oral, pharyngeal and tracheal axes, thereby prevailing a better laryngeal view and ensuing tracheal intubation easier to perform. [8] In the past there have been studies on manikins comparing different types of VLs, but only few of them are on real patients with variable intubating conditions[9-12] so we conducted the study to compare and contrast the kings vision and TruView Video laryngoscopes in routine with very studies in comparison of Kings vision to Truview. Inspite of good glotis visualization, there was difficulty in intubation with most video laryngoscopes in many of the studies Most of the time was spent in inserting the channeled blade into the mouth [13], inserting the ETT with J shaped stylet [14] with difficulties in introducing the blade. [15] In our study, we found that visualization of the vocal cords was excellent, but the introduction of the tube was challenging in certain cases. Majority of cases in both the groups reported easy intubation. In 13.3 % cases in VL Gp and 3%in KV Gp we used external laryngeal manipulation and manoeuvres like slight withdrawal of VL blade, and redirection of ETT after rotation so that it enters the glottis, in case if it directed towards the pyriform fossa. These resulted in a successful intubation in the first attempt. We used 'J' curvature (like a Hockey stick) at the end of the tracheal tube for all the patients in TV Gp as used by Sun and colleagues, [16] which helps to maneuver the ETT into the glottis. This was planned in all the patients of TV Gp to avoid time wastage and as this difficulty was foreseen in the pilot study. Once the blade was out of mouth it was considered second attempt (7 (23.3%) in TV Gp and 1(3%) in KV Gp), optimization of blade position was done during re insertion in the oral cavity. From the various studies done on VLs showed that anaesthesiologists reported difficulties in advancing the tube towards the glottis, but sufficient experience in using these devices overcame these difficulties. There are contrasting reports regarding Time to intubation (TTI) with VL. Some studies say that VLs are associated with a better laryngoscopic view but require a longer TTI.[17,18] TTI was 23.5 sec in KVL [13] and 17.9 sec [19] some say that the time to tracheal intubation is not different between the VLs and DL for orotracheal intubation. [20] Our mean TTI was 11 ± 2.9 seconds for KV Gp and 22.03 ± 3.4 seconds for TV Gp which was highly significant. Mean Heart rate and Mean arterial pressure did not change significantly in KV Gp from baseline to T5 min after insertion of ETT but in TV Gp there was significant change in relation to KV Gp which could be because of angulation needed with the insertion of endotracheal tube and more time requirement.

CONCLUSIONS

During this study, use of both the VLs resulted in a good glottic view with a good success rate of orotracheal intubation. With Statistically significant difference in TTI the KVL scored highly in overall performance than TVL. Being portable and economical their use can be expanded to cover a wider variety of scenarios.

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