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A Comparison of Kings Vision Video Laryngoscope with Macintosh Laryngoscope in Adult Patients Undergoing Elective Surgical Procedure

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Abstract: ***Airway management remains a vital primary skill for anaesthesiologist. We aimed at comparing the efficacy of direct laryngoscopy using the conventional Macintosh blade with indirect laryngoscopy using the King Vision video laryngoscope (KVVL) with regard to visualization of the laryngeal view, speed of intubation, intubation success rate, complications and hemodynamic stability. After approval from hospital ethical committee this study was carried out in 50 patients of American Society of Anesthesiologist (ASA) physical status I & II , aged 20 to 60 years of either sex, scheduled for elective surgeries under general anaesthesia. All patients were divided in to two groups. Group K – patients were intubated using King vision laryngoscope and in Group M - patients were intubated using Macintosh laryngoscope. Kings vision video laryngoscope with channeled blade performed better during intubation as compared to Macintosh laryngoscope in terms of better visualization of glottis, lesser attempts for intubation, lesser airway trauma & reduced hemodynamic response to laryngoscopy.***

Keywords: Direct laryngoscopy ,endotracheal intubationn, video laryngoscopy, King's Vision video laryngoscope.

1. Introduction

Endotracheal intubation remains the mainstay to secure airway under general anaesthesia. The leading cause of anaesthesia related injury is inability to intubate & secure the airway[1]. Direct laryngoscopy has been the standard technique for intubation for almost a century.

Video laryngoscopes are indirect laryngoscopes used to visualize an enlarged video image of airway amongst which kings vision video laryngoscope is recently introduced laryngoscope for difficult airway[1] It is an indirect, optical laryngoscope that has been designed to provide a view of the glottis without alignment of the oral, pharyngeal and tracheal axis. It is available with two blades − channelled and nonchannelled.[2]

Video laryngoscopy (VL) has become popular as a primary device for airway management in the emergency department. Emergency medical services (EMS) providers regularly encounter difficult airways due to emesis, blood or other fluid in the airway, facial or neck trauma, or cervical spine immobilization. VL has been proposed as an ideal approach as it provides better visualization of patient's vocal cords and promoting a more successful endotracheal tube placement rate.[3]

2. Aim of the Study

This study was carried out to compare the efficacy of king's vision video larygoscope with Macintosh Laryngoscope with regards to visualization of laryngeal view, speed of intubation, success rate of intubation, hemodynamic response and complications.

Image: The king's vision videolaryngoscope

3. Material and Method

After approval from hospital ethical committee the present study was conducted in 50 patients aged between 20 to 60 years of either sex , ASA physical status I and II scheduled for different elective surgeries under general anaesthesia with endotracheal intubation.

Inclusion criteria for this study were weight 40-70kg ,minimum mouth opening of 18 mm, all Mallampati Grades, thyromental distance of at least 6.5 cm ,neck circumference less than 38 cm for men and less than 35 cm for women, free neck mobility.

Patients with Coronary artery disease, oral pathology, neck flexion deformity, patients needing Rapid Sequence Intubation were excluded from the study.

Patients were randomly divided into two equal groups of 25 patients each after taking written informed consent. Patients in Group K were intubated using Kings vision whereas in Group M were intubated using Macintosh laryngoscope.

All patients were subjected to thorough preoperative clinical assessment. Patients were kept nil per oral for 6 hours prior to the surgery. In recovery room, after securing intravenous access, injection Ringer lactate i.v. fluid was started. In operation theatre, baseline preoperative heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial blood pressure (MAP) and oxygen saturation (SPO2) were noted.

Patients were preoxygenated with 100% Oxygen for 5 min. Intravenous Midazolam(0.02mg/kg) was administered before induction to allay anxiety. Patients were induced with injection propofol(2.5 mg/kg) mixed with inj. lignocaine (1.5mg/kg) and inj. Succinylcholine (1.5 mg/kg) i.v. After adequate muscle relaxation intubation was done with either Kings vision videolarygoscope (Group K) or Macintosh laryngoscope (Group M). Intubation was done after central visualisation of glottis and confirmed with ETCO2 curve. Anesthesia was maintained with O2, N_2O, Isoflurane, loading and intermittent dose of Inj. Vecuronium Bromide(0.1-.0.2 mg/kg). At the end of the surgery patients were extubated after reversing neuromuscular blockade with Inj.Glycopyrolate (0.01mg/kg) and Inj. Neostigmine.(0.05 mg/kg)

Haemodynamic parameters like pulse rate, blood pressure, peripheral oxygen saturation (SpO2%) were assessed. These

parameters were measured continuously and recorded before induction, before laryngoscopy, immediately after intubation and 3 min after intubation.

Time of intubation noted as time from insertion of blade to appearance of ETCO2 curve, number of trials to successful intubation, percentage of glottic opening using Cormack-Lehane Scoring system, Grade I –Visualization of entire vocal cords, Grade IIa – Visualization of posterior part of vocal cords, Grade IIb – Visualization of arytenoids only , Grade IIIa – Epiglottis liftable, Grade IIIb – Epiglottis adherent or only tip visible, Grade IV – No glottic structures seen.

Complications like possible airway trauma & oesophageal intubation if any were noted. Manoeuvres required during laryngoscopy- BURP manoeuvre 'backward, upward, rightward & posterior external laryngeal pressure' were noted. Two attempts were allowed for intubation.

Data were tested for normal distribution, and data analysis was performed using the independent t-test for two independent groups. Results are presented as ranges, percentages (%), arithmetic means ($\chi 2$) and SDs. The P value was considered statistically significant at less than 0.05.

4. Observation and Results

The mean age of patients was 35.0 ±10.27 years in group M (Macintosh group) and 32.68±9.43 years in group K (KVVL group) with no significant difference in age between the two studied groups (Table 1).

Table 1: Comparison between the two studied groups according to age (years)

	Group M (n=25)	Group K (n=25)
Minimum	20	18
Maximum	60	52
Mean	35.6	32.68
SD	10.27	9.43
P value	0.3	

With regard to haemodynamic response, comparison between the two groups showed that the heart rate were significantly less in group- K compared to group -M immediately after intubation and at 3 min after intubation.(fig. 1).

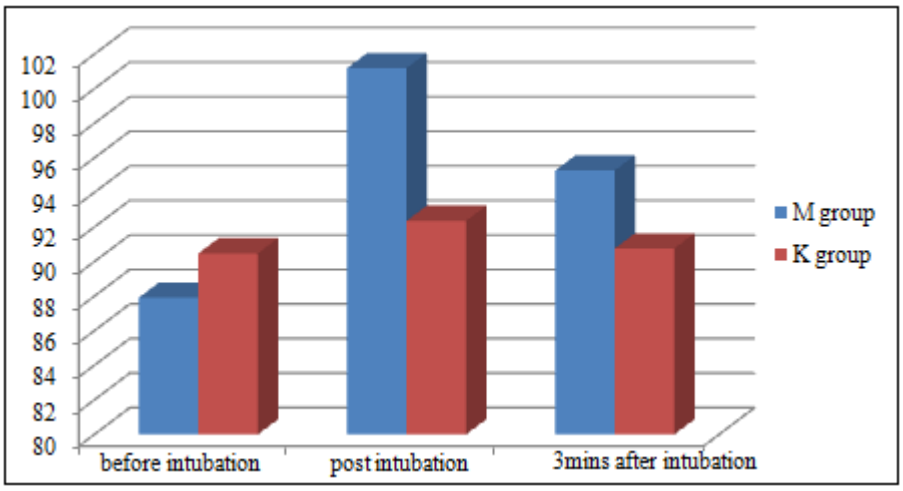

Figure 1

Comparison between the two studied groups according to heart rate (beats/min).

On comparing the two groups for BP, there was a significant difference in systolic & diastolic blood pressure on intubation using the KVVL as compared with the ML immediately after intubation and at 3min after intubation (Fig. 2).

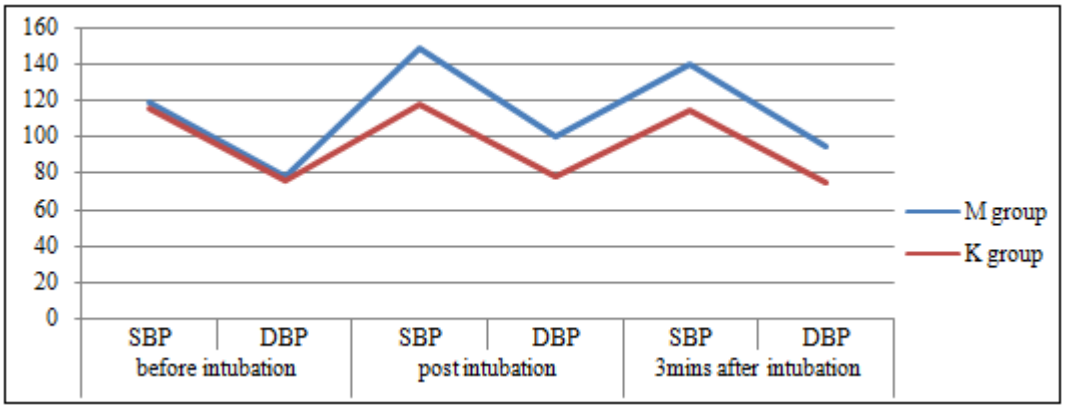

Figure 2

Comparison between the two studied groups according to Blood pressure (mmHg)

According to the laryngoscopic view, 10 patients who were intubated with the ML had grade 1, 11 had grade 2, and 9 patients had grade 3 Cormack and Lehane glottic view, in comparison with 21 patients who were intubated with the KVVL having grade 1and 4 patients with grade 2 Cormack and Lehane glottic view. Therefore, there was a significant difference between both the groups. The KVVL improves the laryngoscopic view, achieving a better glottic view

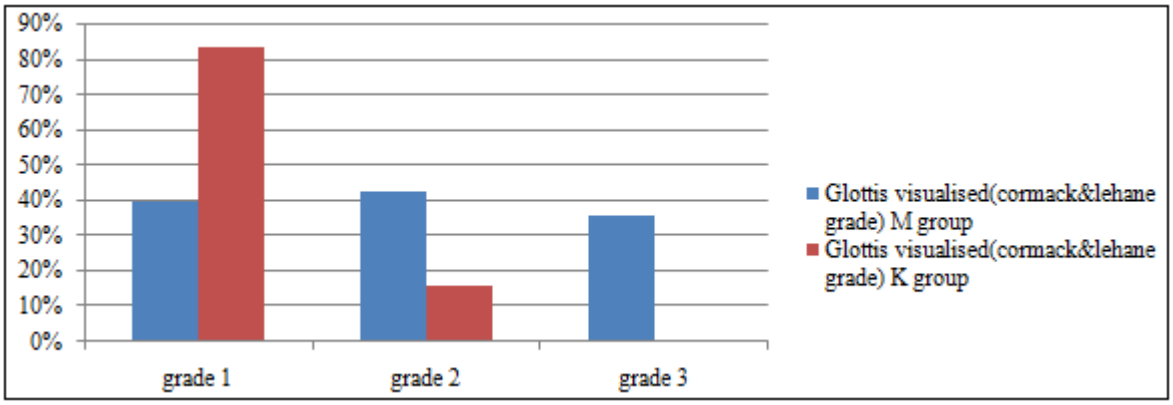

Figure 3

Comparison between the two studied groups according to laryngoscopic view

Regarding the number of trials, 5 patients needed more than one trial in the Macintosh group in comparison with 3 in the King vision group, and this was not significantly different(p value>0.05)(Table:2)

Table 2: Comparison between the two studied groups according to the number of trials for intubation

NO.	Number of trials	
	Group M (n=25)	Group K (n=25)
1	20	22
2	4	3
3	1	0

KVVL reduced the need for optimization manoeuvres, laryngeal pressure manipulation (BURP) required while intubating and changing of blade size; this was statistically significant (Figs 4)

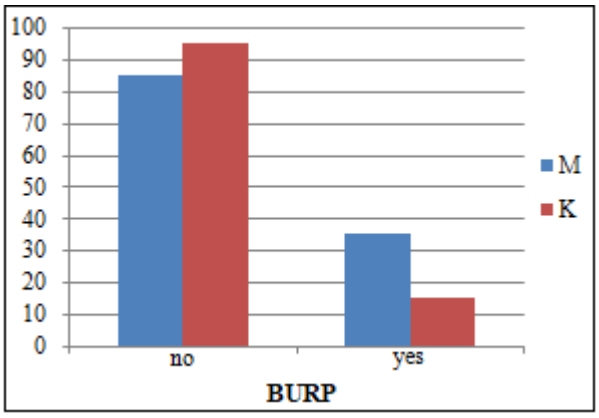

Figure 4

Comparison between the two studied groups according to BURP

The total tube insertion time was not significantly different between the two groups; the mean insertion time was 34.04±5.79 in group M and 31.6±4.29 in group K.(p value >0.05).

There was no significant difference between the two groups regarding failure rates.

There was less chance of airway trauma in group K compared with group M after intubation.

5. Discussion

Securing a patent airway in patients undergoing general anesthesia is routinely performed using direct laryngoscopy with a Macintosh laryngoscope blade. However, successive intubation attempt to pass the vocal cords can have a tremendous impact on patient outcome. A good laryngeal view is often a prerequisite, if not a guarantee, for successful intubation.The recent introduction of video laryngoscopes incorporating optics at the tip of the intubation blade has proven advantageous of improved viewing of the glottis with fewer trauma to the patient and faster intubation time.[4]

The present study demonstrated that the KVVL maintains haemodynamic stability during endotracheal intubation..This is in agreement with **Ralph LJ et al. in 2012**, they concluded that endotracheal intubation using video-laryngoscopy causes less cardiovascular responses compared to classic direct laryngoscopy.[5] Similar results were reported by **Maharaj CH et al,in 2008** their study to evaluate evaluation of the Airtraq and Macintosh laryngoscopes in patients at increased risk for difficult tracheal intubation. They concluded that videolaryngoscope reduce the haemodynamic response after intubation.[6] **Sherif M. Elhadi et al. in 2017** concluded that the KVVL performed better by reducing haemodynamic response to laryngoscopy and intubation.[2]

The kings vision videolaryngoscope improves the laryngoscopic view, achieving a better glottis view. This study is in agreement with **Q.E Ali et al, in 2015**,they concluded that KVVL improve the laryngeal view during intubation Similar results were reported by **Siddharta hanjura et al,in 2017**,they observed that KVVL improve glottis view during intubation.[7] **A.A.J.van Zundertl et al,**

2008, conducted similar study and they concluded that KVVL improves glottis view and achieved more successful intubation.[4]

Our results in regard with requirements of optimization manoeuvres revealed that both devices needed some optimization manoeuvres such as external laryngeal manipulations (BURP) and changing the blade size. The KVVL needed less optimization manoeuvres, showing that it offered easier intubating conditions. This study is in agreement with **Sherif M. Elhadi ,et al in 2017**,they concluded that KVVL reduce the requirement of BURP manoeuvres during laryngoscopy**. Q.E Ali et al,in 2015**,concluded that KVVL reduce the requirement of assisting manoeuvres and improve the laryngeal view during intubation.[1]

Our results regarding complications including possible airway trauma KVVL is associated with less airway trauma and complications .This study agreement with **Q.E Ali et al, in 2015**. [1] and **Siddharta hanjura et al, in 2017**,they reported that KVVL is associated with less complications and airway trauma. [7].**Maharaj CH et al, in 2008,**observed that KVVL associated with less airway trauma as compared to macintosh laryngoscope .[6] **James. W. Ibiuson et al, in 2014**, concluded that videolaryngoscope associated with less complications rate as compared with direct laryngoscopy [8]

When considering the duration of the intubation procedure, the mean tube insertion time was 34.04±5.79 sec. in group M and 31.6±4.29 sec in group K(p value < 0.05).

Regarding the number of intubation attempts in the present study, there was no significant difference.

Difficulty in airway management has been associated with serious complications, especially when intubation fails. When using conventional laryngoscope, anaesthesiologist have only a narrow view of the airway structure, whereas video laryngoscopes provide high quality video images, that are enlarged on the video monitor for easier visualization. With a channeled blade, it is easier to intubate.

It has been found that video-laryngoscopes yield better glottic visualization,higher success rate for difficult airways, and faster learning curve, resulting in higher success rates for intubations by novice physicians.

6. Conclusion

The KVVL has been found to be more effective in reducing haemodynamic responses to laryngoscopy and intubation, improvement in the laryngoscopic view with a higher success rate, easier procedure of laryngoscopy and intubation and the least usage of assisting manoeuvres during endotracheal intubation.

7. Financial support and sponsorship

Nil

8. Conflicts of interest

There are no conflicts of interest.

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