Comparison of non-channelled and channelled blade of king vision video laryngoscope for Oro-tracheal intubation: A randomized control trial.

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Abstract

Background: The video laryngoscope is widely accepted as essential tool in clinical anaesthesia as they provide better view of the larynx for the placement of the endotracheal tube particularly in patients with difficult airway. Commercially available King vision video laryngoscope (KVL) has two types of blades. We hypothesised that preloaded channelled blade may result in faster intubation as compared to non-channelled blades of King vision.

Methods: Sixty patients (n=60) posted for elective surgery under general anaesthesia were randomly assigned to be intubated with either the channelled blade or non-channelled blade of KVL. The primary aim was to compare the time to successful intubation during first attempt. Secondary aim being glottis visualisation time, number of intubation attempts and haemodynamic changes.

Results: Mean time taken for intubation was significantly less in non-channelled blade of King vision video laryngoscope (23.17±3.83s) as compared to channelled blade (31.53±4.55s) with significant p<0.001. Glottis visualisation time and number of endotracheal tube insertion attempts were less with non-channelled blade as compared with channelled blade with a significant p value. Changes in haemodynamic parameters were comparable in both groups and no significant fall in oxygen saturation during intubation in both groups.

Conclusion: Contrary to the hypothesis, glottis visualisation time and time for the successful intubation during first attempt was shorter with non-channelled blade as compared to channelled blade of King vision video laryngoscope.

Key words: Endotracheal intubation, video assisted, laryngoscope.

Introduction

Safe and effective airway management has always been basic foundation for good anaesthetic practice. Among various alternatives to manage difficult airway, video laryngoscopes have gained popularity in recent times and are widely accepted. The King vision video laryngoscope (KVL) (King Systems, Noblesville, IN, USA),is a newer, portable and affordable device, designed with an inbuilt camera with light at tip of the blade for direct laryngoscopy and has better glottis view time, reduced intubation time and requires less manipulation at the cervical spine in order to align all three optical axes in the pharynx and mouth[1,2]. The KVL comes with two blades channelled and non-channelled, the built of these blades gives the KVL a distinct feature and requires definitive handling[3]. Non-channelled blade is small and needs less mouth opening (13 mm) and is hyper angulated, so a malleable stylet is required for intubation and it also requires simultaneous handling of the KVL and tracheal tube (TT) which may be difficult for novice users. To avoid this hassle, channelled blade was introduced with an aim to provide better vision of glottis and for easy and early endotracheal intubation[4]. Channelled blades are bulkier and requires mouth opening of 18mm[5]. To reduce the bias of handling we did our study in a single centre and a single skilled anaesthesiologist performed all the intubations, with a primary

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objective to determine difference in intubation time of channelled and non-channelled blade of King vision video laryngoscope.

Methods:

After obtaining institutional ethics committee clearance and it was registered in Clinical Trials Registry of India. The study was conducted between June 2019 and June 2020 in a tertiary care teaching hospital in accordance with the principles of the Declaration of Helsinki. Inclusion criteria were patients in the age group of 18-60 years, belonging to American Society of Anaesthesiologist's (ASA) physical status I or II posted for elective surgeries under general anaesthesia. Exclusion criteria were patients with full stomach, predicted difficult airway (Mallampati III or IV) and patient's refusal to participate. Written and informed consent was taken from all 60 subjects. After careful selection of patients preoperatively, they were randomly assigned based on computer generated randomisation into non channelled (NC) and channelled (C) groups with concealment of allocation in closed envelopes. (Figure 1).

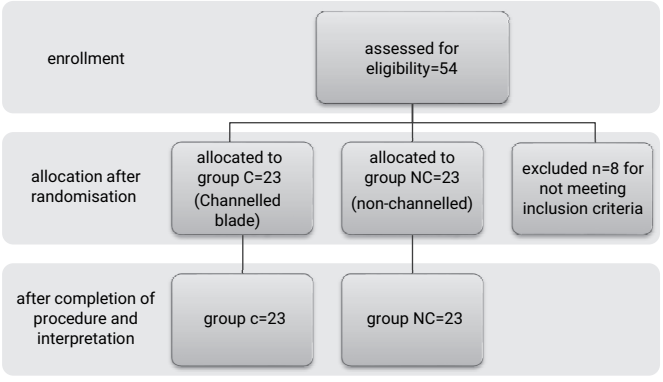

Figure 1: Randomization of patients into groups.

Group NC- patients intubated using non channelled blade, and Group C- patients, intubated using channelled blade. On the day of surgery, after confirming the nil per oral status, the patient was taken inside the operation theatre, non-invasive monitors, like, pulse-oxymetry, blood pressure and electrocardiogram(ECG) were attached and basal parameters were noted. Patients were given pre-anaesthetic medications with injection. glycopyrrolate 0.01mg/kg, midazolam 0.05mg/kg and fentanyl 0.002mg/kg intravenously. Induction was done with injection propofol 2mg/kg and after confirmation of adequate face mask ventilation Injection. vecuronium 0.1mg/kg was given. Patients were manually ventilated with oxygen for nearly 3 minutes with facemask till ade quate jaw relaxation was achieved. King Vision video laryngoscopy with either non-channelled or channelled blade was done by a single trained anaesthesiologist in all the cases. Intubations in group NC was done by placing stylet inside the endotracheal tube (ETT) after proper lubrication with lignocaine jelly and the distal end of ETT was angulated to 90^0. Following things were noted, glottic view time (it is the time between blade insertion and best appearance of glottis), endotracheal tube placement time (is defined as time from inserting the ET tube until the tip of tube disappears between the vocal cords), the intubation time (defined as time when blade passes the incisors and the appearance of first wave of CO2 at capnometer) and routine hemodynamic parameters. Number of failed attempts during intubation was also noted. Failed intubation defined as an elapsed intubation time of more than 120s, failed tracheal placement of the tube and removal of the device or repositioning from the oral cavity without advancing the tube.

Maintenance of anaesthesia was done with Oxygen, nitrous oxide, isoflurane and vecuronium 0.025mg/kg. After the completion of surgical procedure, neuromuscular blockade was antagonized by Injection. neostigmine0.05mg/kg and glycopyrrolate0.01mg/kg and the patients were extubated.

Statistical analysis: Sample size estimation was done using OPEN EPI software version2.3.1 at 95% confidence level and 80% power of the study. According to the study conducted by Akihisa Yetal [6], sample size estimated was 22, with extra for sample loss rounded off to 30 in each group, based on individual airway anatomy of patients and all patients were intubated by single anaesthetist. Study data was entered in Microsoft Excel and later analysed statistically by using IBM Statistical Package for Social Sciences for windows, version [20] (International Business Machines Corp, Armonk, N.Y, USA). Mean and Standard Deviation were calculated for quantitative data like age and weight and Student's t-test was applied. Percentage and number were used to represent qualitative data like gender, ASA physical status, intubating conditions and chi-square test was applied. P value <0.05 was considered significant.

RESULTS: The demographic data like age, sex, and weight of the patients among both the groups were comparable. Hemodynamic parameters like pulse rate, blood pressure were measured and compared in both the groups and the results were comparable and not statistically significant. The intubation time measured among both the groups showed relatively less time taken for intubation in group NC (23.17 ± 3.83s) as compared to group C (31.53 ± 4.55s) with significant p<0.001, (Table 1) (Figure 2). The Glottic view time in both the groups was assessed and found to be the same, with no significant p value (Figure 3). Time required to place the endotracheal tube after

visualization of glottis was compared and found to be less time in Group NC 16.80 ± 3.54 (17) (seconds) as compared to Group C 23.43±4.61 (25)(seconds),which was significant with p value of <0.001 (Figure 4). The hemodynamic parameter of maintaining oxygen saturation during the procedure was comparable in both the groups and was not statistically found to be significant (Figure 5).

Table1: Table showing the comparison between two groups on

Variables	Channelled Mean±SD (Median)	Non Channelled Mean ± SD (Median)	p value*
Intubation time (seconds)	30.97±4.06 (31.5)	23.17±3.83 (23)	<0.001
Glottic view time(seconds)	6.93±1.08 (7)	6.43±1.22 (6)	0.098
Tubal placement time (seconds)	23.43±4.61 (25)	16.80±3.54 (17)	<0.001
SpO2 (%)	98.57±0.90 (99)	98.67±0.92 (99)	0.6720

* t test applied

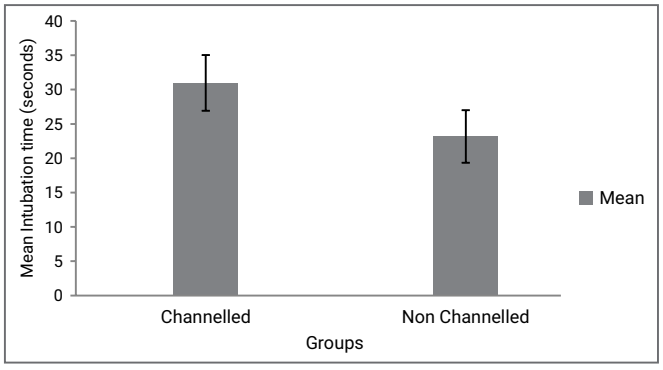

Figure 2: The mean intubation time

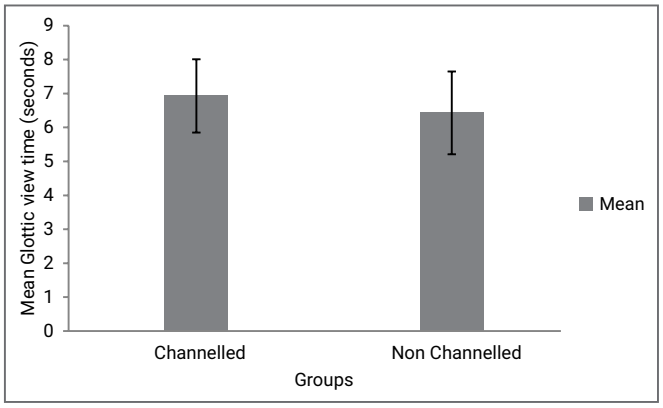

Figure 3: The mean glottis view time

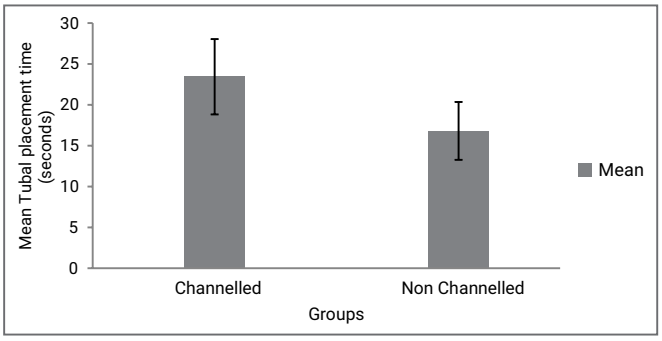

Figure 4: The mean tubal placement time

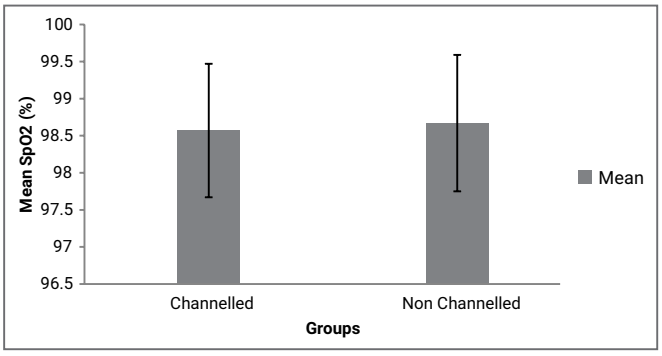

Figure 5: Oxygen saturation

Discussion

Video laryngoscopes are the armours of routine anaesthesia practices and a must to be devices in the difficult airway cart. Various types of video laryngoscopes are available and are tested for their optimal use in specific circumstances. The KVL is a wireless and fully portable video laryngoscope with 2.4 inch reusable OLED (organic light emitting diode) display. The basic difference in blades of the KVL is either they have slot for endotracheal tube (channelled) or without it (non-channelled). This difference in blade design itself will cause major practical and methodological difference in handling the KVL[7]. Hence the study was done to compare intubation time as primary objective between the two blades of KVL.

The mean intubation time was prolonged in group C (31.5secs) as compared to group NC (23 secs).This difference was in opposition to our hypothesis of better intubation with channelled blades. The result of reduced intubation time with non-channelled blade was in accordance to the study conducted by KriegeM et al[2], in their study they found better intubation time with non-channelled blade as 40 seconds and 59seconds in channelled blade, this time difference was more as compared to our study because of residents lesser than four years of experience were doing intubations in study conducted by Kreige M et al, where as we have done study with intubations performed by experienced anaesthetist with more than 50 VL intubations. Another study conducted by

Alvis et al[8], using different VL that is, non-channelled MacGrath blade versus channelled KVL, and they found that non channelled blades performed better with significant shorter median intubation time of 17seconds versus 38 seconds in channelled blade of KVL. This difference might also be due to the difference in basic design of the build of the video laryngoscopes, so to avoid this bias we have done our study using single VL with its own blade designs.

Intubation time was the sum of glottis visualisation time and endotracheal tube placement time. The glottis visualisation time of our study was 6.93 seconds in group C and 6.43seconds in group NC, it was comparable in both the groups and was not statistically significant, the same observation was seen in the study conducted by KriegeM et al[2]. In our study we did all intubations by using a single experienced anaesthetist to get accurate measurements. The glottis visualisation time of channelled blade was6.93 seconds which is because the channelled blade of KVL has longitudinal trough on right edge where the ET tube will be loaded, this tip of the ET tube is permanently visible on the screen which interrupts the glottis visualisation. Once ET tube is inserted into the slot the blade becomes bulkier, cumbersome to manipulate and requires larger mouth opening. The endotracheal intubation time with channelled blade in our study was 23.43 seconds whereas with non-channelled blade it was 16.23 seconds and it was statistically significant. There are studies contradicting the above findings. This difference is mainly because most of these studies were done on manikins and the general anatomy of the airway varies to minor degree among the patients. The time for endotracheal placement was higher in channelled blades because, the slots for ET tube insertion in the blades were narrow and gliding of the tube was not smooth even after adequate lubrication. When tube was advanced in most of the cases it was hitting the arytenoids. For proper placement of the tube multiple adjustments of the blade had to be done. This happened even after following the manufacturer's instruction of using Macintosh blade like technique (that is to position tip of blade into the vallecula). When NC blades were used there was free trajectory movement of the ET tube which was held in the right hand and facilitation of ET tube insertion into vocal cord was enhanced by using the ET tube preloaded with stylet and was bent according to the shape of the blade which helps in proper guiding of the tube. The main hindrance with NC blade was to maintain the best glottis view on screen as both video laryngoscope and ET tube are to be held in two different hands and proper coordination of hand and vision is must as there is some amount of blind time in which tip of the ET tube has not yet appeared in the screen[9]. This blind time can be reduced when an experienced anaesthesiologist does the intubation. Hence endotracheal tube placement time was reduced with non-channelled king vision video laryngoscope.

Conclusion: We conclude that time taken for intubation with non-channelled blade of King Vision video laryngoscope is short with successful first attempt intubations as compared to non- channelled blade.

Acknowledgements: Dr. S.Y. Hulakund, Prof and HOD department of Anaesthesiology, S.Nijalingappa medical college, Bagalkot.

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Conflict of interest: Nil
Source of funding: Nil

Date received: May 23, 2023
Date accepted: Nov 25, 2023