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Original Research Article

A Randomised Comparative Clinical Study of Intubation Performance with Non Channeled Kingvision Vs Non Channeled Hugemed Videolaryngoscope

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Conflict of interest: Nil

Abstract

Background: Different types of videolaryngoscopes may result in different performance and success of tracheal intubation. This study investigates the intubation performance of nonchanneled Kingvision vs non channeled Hugemed videolaryngoscope.

Aims: To compare the time to successful intubation of nonchanneled King vision vs non channeled Hugemed videolaryngoscopes.

Materials and Methods: Sixty subjects aged 18-60 years, American Society of Anesthesiologists (ASA) class I and II undergoing elective surgeries under general anaesthesia were randomly assigned into two groups of 30 each. Following standard premedication and induction, the patients were intubated using nonchanneled Kingvision or non-channeled Hugemed videolagyngoscope by skilled anesthesiologists familiar with the videolaryngoscopic intubation technique. The intubation time, visualization of the glottis, percentage of glottic opening (POGO) scoring was determined. The degree of difficulty of intubation using a five point Likert scale and the number of intubation attempts were assessed. Statistical analysis was performed using appropriate tests with p value < 0.05 considered significant.

Results: Intubation time was significantly shorter with Hugemed 20.5 ± 7 vs Kingvision 32.7 ± 7.6s ($p<0.001$). The time from laryngoscope insertion to glottis recognition with the Kingvision was 6.5 ± 1.6s as compared to Hugemed with 15.7 ± 6.7s ($p<0.001$). The ease of intubation grading, glottis view grading, number of intubation attempts were comparable between the groups.

Conclusion: The time for tracheal intubation was shorter with non-channeled Hugemed Videolaryngoscope compared to non-channeled Kingvision videolaryngoscope whereas Glottic recognition time was shorter with Kingvision videolaryngoscope. POGO score, Likert scale and intubation parameters were comparable between the two devices.

Keywords: Videolaryngoscopy, Tracheal Intubation, Nonchanneled Kingvision videolaryngoscope, non-channeled Hugemed videolaryngoscope.

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Introduction

Video Laryngoscopy (VL) has gained a strong base in routine anaesthesia practice and has become an alternative technique in case of anticipated difficult airway situations.[1] It is a portable device designed to perform indirect laryngoscopy in elective and emergency settings, used in both routine as well as in difficult intubation.

It facilitates the tracheal intubation by visualizing the patient's larynx through a fibreoptic camera incorporated into the laryngoscope blade and displaying the image on a monitor. The principal advantage is the visualization of the target, as the operator's "eye" is now positioned at the tip of the blade, 2 or 3 cm proximal to the aditus laryngis. The alignment of the oral-pharyngeal-laryngeal axis is crucial to direct larygoscopy, which is rendered nonessential in video laryngoscopy. The number of attempts and consequently the trauma to the airway is also reduced.[2]

The Kingvision VL has 2.4" display with an antifog lens. It is available in paediatric and adult sizes, with reusable and disposable version.[3] The Hugemed VL weighs 350 g with a 3.5" display 2-megapixel sensor and an antifog lens. It is available in neonatal,

paediatric, and adult sizes with reusable and disposable version. [4] Although both the videolaryngoscopes are widely used in clinical practice, there is a lack of research that has compared these two videolaryngoscopy blades. This study was aimed to address this gap. The present study evaluates and compares the efficacy of non channeled Hugemed videolaryngoscope and non channeled Kingvision videolaryngoscope for tracheal intubation. Hence the primary objective of this study was to compare the intubation time between the two videolaryngoscopes blades. Secondary variables were glottic visualization using POGO score, ease of intubation using a five point Likert scale, number of attempts for successful intubation, the need for External laryngeal manipulations (Backward upward rightward pressure maneuver) to improve glottis view were assessed.

Materials and Methods

This randomized clinical trial was approved by Institutional Ethics Committee, (ECR/134/Inst/KA/2013/RR-19) and registered at ClinicalTrials.gov (CTRI/2024/02/062397) and was conducted in a tertiary care hospital in South India over a period of 3 months from March 2024 to May 2024.

60 patients were recruited for the study. Participants were of either sex belonging to American Society of Anaesthesiology physical status I &II aged between 18-60 years scheduled for elective surgeries under general anaesthesia. Patients with predicted difficult airway (inter-incisor distance <3 cm, limited cervical extension >800, short thyromental distance <4cm or Mallampati class III or IV), obesity, diabetes, hypertension, pregnant and lactating women, history of drug allergy were excluded. Patients were grouped randomly into two groups using shuffled closed opaque envelop technique, comprising of 30 in each group.

Group King Vision (n=30): Intubation was performed using non channeled Kingvision videolaryngoscope.

Group Hugemed (n=30): Intubation was performed using non channeled Hugemed videolaryngoscope.

Non channeled kingvision blade is of disposable version, non channeled hugemed blade is of reusable version.

A thorough pre-anaesthetic evaluation of all the patients with necessary basic investigations was done on day prior to surgery. Informed consent was obtained after informing the patients of the study protocol in their own understandable language. The patients were kept fasted for six hours for solids and two hours for clear liquids. Patients were premedicated with oral ranitidine 150 mg, and alprazolam 0.5mg the night before surgery. In the operating room, monitors including 5 lead ECG, automated non-invasive blood pressure, and pulse oximeter were instituted and base line vitals were recorded. Peripheral venous access was secured with 18G intravenous cannula.

All patients were premedicated with inj midazolam (0.02mg/kg body weight), inj glycopyrrolate (0.01mg/kg body weight), inj fentanyl (1.5mcg/kg body weight). Preoxygenation was done with 100% oxygen for 3 min followed by induction with propofol 2mg/kg body weight and neuromuscular blockade with vecuronium 0.1mg/kg body weight.

Intubation was performed using non channelled Kingvision or Hugemed videolaryngoscope blade by skilled anaesthesiologists who had experience of performing more than 50 intubations with the videolaryngoscopic intubation technique. Four skilled Anaesthesiologist were involved in the study. Visualization of the glottis using POGO score were determined by the anaesthesiologist performing intubation. The intubation time required for the two groups was recorded and the anaesthesiologist performing the intubation was asked to rate the ease or difficulty of intubation using a five point Likert scale. Number of attempts required for successful intubation, external laryngeal manipulations (BURP) to improve glottis view were noted. In case of failure to intubate the patients within 3 attempts, alternative technique using Macintosh blade was planned. Alternative technique was not needed in our study since all patients were successfully intubated within 3 attempt.

Anaesthesia was maintained with 33% O2, 66% N2, and Isoflurane 0.5-1.5 %. Vitals were monitored. At the end of the surgery, neuromuscular blockade was reversed with inj Neostigmine 0.05mg/kg body weight and inj Glycopyrolate 0.02 mg/kg body weight.

The following parameters were recorded

- Time to intubation: Time interval from insertion of blade between the dental arches to the first deflection of capnograph after placement of endotracheal tube.
- Glottic recognition time: the time (in seconds) from insertion of the laryngoscope blade between the teeth to the moment the best glottic view is obtained.
- POGO: percentage of glottis opening score[5,6]

A POGO score of 100% denotes visualization of entire glottis from anterior commissure of the vocal cords to inter-arytenoid notch. If none of the glottic opening was seen then POGO score would be considered 0%.

Percentage visibility of the glottis: 0 (no visibility of even interarytenoid notch), 1 (only arytenoid and or epiglottis), 2 (1% to 25%), 3 (>25% to 50%), 4 (>50% to 75%), 5 (>75 to <100%), and 6 (100%).

- Five point Likert scale: 1) very easy, 2) easy, 3) moderate difficulty, 4) difficult, 5) very difficult.
- Number of attempts: it is defined as the time from introduction of laryngoscope into the oral cavity until its removal. " Failure to intubate" was defined as the inability to intubate after 3 attempts or which requires more than 60 seconds to perform

Sample Size and Statistics: Sample size was calculated using the equation

$$n = \frac{(Z\alpha + Z\beta)^2 \times \sigma^2}{\delta^2}$$

- Where, α = The probability of falsely rejecting a true null hypothesis, Zα = 1.96
- β = The probability of failing to reject a false null hypothesis, Zβ= 0.84
- δ = The size of the effect that is clinically worthwhile to detect
- SD = The standard deviation of the population being studied
- n = (1.96 + 0.84)2 x (9.87) 2 / (4.5)2
- n = 30 in each group

Statistical analysis was performed using SPSS 21.0 software.

Descriptive parameters are represented as mean, standard deviation, frequency and percentage. Inferential statistics was done using chi square test, t-test independent samples. P value <0.05 was considered statistically significant.

Results

Table 1: Comparison of Demographic Variables between the Groups

Parameters	Kingvision VL (n=30)	Hugemed VL (n=30)	p-value
No. of patients	30	30	–
Age in years (Mean ± SD)	38.5 ± 11.3	35.3 ± 12.4	**0.31**
Height in cm (Mean ± SD)	164.2 ± 6.9	164.0 ± 7.0	**0.91**
Weight in kg (Mean ± SD)	65.1 ± 9.8	67.3 ± 9.4	**0.38**
Sex (M/F)	14/16	15/15	–

Note: Values are expressed as Mean ± SD where applicable. All reported p-values are >0.05, indicating no statistically significant difference in baseline demographic characteristics between the two groups.

Our study recruited 60 eligible patients and divided them equally into two groups, Kingvision VL and Hugemed VL. The demographic variables and ASA status were comparable in both groups (Table 1).

POGO score, Likert scale and number of intubation attempts between non channeled Kingvision and non channeled Hugemed videolaryngoscope were comparable in our study (Table 2).

Table 2: Comparison between Kingvision and Hugemed VL Regarding Glottic Visualization and Intubation Characteristics

Parameters	Kingvision VL (n=30)	Hugemed VL (n=30)	p-value
Percentage of Glottis Opening (POGO)			**0.51**
3	7 (23.3%)	5 (23.3%)	
6	23 (76.7%)	25 (76.7%)	
Number of intubation attempts			**0.61**
1	25 (83.3%)	26 (86.7%)	
2	4 (13.3%)	4 (13.3%)	
3	1 (3.3%)	0 (0.0%)	
External laryngeal manipulation (BURP)			**0.99**
Yes	2 (6.7%)	2 (6.7%)	
No	28 (93.3%)	28 (93.3%)	
Degree of difficulty in intubation (Likert scale)			**0.04**
Very easy	16 (53.3%)	9 (30.0%)	
Easy	7 (23.3%)	15 (50.0%)	
Neutral	0 (0.0%)	3 (10.0%)	
Difficult	6 (20.0%)	3 (10.0%)	
Very difficult	1 (3.3%)	0 (0.0%)	

Note: Data are presented as n (%). A p-value of 0.04 indicates a statistically significant difference in the degree of difficulty of intubation between the two groups at the 0.05 significance level.

Data check: In the Hugemed VL group, 5/30 = 16.7% and 25/30 = 83.3%, whereas the supplied table states 23.3% and 76.7%, respectively. These percentages should be verified before final publication. A significant decrease in intubation time with greater ease of passing endotracheal tube using the Hugemed 20.5 ± 7s as compared to Kingvision 32.7 ± 7.6s, p value <0.001 and a significant decrease in glottic recognition time with Kingvision 6.5 ± 1.6s as compared to Hugemed 15.7 ± 6.7s, p value <0.001 and was noted (Table 3).

Table 3: Time of Glottic Recognition and Intubation Time by Groups

Parameter	King Vision (n=30)	Huge Med (n=30)	p-value
Time of glottic recognition	6.5 ± 1.6	15.7 ± 6.7	**<0.001**
Intubation time	32.7 ± 7.6	20.5 ± 7.0	**<0.001**

Values are expressed as Mean ± SD. p < 0.001 indicates a statistically significant difference between the groups.

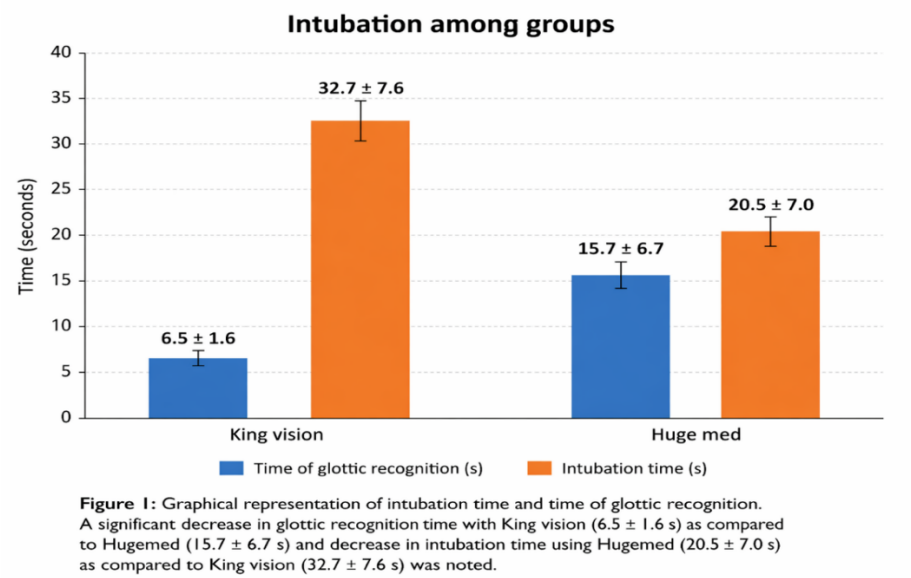

Figure 1: Intubation among groups

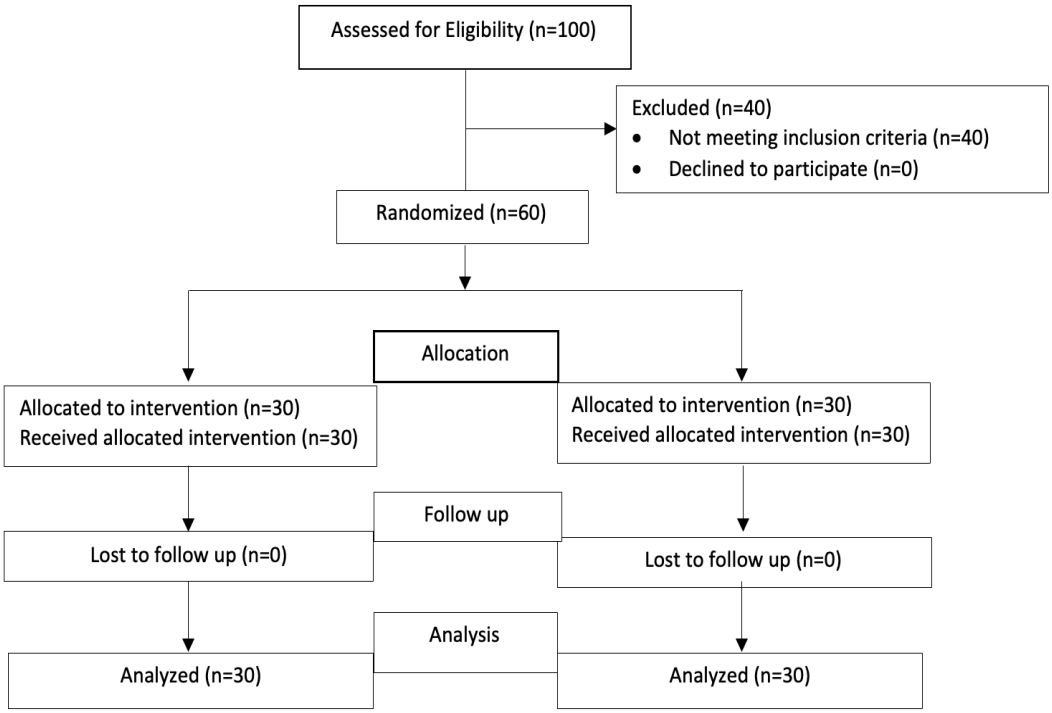

Figure 2: Consort flow diagram

Discussion

Endotracheal intubation is the safest method to secure airway and to administer general anaesthesia. Macintosh laryngoscope is widely used laryngoscope since its introduction. Videolaryngoscopes were later developed and became popular as new tools to combat unanticipated difficult airway. The role of videolaryngoscopy in difficult intubation has been recognised in Difficult Airway Society 2025 guidelines, which recommend that all anaesthetists are trained in videolaryngoscopy and that all anaesthetists have immediate access to a videolaryngoscope all the times.[7]

With a camera on the distal end of the blade, videolaryngoscope gives a better view of larynx than with standard Macintosh blade, with only minimal head and neck manipulation.[8,9] For videolaryngoscope with hyperangulated blade, the field of view is augmented by the capacity to see around the corner and gain a view of structures that are beyond the reach of Macintosh style blades. [10] The risk of trauma to soft tissues and teeth and incidence of sore throat is reduced. The number of laryngoscopic attempts are minimized and it is highly likely that unanticipated difficult intubation would be less frequent if videolaryngoscope were used as a first line technique. This prospective randomized controlled trial was conducted to assess the utility of the Nonchaneled Kingvision and Nonchaneled Hugemed Videolaryngoscope blades in routine adult airway management since there is lack of available data comparing the two.

In our study, the demographic variables like age, sex, BMI were comparable between the groups. Intubation time, POGO score, Likert scale and the number of intubation attempts were compared between non channelled Kingvision and non channeled Hugemed videolaryngoscope. A statistically significant decrease was noted in glottic recognition time with King vision 6.5 ± 1.6s as compared to Hugemed with 15.7 ± 6.7s. Humaria Bashir et al [11] described better visualization of glottis and higher success rate in first attempt at intubation with Kingvision videolaryngoscope as compared to Macintosh laryngoscope. Haozhen Zhu et al [12] noted better glottic view with non channeled Kingvision or McGrath groups than Macintosh group. The intubation time of Kingvision and McGrath group was comparable and both were shorter than Macintosh group. Both the above studies noted that the glottic recognition and intubation time was better with videolaryngoscopes when compared to Macintosh blade.

A significant decrease in intubation time with greater ease of passing endotracheal tube using the Hugemed 20.5 ± 7.0s as compared to Kingvision 32.7 ± 7.6s was noted in our study.. The alignment of the oral-pharyngeal-laryngeal axes is eliminated due to the presence of a camera at the tip of the blade of a videolaryngoscope unlike the traditional Macintosh blade. Videolaryngoscopy requires the tip of the tracheal tube to pass around a relatively acute angle to enter the larynx.[13] A problem reported with most Videolaryngoscopes is difficulty in intubation despite good glottis visualization. Most of the Videolaryngoscopes have achieved a good glottic view and have reported similar success rate.[13] In our study, we noted that visualization of the vocal cords was excellent, but the introduction of the tube was challenging in patients intubated using Kingvision nonchaneled blade. Due to the hyper angulation of the Kingvision blade[14] when compared to the Hugemed blade, less space is created for tube insertion as the pharyngeal tissues are not displaced far anteriorly when Kingvision blade is used. The shorter intubation time in our study could be due to the reason that Hugemed videolaryngoscope has a less bulkier blade compared to Kingvision videolaryngoscope, thus enabling easy laryngoscopy and faster passage of endotracheal tube through the glottis.

Various studies comparing different types of Videolaryngoscopes, comparison with Macintosh blades, in patient population and mannikin studies have been reported which show that anaesthesiologists have reported difficulty in advancing the tube towards the glottis. This problem could be solved by increasing the experience in using these devices routine practice. A prospective randomised study by Appikonda I et al [15] described Hugemed videolaryngoscope requires less time for intubation as compared to McCoy. Ozlem Kocaturk et al [16] noted that Hugemed videolaryngoscope may provide easier tracheal intubation, create a better glottic view, and significantly reduced the need for additional manipulation compared to the Macintosh direct laryngoscope for nasotracheal intubation.

Various studies are reported comparing different Videolaryngoscopes and with Macintosh blade and not Kingvision and Hugemed in particular. In contrast to the above studies, Sathyavathy et al [17] noted longer duration of laryngoscopy and intubation time for Hugemed videolaryngoscope when compared to Macintosh blade and concluded that videolaryngoscopy did not provide any benefit with regard to reduction in intubation time. Divya MJ et al [18] noted Macintosh laryngoscope was found to be faster than Kingvision videolaryngoscope and TAScope in time taken for intubation, the reason being use of bougie for endotracheal intubation in TAScope and the bulkier nature of Kingvision videolaryngoscope. Basar Erdivanli et al [19] also noted, the bulkier KingVision videolaryngoscope requires longer

times to visualize the glottis and to intubate the trachea, when compared to Macintosh blade.

POGO score, Likert scale assessed by the anaesthesiologist performing the technique were comparable between the two groups and the number of intubation attempts between non-channeled Kingvision and Hugemed videolaryngoscope were comparable in our study.

Our study has several strengths and limitations. Our study was performed by four anaesthesiologists who were experienced with videolaryngoscopy. The limitation in our study was the anaesthesiologist performing the intubation could not be blinded to the devices used in the study. A multiple user approach with clearly stratified user experience level and in a bigger patient population would be desirable to identify the impact of other VL blade types.

Conclusion

The intubation time with Hugemed videolaryngoscope was shorter compared to Kingvision videolaryngoscope. The glottic recognition time was longer with hugemed blade compared to kingvision blade. POGO score, Likert scale and number of intubation attempts between non channeled Kingvision and Hugemed videolaryngoscope were comparable in our study.

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