Section: Anesthesia

Research

A PROSPECTIVE, RANDOMISED CONTROLLED STUDY INVOLVING A COMPARISON BETWEEN KING VISION VIDEO LARYNGOSCOPY AND MACINTOSH LARYNGOSCOPY IN ROUTINE AIRWAY MANAGEMENT FOR ELECTIVE SURGERIES

S. Gomathy[1], M. Mahendran[2], S. Devasena[3]

[1]Assistant professor, Department of Aneasthesia, Government Vellore Medical college, Tamilnadu, India.
[2]Associate professor, Department of Anesthesia, Government Villupuram Medical college, Tamilnadu, India.
[3]Assistant professor, Department of Aneasthesia, Government Villupuram Medical college, Tamilnadu, India.

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Corresponding Author:
Dr. S. Devasena,
Email: udtdeva@yahoo.com
ORCID: 0000-0002-0918-8914

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Abstract

Background: Despite advances in intubation technology, tracheal intubation is still performed using the classic approach of direct laryngoscopy. However, direct laryngoscopy's inability to give good glottic vision, combined with a significant pressure response, has contributed to the emergence of novel intubation devices. The aim is to evaluate and compare the use of king vision video laryngoscopy (KVVL) and Macintosh laryngoscopy (ML) among adults undergoing elective surgery under general anaesthesia. The primary objectives are to assess the ease of intubation, the reduction of intubation failure, and the hemodynamic responses to the intubation. **Materials and Methods:** This Prospective randomised control study was conducted for one year (March 2020 to March 2021) at Govt Medical college hospital, Villupuram. A total of 100 study participants were assigned into two groups, I and II. Group, I consisted of patients intubated using a conventional Macintosh blade; and group II included patients intubated using KVVL. Preoperative anaesthetic checks and airway evaluations were performed, including mouth opening and Mallampati classification. **Result:** The 100 participants were recruited from ages 18-65 years, having Mallampati class I or II and belonging to ASA class 1 or 2. 16 subjects had Grade 1, 24 had Grade 2a, 9 participants with Grade 2b, and one patient had grade 3 C in the ML group. Optimising maneuvers were found in 96% of ML group participants. Moreover, the mean change in Heart rate change in systolic, diastolic, and MAP from PI to PT0,1 and 3 minutes shows the hemodynamic changes are more stable in the KVVL group than the ML group. Thus, proving the superiority of using KVVL for airway maintenance in elective surgery. **Conclusion:** Our study suggests KVVL has a better glottic view, fewer attempts, and less optimising manoeuvre, making it much better and more efficient than ML in securing the airway.

INTRODUCTION

Anesthesiology is the most integral part of every surgery. Every anesthesiologist's primary skill is maintaining the airway in all critical situations.[1] Laryngoscope is mainly designed to visualise the vocal cords and helps to place the endotracheal tube (ETT) into the trachea under direct vision.[2]

Direct laryngoscopy (DL) is one of the gold standard techniques for securing an airway.[2] Direct laryngoscope for tracheal intubation requires good technical skills, and it often involves alignment of the 3-airway axis, namely laryngeal, pharyngeal & oral, in a straight line.[2] This can be done by extension of the head and flexion of the lower cervical spine before the procedure.

Direct laryngoscopes such as the Macintosh or miller blades are used for tracheal intubation. The laryngoscope is composed of a handle and blades with a light source. The main disadvantage of DL is that it is challenging to maintain cervical immobilisation in patients with cervical immobility, cervical trauma, and unstable cervical spines.[3] The failure rate in DL is mainly due to inadequate glottis

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visualisation and various hemodynamic pressure changes. The American Society of Anesthesiologists (ASA) concluded that anaesthesia-related morbidities constitute 17% of closed claims, with a 5% difficult intubation rate.[4]

With the advancement in digital technology, these problems are overcome by developing some video laryngoscopes (VLs) for clinical purposes.[5] The main advantage of VL scope is better glottic visualisation and safer intubation with a high success rate.[6] The King Vision video laryngoscope (KVVL) is a recently developed video laryngoscope with a reusing 2.4-inch monitor and even a disposable stiff blade with a channel to direct the tracheal tube. This results in tracheal intubation being more accessible and safer compared to DL.[7] With the help of display in KVVL, it delivers a clear view of the patient's airway for quick and easy intubation for the anesthesiologist.

Stress responses such as tachycardia and hypertension are seen in patients during intubation. It is mainly due to a sudden surge in adrenaline concentration which may result in high mortality in high-risk cardiovascular and cerebral disease patients.[8] Better training of technical skills and proper equipment selection with awareness of complications are mandatory.

The American Society of Anesthesiologists (ASA) started guidelines for proper airway management to reduce anaesthesia-related morbidities. The ASA advocated classifying preoperative patients' conditions for anaesthetic risk evaluation. The ASA score is a subjective evaluation of a patient's general health based on five classifications (I to V).[9]

A good laryngoscopy should provide adequate glottis visualisation for endotracheal intubation with less effort, less time, and minimal injury with a high success rate.10 In this view, this study mainly compares King Vision Video Laryngoscope with direct laryngoscope to analyse the better performance.

AIM

To evaluate and compare the use of king vision video laryngoscopy and Macintosh laryngoscopy among adults undergoing elective surgery under general anaesthesia. The primary objectives are to assess the ease of intubation, the reduction of intubation failure, and the hemodynamic responses to the intubation.

MATERIALS AND METHODS

A Prospective randomised control study was conducted at the Government Villupuram medical college & hospital for 12 months from March 2020-March 2021. One hundred study participants were included and divided into two groups. 1) Group ML: Standard Macintosh Laryngoscope used for intubation (n=50). 2) Group KVVL: using King Vision Video Laryngoscope with Channelled blade for intubation. (n=50). Written informed consent was obtained from all the patients before the surgery, and ethical approval was obtained. All patients were evaluated in a pre-assessment clinic. A detailed history was taken to rule out any serious comorbidities, and routine general and systemic checks were performed. Blood pressure, heart rate, and BMI calculations were made.

Inclusion Criteria: Patients between 18 – 65 years, Patients with ASA I and ASA II (American Society of anesthesiologists) classification posted for elective surgery under general anaesthesia, Mallampati scores: 1 and 2 are included.

Exclusion Criteria: Increased intracranial pressure, cervical spine damage, and pathology of the head and neck, ASA physical status III and IV, Mallampati class III and IV, Obesity (BMI>30 kg/ m2), Patients with a past of musculoskeletal diseases, those undergoing emergency surgery, and those at risk of aspiration, pregnancy are excluded from the study.

All data were entered in Microsoft excel software, and statistical analysis was done using IBM SPSS 22 software. First, the percentage or mean differences were calculated to examine the relationship between the laryngoscope and the outcome variables. Then, the statistical significance of the variations was determined using the chi-square test and Fischer's exact test.

RESULTS

Gender distribution in KVVL and ML, Male in KVVL is 25 (50.0%), ML is 27 (54.0%), and in female KVVL is 25 (50.0%), ML is 23 (46.0%). So, there was no difference in the prevalence of gender between the two groups. In KVVL intubation, all the participants were intubated in the first attempt, whereas in ML, 3 participants needed more than one attempt to intubate. [Table 1]

There is no significant difference in age between the two groups. The mean weight significantly differed in both groups, whereas there was no significant difference in BMI and height. The mean and SD of the Mallamapati score between the two groups were not statistically significant. The difference in the experience of intubation was not statistically significant in both groups, with KVVL group intubators having 0.76 years higher than ML but not significant. The Tracheal intubation in seconds and duration of laryngoscopy in seconds between the two groups were not statistically significant. There was a significant difference in ease of intubation between the two groups, with the KVVL group having good ease of intubation compared to the ML group with a p-value <0.001. [Table 2]

No optimising manoeuvres were done in 2 participants in ML groups, whereas 44 patients in the KVVL group required no optimisation manoeuvre. Anticlockwise rotation of ETT and external elevation of the larynx were needed only in

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6 patients in the KVVL group. In the ML group, 22 patients needed external laryngeal manipulation, 11 needed external laryngeal manipulation with bent back manoeuvre, and 7 needed external laryngeal manipulation with head extension. It shows around 96% of ML participants needed some manoeuvre for intubation. [Table 3]

Table 1: Gender distribution.

Variable		KVVL %	ML %	p-value
Gender	Male	25 (50.0%)	27 (54.0%)	0.689
	Female	25 (50.0%)	23 (46.0%)	
Type of laryngoscope	No of attempts 1	50 (100%)	47 (94.0)	0.079
	No of attempts 2	0	3 (6.0%)	

Table 2: Distribution of Age, Weight, Height, BMI, Mallampatti score, Experience of intubation, Tracheal intubation, Duration of laryngoscopy, and Ease of intubation in Study groups.

Variable	Group	Mean and Std	P-value
Age in years	KVVL	38.26 ± 11.017	0.110
	ML	41.68 ± 10.714	
Weight in kg	KVVL	65.36 ± 5.703	0.030
	ML	62.98 ± 5.077	
Height in cm	KVVL	162.84 ± 4.400	0.791
	ML	163.16 ± 7.280	
BMI	KVVL	24.724 ± 2.3113	0.059
	ML	23.736 ± 2.4230	
Mallampati score	KVVL	1.560 ± 0.5014	0.310
	ML	1.660 ± 0.4785	
Experience of intubation (in years)	KVVL	7.960 ± 2.4071	0.095
	ML	7.200 ± 2.0603	
Tracheal intubation (TTI) in seconds	KVVL	21.86 ± 8.162	0.136
	ML	19.42 ± 8.081	
Duration of laryngoscopy (DOL) in seconds	KVVL	42.38 ± 9.189	0.346
	ML	40.28 ± 12.717	
Ease of intubations	KVVL	52.20 ± 16.573	<0.001
	ML	21.00 ± 17.173	

Table 3: Comparison of optimising manoeuvres in both groups.

MANOEUVRES	KVVL		ML	
	n	%	n	%
None	44	88	2	4
Anticlockwise rotation of ETT	3	6	0	0
Bent back	0	0	2	4
External elevation of the larynx	3	6	0	0
Bent down	0	0	0	0
Bent down, External laryngeal manipulation	0	0	0	0
External elevation of the larynx	0	0	0	0
External laryngeal manipulation	0	0	22	44
External laryngeal manipulation with a bent back	0	0	11	22
External laryngeal manipulation, head extension	0	0	7	14
External laryngeal manipulation, head extension, bent back	0	0	0	0
External laryngeal manipulation with bent back, bougie used	0	0	3	6
External laryngeal manipulation, head extension, bougie use	0	0	2	4
External laryngeal manipulation with bent down, bougie used	0		1	2

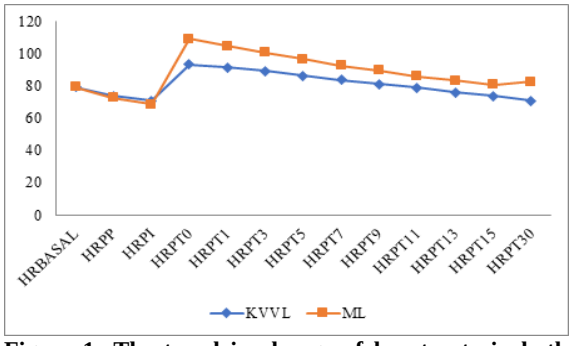

Figure 1: The trend in change of heart rate in both groups.

The heart rate lowered from basal to post-premedication and fell further until post-induction in both groups. Then after post-induction, the heart rate raised and peaked in both groups at PT0 (post-intubation at 0 minutes) and then fell gradually till 30 mins post-intubation in both groups.

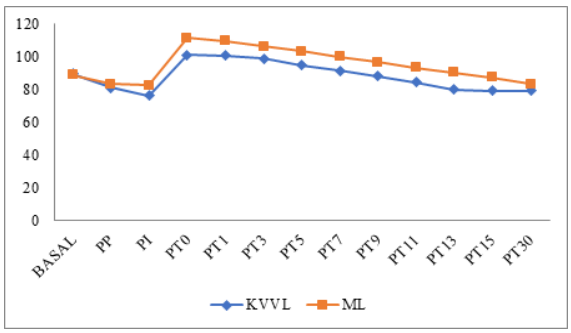

Figure 2: The trend in mean arterial blood pressure changes in both groups.

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MAP at basal was not significantly different in the two groups. But after post-induction and post-intubation, from 0 to 30 minutes, the Mean arterial blood manipulation was significantly lower in KVVL compared to the ML group. The trend in MAP of both groups shows that BP lowered from basal to post-premedication and then fell further till post-induction. Then after post-induction, it peaked in both groups at PT0 (post-intubation at 0 minutes) and then decreased gradually till 30 mins post-intubation in both groups.

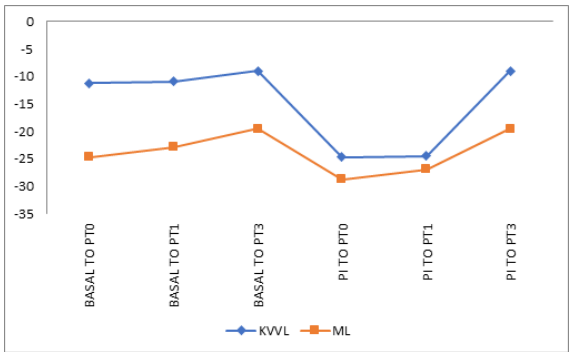

Figure 3: Mean change in MAP.

The mean change in MAP from basal to PT0, PT1, and PT3 in the KVVL group is lesser when compared to the mean change among the ML group, and the difference is significant. Similarly, the change from PI to PT0 and 3 was lesser in the KVVL group compared to the ML group. It shows the hemodynamic changes are more stable in the KVVL group than in the ML group.

DISCUSSION

All 100 subjects were either Mallampati class I or II with sufficient mouth opening and normal thyro-mental and sterno-mental distance. The mean with SD of Mallamapati score and experience of intubation between two groups were not statistically different, making both groups comparable. Trained persons in the neutral position did all intubations (100%) in both groups and with the table levelled.[10]

Megala R et al. studied that the mean intubation time in seconds is 21.8 seconds in KVVL and 19.4 seconds in ML. There was no significant variation in our study for intubation time in both groups. A 2014 randomised trial on the same topic compared intubation with KVVL and ML and showed that the mean intubation time was 3.6 seconds faster with the Macintosh group.[11] Kanchi M et al. studied whether video laryngoscopy and endotracheal intubation are superior to traditional laryngoscopy and endotracheal intubation in patients with cardiovascular disease. The study has shown results similar to ours, with no difference between ML and KVVL groups.[12]

In a study by Elfadly A et al, when compared to a Macintosh laryngoscope, the KVVL was analysed much better in these individuals by minimising hemodynamic reaction to laryngoscopy and intubation, enhancing the Cormack and Lehane glottis view, minimising the requirement for optimisation procedures, and lowering the difficulty Likert scale score (ML). There are still no differences between the devices regarding intubation time, success rates, or problems. It has shown similar results to heart rate changes and values. And also, the MAP was lower in the KVVL group than in the ML group, which is similar to our study results.[13] Erdivanli B et al. performed a prospective randomised controlled clinical trial on adult patients with varied intubating circumstances to evaluate the King Vision video laryngoscope's effectiveness with the Macintosh laryngoscope and found that KVVL enhanced the glottis viewing in more individuals (220 patients, 56.7%) than Macintosh (180 patients, 46.4%) with a statistically significant p-value based on the modified Mallampati class at the preoperative visit. The study concluded that KVVL is better than ML.[14]

In our study, the mean change in heart rate from basal to PT0, PT1, and PT3 in the KVVL group is lesser when compared to the mean change among the ML group, and the difference is significant. Similarly, the heart rate change from PI to PT0,1 and 3 was lesser in the KVVL group compared to the ML group. The mean change in systolic Bp from basal to PT0, PT1, and PT3 in the KVVL group is lesser when compared to the mean change among the ML group, and the difference is significant. Similarly, the systolic Bp change from PI to PT0 was lesser in the KVVL group compared to the ML group. Whereas no difference in changes of systolic Bp from PI TO PT1 & 3. Our study shows the hemodynamic changes are more stable in the KVVL group than in the ML group, showing the superiority of using KVVL for airway maintenance in elective surgery.

CONCLUSION

Our study result suggests that the KVVL has a better glottic view, a fewer number of attempts, and less optimising maneuver, making it much better and more efficient than ML for use in airway securing. Also, good hemodynamic stability was observed while using KVVL compared to ML, suggesting that KVVL has more Efficacy than ML.

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