



www.bioinformation.net  
Volume 21(5)



Research Article

Received May 1, 2025; Revised May 31, 2025; Accepted May 31, 2025, Published May 31, 2025

DOI: 10.6026/973206300211234

SJIF 2025 (Scientific Journal Impact Factor for 2025) = 8.478

2022 Impact Factor (2023 Clarivate Inc. release) is 1.9

**Declaration on Publication Ethics:**

The author's state that they adhere with COPE guidelines on publishing ethics as described elsewhere at <https://publicationethics.org/>. The authors also undertake that they are not associated with any other third party (governmental or non-governmental agencies) linking with any form of unethical issues connecting to this publication. The authors also declare that they are not withholding any information that is misleading to the publisher in regard to this article.

**Declaration on official E-mail:**

The corresponding author declares that lifetime official e-mail from their institution is not available for all authors

**License statement:**

This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited. This is distributed under the terms of the Creative Commons Attribution License

**Comments from readers:**

Articles published in BIOINFORMATION are open for relevant post publication comments and criticisms, which will be published immediately linking to the original article without open access charges. Comments should be concise, coherent and critical in less than 1000 words.

**Disclaimer:**

Bioinformation provides a platform for scholarly communication of data and information to create knowledge in the Biological/ Biomedical domain after adequate peer/editorial reviews and editing entertaining revisions where required. The views and opinions expressed are those of the author(s) and do not reflect the views or opinions of Bioinformation and (or) its publisher Biomedical Informatics. Biomedical Informatics remains neutral and allows authors to specify their address and affiliation details including territory where required.

Edited by Neelam Goyal & Shruti Dabi

E-mail: [dr.neelamgoyal15@gmail.com](mailto:dr.neelamgoyal15@gmail.com) & [shrutidabi59@gmail.com](mailto:shrutidabi59@gmail.com);

Phone: +91 98188 24219

Citation: Keshari *et al.* Bioinformation 21(5): 1234-1238 (2025)

# Ease of intubation: King vision video laryngoscope versus macintosh laryngoscope

Urmila Keshari, Rajni Thakur, Sherin Soni & Ajay Yadav\*

Department of Anaesthesia, Gandhi Medical College, Madhya Pradesh, India; \*Corresponding author

**Affiliation URL:**

<https://gmcbhopal.net/en>

**Author contacts:**

Urmila Keshari - E-mail: [drsumi@rediffmail.com](mailto:drsumi@rediffmail.com)

Rajni Thakur - E-mail: [dr.rajni\\_1507@rediffmail.com](mailto:dr.rajni_1507@rediffmail.com)

Sherin Soni - E-mail: [sherinsoni9@gmail.com](mailto:sherinsoni9@gmail.com)

Ajay Yadav - E-mail: ajayky88@gmail.com

### Abstract:

The ease of endotracheal intubation between the King Vision Video Laryngoscope (KVVL) and the Macintosh Laryngoscope (MAC-L) in 100 adult patients is of interest. Key outcomes assessed were hemodynamic changes, number of intubation attempts, procedure duration, and complications. Results indicated the KVVL had a higher first-attempt success rate (80% vs. 70% for MAC-L), required fewer attempts, and was associated with more stable hemodynamics. No major complications were observed with either device. The study concludes that the King Vision Video Laryngoscope offers advantages in ease of intubation, success rate, and hemodynamic stability over the Macintosh laryngoscope.

**Keywords:** Macintosh laryngoscope, king vision video laryngoscope, intubation

### Background:

The most effective method of securing an airway during tracheal intubation was by using the Macintosh laryngoscope (MAC), direct laryngoscopy is the primary technique for tracheal intubation [1]. Teaching this skill is difficult since Macintosh direct laryngoscope (DL) allows only one individual to view the larynx during the procedure [2]. This skill is difficult to master and has long learning curve [3, 4]. Most of the difficult intubation is unpredicted and predictive tests have low sensitivity and positive predictive value [5, 6]. There is no single factor to predict the existence of a difficult airway, so difficult airway is not known until the induction of anaesthesia [7]. Video laryngoscopes had been proven useful for intubating patients with difficult airway by inexperienced laryngoscopists and advocated by experts also. A recently developed video laryngoscope, King Vision laryngoscope can securely and effectively manage both normal and challenging airways. Therefore, it is of interest to evaluate ease of tracheal intubation and time taken for intubation by junior residents with the use of king vision video laryngoscope and Macintosh laryngoscope

### Materials and Methods:

The present study is Observational hospital based study conducted in the Department of Anaesthesiology, Gandhi medical college and associated Hamidia Hospital from January 2023 to January 2024. After approval from institutional ethics committee under letter number (32293/MC/IEC/2022), and with CTRI number: CTRI/2023/07/055842 study was conducted on 100 patients of ASA grade 1 and 2, aged between 18-60 years schedule for elective surgery, that require general anesthesia, laryngoscopy and tracheal intubation.

### Inclusion criteria:

- [1] Patients of ASA grade – I, ASA grade II
- [2] Age group 18-60 years of either sex.
- [3] BMI <30
- [4] MPG – 1&2

### Exclusion criteria:

- [1] Patient refusal or not giving consent.
- [2] Limited oral opening
- [3] Limited cervical extension
- [4] Short thyro mental distance
- [5] Mpg – 3&4
- [6] Pregnant women

[7] Patient with Co morbidities

[8] Seizure disorder

[9] ASA grade III,IV,V

### Methods:

Preoperatively patients were explained about the procedure and technique and informed consent was taken, each patient was assessed for difficult airway and previous intubation attempts. Baseline parameters of patients such as heart rate, NIBP, mean arterial pressure, spo2, ECG were noted down and monitored accordingly during procedure. General anaesthesia technique was standardised for all patients. Premedication was done with inj. glycopyrrolate I.V (0.01mg/kg), inj. fentanyl I.V (1-2mg/kg), inj. midazolam I.V (0.05-0.1mg/kg) done, induction with inj. propofol I.V (2-3mg/kg), inj. succinyl choline I.V (1-2mg/kg) was done. The choice of laryngoscope blade size was at discretion of attending anaesthesiologists. Patients were divided into two groups: Group MAC (n=50) patients intubated by using a macintosh laryngoscope, positioned in sniffing position and intubated with Macintosh laryngoscope. Group KVVL (n=50) patients were intubated by using a king vision video laryngoscope, positioned with head in neutral position and intubated with King vision Laryngoscope, using channeled blade with the endotracheal tube preloaded and entering through midline and requires depression of the tongue, not deviation as with Macintosh laryngoscope. A maximum of two attempts or 120 seconds were allowed with the assigned laryngoscope, if failed to intubate, the patient was ventilated and intubated with conventional laryngoscope by an trained anesthesiologist. All intubations were performed by junior residents of mean age group of 25 years, having no experience in laryngoscopy/intubation/ anaesthesiology. We measured the outcome by intubation difficulty score which constitutes 7 different variables associated with difficult intubation and each variable has 0-1 score (Table 1). Time taken to endotracheal intubation defined as time from passage of laryngoscope tip past incisors to the appearance of ETco2 tracing. After extubation, patient was assessed for any airway trauma or cervical spine injury due to hyperextension of neck.

**Table 1:** Intubation difficulty score

IDS PARAMETER	SCORE
Number of attempts > 1	N1
Number of attempts > 1	N2
Number of alternative techniques	N3
Cormack and lehane grade - 1	N4

Lifting force required	
Normal	N5=0
Greater than normal	N5=1
Cricoid compression	
Not applied	N6=0
applied	N6=1
Vocal cord mobility	
Abduction	N7=0
Adduction	N7=1
TOTAL : IDS = SUM OF SCORES	
N1-N7	
IDS SCORE	Degree of Difficulty
0	Easy
0<IDS<5	Slight difficulty
IDS >5	Moderate to major difficulty

**Data collection procedure:**

After taking consent for study protocol, patient was registered for the study. Data was collected by an independent person and entered in the attached patient preform and finally entered in the master chart attached.

**Statistical analysis:**

Parametric data was analyzed using student t-test. Non-parametric data was analysed using Mann Whitney ‘U’ test. Statistical analysis was performed using Statistical Package for Social Sciences® software (SPSS) version 25.0 IBM.

**Results:**

In the present observational study 100 patients were divided into two groups.

- [1] Group MAC (n=50) patients intubated by using a macintosh laryngoscope.
- [2] Group KVVV (n=50) patients were intubated by using a king vision video laryngoscope.

**Table 3:** Comparison of mean time taken for intubation

VARIABLE	MAC GROUP	KVVV GROUP
MEAN TIME TAKEN FOR INTUBATION	55 SECONDS	52 SECONDS

**Table 4:** comparison of mean number of attempts taken for intubation in between the groups

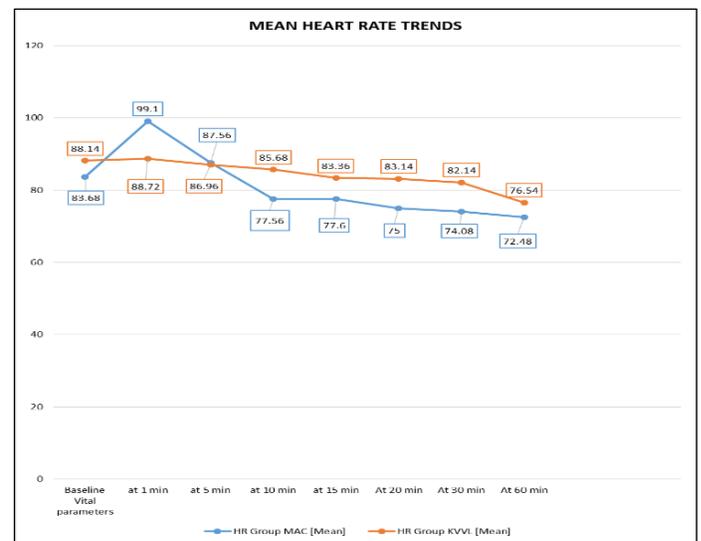
Variable	MAC GROUP	KVVV GROUP
Mean number of attempts taken for intubation	1.34	1.06

Patients in both the groups were comparable in terms of Age, Gender, BMI and ASA grade, no statistical significance was observed in Age, Gender, BMI and ASA grade (Table 2). There are statistical significant differences in mean heart rates between Groups MAC and KVVV during the all observed time intervals except at 5 minutes time interval following endotracheal intubation. By comparing the two groups according to the MAP, there was a significant decrease in MAP after intubation using the KVVV compared with the MAC-L at time intervals of 15,20,30,60 min with p-values <0.05 after intubation. By comparing the two groups according to the Time taken for intubation (TTI) by novice intubators, there was no significant difference in TTI using the KVVV compared with the MAC-L. By comparing the two groups according to the NUMBER OF ATTEMPTS taken by novice intubators, there was a significant decrease in AVERAGE number of attempts taken for the

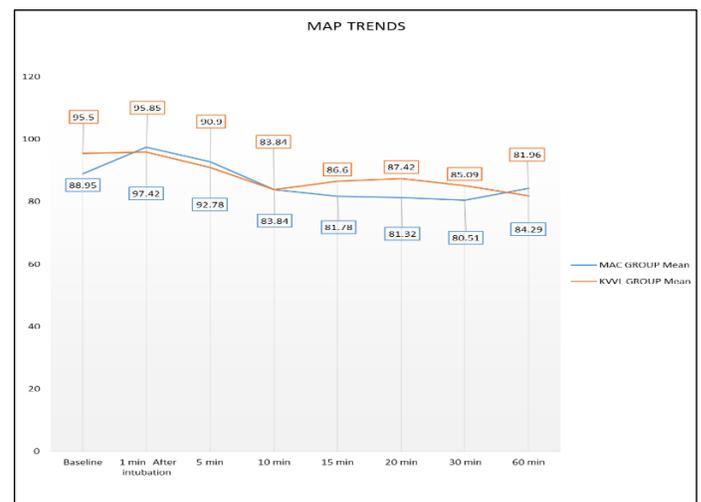
endotracheal intubation by using the KVVV compared with the MAC-L. By comparing the two groups according to the MAP, there was a significant decrease in MAP after intubation using the KVVV compared with the MAC-L at time intervals of 15,20,30,60 min as shown in Figure 2 with p-values <0.05 after intubation. Group KVVV and Group MAC had similar baseline heart rates, but significant differences emerged post-intubation, with Group KVVV showing higher heart rates at most time points except at 5 minutes as shown in Figure 1.

**Table 2:** Demographic data

Parameters	Group MAC (n=50)	Group KVVV (n=50)	P-value
Age (years)	37.85 ±12.44	35.12± 12.47	0.275
BMI( kgs/m2)	21.35± 2.24	21.37 ± 2.635	0.96
sex (M/F)	27/23	25/25	0.688
ASA Grade (1/2)	21/29	27/23	0.229



**Figure 1:** Line showing mean heart rate trends between the groups



**Figure 2:** Line graph showing mean arterial blood pressure trends between the groups

By comparing the two groups according to the Time taken for intubation (TTI) by novice intubators as shown in **Table 3**, there was no significant difference in TTI using the KVVV compared with the MAC-L. By comparing the two groups according to the NUMBER OF ATTEMPTS taken by novice intubators as shown in below **Table 4**, there was a significant decrease in AVERAGE number of attempts taken for the endotracheal intubation by using the KVVV compared with the MAC-L. In both the groups, the reason for 2nd and 3rd attempt was difficulty in placement of endotracheal tube. In MAC-L group students faced difficulty in lifting and cricoid compression was also applied. In King Vision laryngoscope the presence of the guiding channel requires a rotational movement rather than external laryngeal manipulation for glottis insertion. As depicted in **Figure 3**, Degree of difficulty was less seen in KVVV group intubators with 44% of patients has IDS score of 0&1 Each, comparably in mac group where only 22% and 8% was present with this IDS scores. Total number of patients with IDS score of >5 is 0 that infers there was no patient with severe difficulty. Comparably, the mean IDS SCORE of KVVV group (0.79) was much less than MAC group (1.81). Hence, degree of difficulty faced during laryngoscopy and intubation was easy in KVVV group comparable to MAC group. As shown in the below Table 5, the percentage of patients which were intubated at 1<sup>st</sup> attempt in MAC group and KVVV group were 70% and 80% respectively and at 2<sup>nd</sup> attempt in MAC group and KVVV group were 26% and 20%

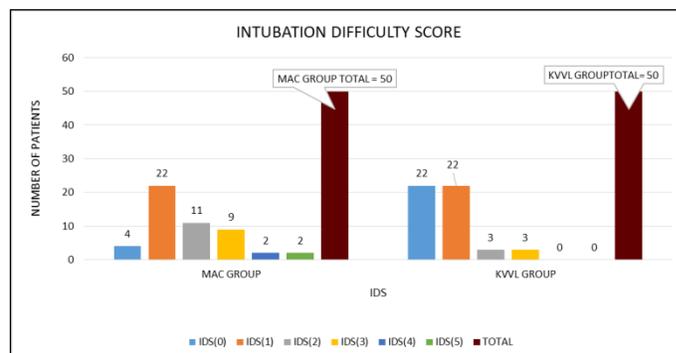
**Table 5:** Comparison of number of attempts taken before successful intubation between the groups.

Number of attempts taken	MAC group	Percentage (%)	KVVV group	Percentage (%)
1st attempt	35	70%	40	80%
2nd attempt	13	26%	10	20%
3rd attempt	2	4%	0	0%
total	50	100%	50	100%

### Discussion:

Macintosh laryngoscopes continue to be the most widely used laryngoscope in anesthesiology, despite the fact that there are now several distinct varieties of video laryngoscopes with differing technological specifications and operational features. Though the indirect image produced by the most recent laryngoscopes makes for a better view of the larynx through optical equipment, it also necessitates more adept and-eye coordination throughout the surgery. We conducted an observational study in elective surgery patients requiring general anesthesia with endotracheal intubation using a King Vision video laryngoscope and a Macintosh direct laryngoscope to assess the ease of intubation among junior residents. In our study, the demographic profile was compared between patients of Group MAC and KVVV, results found were not significant (p value>0.005). We observed that mean BMIs of group MAC and KVVV was 21.35 and 21.37 kgm<sup>-2</sup>, respectively. The percentages of males were more than the females by 4 %. There are no statistically significant differences in both the groups with respect to [Age, Gender, BMI or ASA physical status classification]. The present study showed that, Just 1 min after intubation, there was increase in the heart rate in both groups. But there was a significant difference in the mean heart rates compared to the baseline heart rate more in the MAC group than

respectively and at 3<sup>rd</sup> attempt in MAC group and KVVV group were 2% and 0% respectively.



**Figure 3:** Bar diagram showing the ids score distribution between the groups

### Complications:

There were no major complications as such in any of the 2 groups. The complications anticipated were trauma to lips, teeth, oral cavity, other airway structures and any desaturation events. Other complications such as hoarseness of voice and bleeding from trauma to airway structures were anticipated and 1 patient in each group had soreness in the throat after extubation which got perished within few hours.

in KVVV group p-value (0.001) & at subsequent time intervals the mean heart rates are on higher side in MAC group than in KVVV group, reflecting the physiological responses to intubation. Mean arterial pressure (MAP) and heart rate (HR) increased less with KVVV than with the Macintosh laryngoscope, according to study done by Ali *et al.* [8]. In addition, Elhadi *et al.* [9] discovered that the Macintosh group had significantly higher HR and MAP than the KVVV group. In our study, When comparing the KVVV to the MAC-L during intubation, there was a statistically significant drop in mean arterial pressure (MAP) in MAC group at intervals of 15, 20, 30, and 60 minutes, with p-values <0.05. This divergence remained throughout the surgical phase, indicating that the type of laryngoscope used for endotracheal intubation had a major influence on hemodynamics. Compare to traditional direct laryngoscopy, Ralph *et al.*'s study, [10] which used indirect video laryngoscopy with a Macintosh blade video laryngoscope, showed fewer hemo-dynamic reactions during endotracheal intubation. Comparing video laryngoscopy to traditional direct laryngoscopy, the relative rise in the rate pressure product (RPP) at intubation was much reduced (*i.e.*, 27%, P < 0.001).

In our study, residents' mean intubation times utilizing the KVVV (52 seconds) and the MacIntosh laryngoscope (55

seconds) were nearly identical. These were some important findings that led to a longer TTI. Students took longer time to view the glottis and elevate the epiglottis correctly because they lacked laryngoscope handling experience. Murphy *et al.*'s study, [11] states that in the typical manikin airway scenario, the KVVV took 3.4 s (99% confidence interval [CI] 0.1-6.6) less time to intubate compared to the DL. In the challenging cadaver airway scenario, the time to intubation was 11.3 s (99% CI 2.4-20.2) faster when using the KVVV. But the doctors who intubated the patients in their study were experienced in treating airways beforehand. According to Narang *et al.* [12] every participant was able to imitate a difficult airway and intubate a mannequin with typical neck mobility in the allotted time. In the meantime during our study, KVVV was also utilized as a teaching tool during intubation, and we anticipated that by employing KVVV, students would acquire intubation skills more quickly. A study on beginner learners by Low *et al.* [13] found that training with a video laryngoscope improves intubation competence and promotes confidence in a simulated difficult airway scenario, in contrast to a standard Macintosh laryngoscopy. Elhadi *et al.* [9] reported that the average time for inserting a tube was  $19.10 \pm 7.08$  for the Mac-L group and  $17.34 \pm 4.62$  for the KVVV group. This indicates that there was no discernible variation in the intubation insertion time using the two laryngoscopes. In an airway management course for beginners, teaching video laryngoscopy alone utilizing KVVV may be adequate to improve global skill, per Wolf *et al.*'s study [14]. They also found that utilizing KVVV resulted in fewer esophageal intubations and greater skill transfer from KVVV to Macintosh blade than vice versa. Two groups ease of intubation was measured using the intubation difficulty score (IDS): the MAC Group and the KVVV Group. By comparing the Mean IDS scores of 1.81 and 0.79, respectively, between the KVVV and MAC groups, our study's findings indicate that the kvvl group of intubators had less trouble with intubation than the latter. The Intubation Difficulty Score was used by Loughnan *et al.* [15] -1 (0-2) for direct laryngoscopes and -0 (0-1.5) for video laryngoscopes with a 95% confidence interval (p value of 0.13). The IDS score turned out to be statistically insignificant. According to Ali *et al.* [8] the King Vision video laryngoscope group's intubation difficulty scores were significantly lower than those of the other groups (P=0.001). Compared to just 6 patients in the Macintosh group and 8 patients in the McCoy group, 13 patients in the King Vision video laryngoscope group experienced simple intubation (IDS score = 0). In our study, KVVV had a higher first attempt success rate (80%) than MAC-L (70%). Compared to the mac group, there was no incidence of esophageal intubation in the kvvl group. Three attempts were required for tracheal intubation in the 2% of esophageal intubations in the Mac group. According to Wolf *et al.* [14] the success rate with the Macintosh blade was 48%, but the KVVV had a higher rate of 52% (OR 0.85, 95% CI 0.4-2.0). Additionally, there was a statistically significant difference in the rate of esophageal intubations -4% with KVVV and 17% with MAC. First pass intubation success rates for the

Macintosh and King Vision were comparable, according to study by Erdivanli *et al.* [16] (94.3% vs. 96.6%, respectively,  $p > 0.05$ ). According to Ali *et al.* [8] the King Vision video laryngoscope group had a first attempt success rate of 97%, while the Macintosh group had an 86% rate and the McCoy group had a 90% rate. A study by Akihisa *et al.* [1] found no appreciable difference between the KVVV and MAC's success rates.

### Conclusion:

The King Vision Video Laryngoscope is better in terms of ease of intubation, 1st attempt success rate, total time taken for intubation with lesser complications KVVV might be a useful tool for teaching airway novices for intubations and it is better in glottis visibility/laryngeal view when compared to Macintosh laryngoscopy. Further, more training for the King vision video laryngoscope is required to determine its usefulness in difficult airway situation.

### Limitation:

Limitation of this study was less sample sizes and exclusion criteria limitations. Further future studies of randomised controlled trials of least possible limitations, with standardised outcome measures to provide more robust evidence must be done to enable better decision making regarding laryngoscope selection for junior residents.

### References:

- [1] Akihisa Y *et al.* *J Anesth.* 2014 **28**:51. [PMID: 23812581]
- [2] Pujari VS *et al.* *Anesth Essays Res.* 2021 **15**:57. [PMID: 34667349]
- [3] Owen H & Plummer JL. *Med Educ.* 2002 **36**:635. [PMID: 12109985]
- [4] Mulcaster JT *et al.* *Anesthesiology.* 2003 **98**:23. [PMID: 12502974]
- [5] Mallampati SR *et al.* *Can Anaesth Soc J.* 1985 **32**:429. [PMID: 4027773]
- [6] Wilson ME *et al.* *Br J Anaesth.* 1988 **61**:2116. [PMID: 3415893]
- [7] Lewis SR & Butler AR *et al.* *Br J Anaesth.* 2017 **119**:369. [PMID: 28969318]
- [8] Ali QE *et al.* *Sri Lankan J Anaesthesiol.* 2017 **25**:70.
- [9] Elhadi SM *et al.* *Research Opin Anesthesiol.* 2016 **3**:168. [DOI: 10.4103/2356-9115.195881]
- [10] Maassen RLJG *et al.* *Acta Anaesthesiol Belg.* 2012 **63**:181. [PMID: 23610856].
- [11] Murphy LD *et al.* *J Emerg Med.* 2014 **47**:239. [doi:10.1016/j.jemermed.2014.02.008]
- [12] Narang AT *et al.* *Simul Healthc.* 2009 **4**:16. [PMID: 19680083]
- [13] Low D *et al.* *Anaesthesia.* 2008 **63**:195. [PMID: 18211452]
- [14] Wolf LE *et al.* *BMC Anesthesiol.* 2017 **17**:5. [PMID:28125969]
- [15] Loughnan *et al.* *Pilot Feasibility Stud.* 2019 **5**:10. [PMID: 30976455]
- [16] Erdivanli B *et al.* *Braz J Anesthesiol.* 2018 **68**:499. [PMID: 30005810]