Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

Original Research Article

A Comparative Study between King Vision Video Laryngoscope, Tascope, and Macintosh Laryngoscope for Endotracheal Intubation in Patients undergoing Surgery under General Anaesthesia

Dr. Divya M.J.[1], Dr. Narendra Babu M.C.[2]

[1]Third Year Resident, Department of Anaesthesiology, Sapthagiri Institute of Medical Sciences and Research Center, Bangalore, Karnataka, India.

[2]Professor, Department of Anaesthesiology, Sapthagiri Institute of Medical Sciences And Research Center, Bangalore, Karnataka, India.

Corresponding Author

Dr. Divya M.J., Third Year Resident, Department of Anaesthesiology, Sapthagiri Institute of Medical Sciences and Research Center, Bangalore, Karnataka, India.

Received: 12-05-2024 / Revised: 22-05-2024 / Accepted: 29-06-2024

ABSTRACT

Background

Airway management remains a vital primary skill for anesthesiologist. In recent days Video laryngoscope have shown to be beneficial in many difficult airway scenarios. The study was aimed to see if King Vision video laryngoscope and TAScope and has any advantages over conventional Macintosh laryngoscope in regard to time taken for intubation, ease of intubation, intubation success rate and in attenuating the hemodynamic response during endotracheal intubation.

Methods

150 ASA 1 & ASA 2 patients (aged 18-50yrs) who got the eligibility criteria and scheduled for elective surgeries under GA were recruited for the study after obtaining approval from the Institutes ethical committee. Written and informed consent were taken from patients who were enrolled in this study. By randomisation they were allotted into three Groups. In Group K patients underwent intubation using KVVL, in Group T patients underwent intubation using TAScope and Group M patients underwent intubation using Macintosh Laryngoscope. The time duration of intubation, number of attempts, ease of intubation and hemodynamic parameters (HR, MAP, SPO2) at baseline, pre laryngoscopy and post intubation were noted.

Results

The duration of laryngoscopy and intubation was significantly longer in Group K and Group T when compared to Group M patients (54.96±15.17, 59.58±13.36) vs (31.58±3.85). However, the quality of visualization of the glottis was better in Group K and Group T compared to Group M. The patients in Group Kand Group T had less hemodynamic response compared to Group M with statistically significant heart rate changes immediately after intubation (92.30±9.75, 93.0±8.94 vs. 99.86±7.82) and that 2 minute post intubation (90.82±9.20, 91.72±8.42 vs. 99.56±7.74). There were no significant differences between the three Groups in terms of number of attempts and post operative oropharyngeal morbidities.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

Conclusion
We conclude that King Vision video laryngoscope and TAScope is a useful alternative to traditional Macintosh laryngoscope for improving the visualization of the glottis and for reducing hemodynamic stress response during endotracheal intubation.
Key words: King vision video laryngoscope, TAScope, Macintosh hemodynamic response and intubation time.

INTRODUCTION

Tracheal intubation is the preferred method for mechanical ventilation. However, untrained personnel often fail when using conventional direct laryngoscopy. Video laryngoscopes (VLS) improve success rates by providing a better view of the glottis and not requiring alignment of optical axes in the pharynx and mouth. The King Vision video laryngoscope (KVVL) and TAScope are two innovative VLS options. KVVL is portable and battery-operated with an LED display, while TAScope connects to mobile devices for a clear glottic view. This study aims to compare the efficacy of KVVL, TAScope, and Macintosh laryngoscope in terms of glottic view, ease of intubation, and hemodynamic stress response. The primary challenge in direct laryngoscopy with a Macintosh laryngoscope is the visual limitation inherent to the procedure, which requires a straight line of sight to view the glottis, blade flange, tongue, and epiglottis, resulting in monocular vision at the level of the larynx.

AIM & OBJECTIVES

Primary objective

To estimate the time taken for intubation & to evaluate the ease of intubation by IDS scale (Intubation difficulty score) between the three Groups.

Secondary objective:

To determine the success rate of intubation & the hemodynamic response to intubation in all three Groups.

MATERIALS AND METHODS

The current Cross-sectional Study was conduction for 3 months in the department of Anaesthesiology, Sapthagiri Institute of Medical Sciences and Research Centre on 150 patients.

After Institutional ethical committee approval and written informed consent, 150 patients of either sexes belonging to ASA status I & II, aged 18 - 50 years posted for elective surgeries under general anesthesia with endotracheal intubation were included in this randomized double blinded study.

Sample size

According to the study done by **Shirley joseph et al**[1], the sample size for the current study can be calculated as follows

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

$$n = \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 (S_1^2 + S_2^2)}{(\overline{X_1} + \overline{X_2})^2}$$

$$n = \frac{(3.29 + 1.642)^2 \left((6.7)^2 + (9.1)^2\right)}{(38.3 - 27.6)^2}$$

$n = 27.10 \approx 30$ each group.

Where

$Z_{1-\frac{\alpha}{2}}$ = Value of normal deviate at centimeter level of confidence

$Z_{1-\beta}$ = Value of normal deviate at centimeter power of study.

S1 = SD of variable in Group1.

S2 = SD of variable in Group2.

X1 = Mean of variable in Group1.

X2 = Mean of variable in Group2.

Inclusion Criteria

- Patient willing to give written informed consent (Annexure 1).
- ASA grade 1 & 2
- Age 18 – 50 years
- BMI of 18 – 24 kg/m²

Exclusion criteria

- Patients at risk of aspiration
- Anticipated difficult airway
- Patients with cervical instability
- Pregnant females.
- BMI > 35

All study participants underwent a comprehensive preoperative evaluation, including a detailed airway examination. Baseline heart rate and blood pressure were recorded prior to surgery. The participants were assigned serial numbers and allotted into either of the three Groups by randomization by computer generated software. The patients were divided into three Groups of 50 each.

1. **Group K**: Patients were intubated with King Vision video laryngoscope.
2. **Group T**: Patients were intubated with TAScope.
3. **Group M**: Patients were intubated using Macintosh laryngoscope.

The patients were blinded to randomization. The senior anesthesiologist was informed and given an opaque envelope revealing the laryngoscope assigned to the patient. For all selected patients, baseline vital parameters (systolic BP, diastolic BP, mean arterial pressure, heart rate, SpO2) were noted (T1).

Following the administration of 1 mg of midazolam IV and three minutes of pre-oxygenation, standardized anesthetic induction was performed with Inj. Fentanyl 2mcg/kg iv and Inj. Propofol 2 mg/kg iv with Inj. Vecuronium 0.1mg/kg iv for neuromuscular blockade.

Patients were ventilated manually with Isoflurane (1% endtidal) in oxygen using facemask and at the end of 3 minutes, intubation was accomplished using King Vision channeled blade in Group K,

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

TAScope in Group T and Macintosh blade in Group M. The airway was secured with a cuffed endotracheal tube, sized 7.5 mm for females and 8.5 mm for males.

The time taken for intubation will be measured using a stopwatch, starting when the blade is introduced into the mouth and ending when a definitive capnographic trace of EtCO2 indicates correct ET tube placement.

The ease of intubation will be graded based on the need for manipulation and the number of attempts:

1. **Grade** 1 (Very easy): Single attempt without any manipulation.
2. **Grade** 2 (Easy): Single attempt with manipulation.
3. **Grade** 3 (Difficult): More than two attempts, with or without manipulation.

The success rate of intubation on the first attempt will be recorded. Hemodynamic parameters (heart rate, blood pressure, mean arterial pressure, and peripheral oxygen saturation) will be noted at baseline (B), before intubation (BI), immediately after intubation (T0), and at 2 (T2), 4 (T4), 6 (T6), 8 (T8), and 10 (T10) minutes post-intubation.

If intubation with the video laryngoscope fails after more than three attempts, it will be considered a failure, and intubation will be performed using a conventional direct laryngoscope. These patients will be excluded from the study. After the surgery, patients will be extubated once the criteria for extubation are met.

Patients will also be monitored for any complaints of sore throat or hoarseness in the postoperative period.

Statistical Analysis

The duration of intubation was chosen as the outcome measure for the sample size calculation. The sample size was determined with a maximum 5% risk, a minimum of 80% power, and a 5% significance level (significant at a 95% confidence interval). Data were recorded in a Microsoft Excel spreadsheet and analyzed using IBM SPSS Statistics for Windows, Version 23.0 (Armonk, NY: IBM Corp.). Continuous data were presented as mean with standard deviation, while categorical data were expressed as numbers and percentages. Power analysis was conducted to calculate the study's power, which was 95% with an α error of 0.05. The P-value was then calculated to assess the level of significance. The results were analyzed and compared with previous studies to draw relevant conclusions.

RESULTS

The three Groups were comparable in view of demographic data and patient characteristics. The distribution of the difficult intubation predictors were well balanced between three Groups.

The mean time taken for intubation in Group K was 54.96±15.17, Group T was 59.58±13.36 and in Group M was 31.58±3.85. The difference in the Groups was found to be statistically significant with P value of (P = 0.019).

The ease of intubation among the three groups were compared. In Group K 42 patients were labelled as grade1 and 8 patients were labelled as grade2, in Group T 46 patients were labelled as grade1 and 4 patients were labelled as grade2 and in Group M 42 patients were labelled as grade1 and 8 patients were labelled as grade2. The ease of intubation grade was slightly better in Group T. The difference in the Groups was not found to be statistically significant. (P = 0.346).

The successful laryngoscopic intubation was compared among the three groups. 94% of the study population were successfully intubated in Group K, 96% of the study population in Group T were successfully intubated and 94% of the study population in Group M were successfully intubated. The percentage of successful intubation was slightly better in Group T when compared to the other

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

two Groups. The difference between the three Groups was not found to be statistically significant (P=0.64).

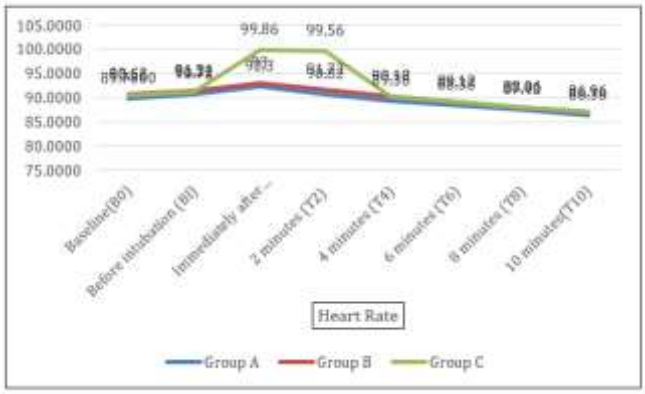
First attempt's success rate was 96% in Group K, 94% in Group T and 92% in Group M. First attempt's success rate was slightly lower in Group M compared to the other two Groups. Rest 4% in Group M, 6% in Group T and 8% Group M were intubated in second attempt. All the patients were successfully intubated and no intubation failure was recorded (P = 0.607)

The inter group hemodynamic variables systolic BP, diastolic BP, mean arterial pressure and Sp02 did not show any statistical significance. However, the heart rate changes immediately after intubation (92.30±9.75, 93.0±8.94 vs. 99.86±7.82) and at 2 minutes post intubation (90.82±9.20, 91.72±8.42 vs. 99.56±7.74). In Group M compared to the other two Groups were statistically significant.

Parameters P	Group K	Group T	Group M	P
Age(years)-mean±SD	40±8.77	39.52±7.34	36±10	0.898
ASA(I/II)-number	32/18	29/21	28/22	0.654
ASA (I/II)- number	37/13	44/6	41/9	0.930
BMI (kg m-2)	22.12±1.21	21.80±1.31	22.1±1.26	0.08
Table 1: Demographics				

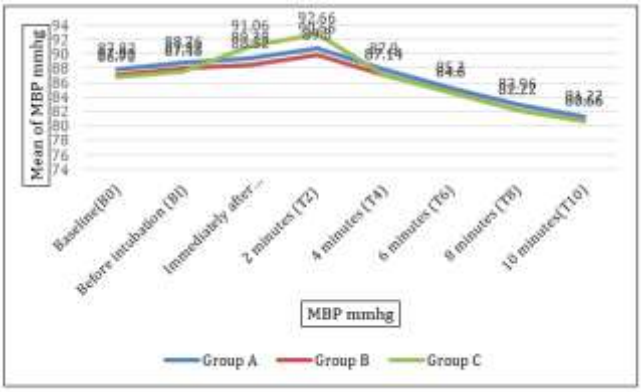
KVVL= King Vision Video Laryngoscope, MDL= Macintosh Direct Laryngoscope SD=Standard deviation, ASA=American Society of Anesthesiologists,
BMI=Body mass index

Parameters P	Group K	Group T	Group M	P
Time Taken For Intubation Mean ±S.D	54.96±15.17	59.58±13.36	31.58±3.85	0.019
Ease of Intubation - Grade 1/2	42/8	46/4	42/8	0.346
Successful Intubation – Yes / No	47/3	48/2	47/3	0.00
Number Of Attempts	48/2	47/3	46/4	0.607
Table 1: Technical Characteristics				

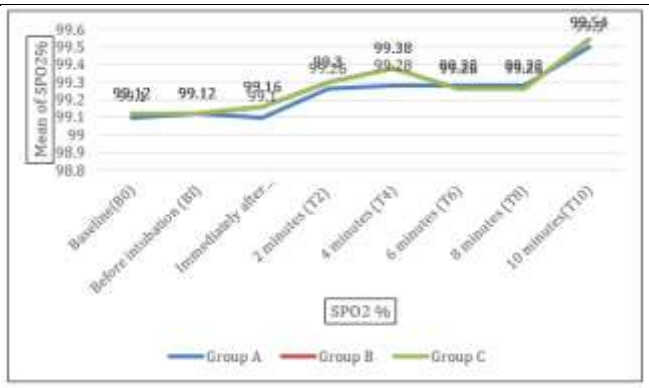


CHANGES IN HEART RATE

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

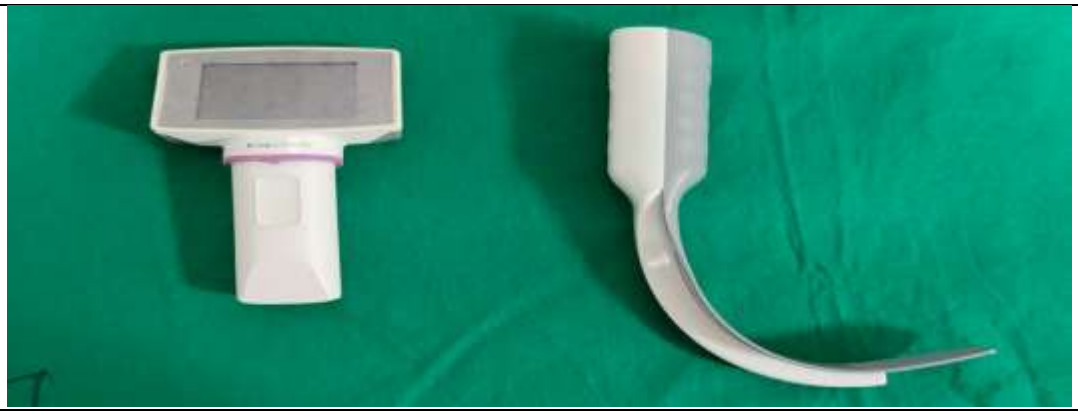


CHANGES IN MBP mmhg



CHANGES in SPO2

Figure 1: ***Hemodynamic parameters***



King vision video laryngoscope

TAScope

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

Figure 2

DISCUSSION

Since the 1940s, when the Miller and Macintosh blades were invented, conventional DL has become the standard of care in OTs, EDs, and ICUs[2]. Over the recent years, VLs have come into vogue. Video laryngoscopes are rapidly gaining popularity in airway management and several devices with different design features are now available. Their use is not only being advocated for difficult airways [3] but is also now being suggested by many airway experts as the first-line technique device for tracheal intubation in all patients[4].

The king vision video laryngoscope is a solid portable battery operated with LED display featuring a camera that enables a clear view of the glottis. The angulation of the channeled blade is in such a way that it requires less lifting force leading to minimal oropharyngolaryngeal stimulation and hence potentially reduced stress response.

Whereas TAScope is an indigenously designed video laryngoscope by a fraternity member, which is a channeled anatomically angulated video intubation aid with an endoscopic camera that can be connected to phones and tablets. TAScope is very cost effective which makes it handy in limited resource setting similar to king vision video laryngoscope, it does not need alignment of the axis to improve the intubating conditions because the axis of the TAScope is curved and the image is seen on the screen.

Earlier studies had compared the efficacies of KVVL with CMAC blade, king vision video laryngoscope with McGrath MAC blade, TAScope with McCoy blade etc. Till date no studies were conducted to compare the efficacies of king vision video laryngoscope, TAScope and Macintosh Laryngoscope.

With this background, this study was formulated to compare the time taken for intubation and the ease of intubation between the three laryngoscopes and this formed our primary objective, and this study was undertaken to compare the efficacies of both the laryngoscopes in mitigating the pressor response during intubation.

Patients aged between 18-50 years were enrolled during the study period. Total of 150 patients were included for statistical analysis with 50 patients in each Group. All three Groups were comparable with respect to demographic characteristics (Age, weight, gender) and ASA physical status.

The duration of intubation was recorded from the time of KVVL or TAScope or Macintosh laryngoscope insertion into the patient's mouth until the passage of ETT into the trachea in a fully anesthetized patient. The mean time taken for intubation in all three Groups was calculated. The mean time taken for intubation in Group K was 54.96±15.17, Group T was 59.58±13.36 and in Group M was 31.58±3.85. Comparison of the intubation time between the three Groups shows that the intubation time is slightly higher in Group T. This owes to the use of a conduit (bougie) to pass the endotracheal tube in some video laryngoscope like TAScope. In TAScope, the use of a bougie is mandatory to pass the endotracheal tube across the vocal cords; hence negotiating the tube by rail-roading over the bougie takes a longer time[5]. The reason for a slightly longer time in Group K that is in the patients intubated with KVVL is the bulkier nature of the channeled blade than TAScope and Macintosh which makes it slightly more difficult for it to enter the mouth of the patient. Similar results were found in a study conducted by Ramneek Kaur et al [6] where it was found that the time of intubation was significantly more with TAScope group (38.3±6.7) as compared to Macintosh group (27.6±9.1) with a $p<0.01$. Some studies showed lesser time taken for intubation with Video laryngoscopes (King Vision) than compared to McCoy and some studies showed longer time taken for intubation with Video laryngoscopes (TAScope / C-MAC) than compared to McCoy.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

In the present study, 84% in Group K, 92% in Group Tand 84% in Group M were categorized as grade 1 in terms of ease of intubation. The association was not found to be statistically significant between the ease of intubation grade in the three groups of the study participants. In a study done by Patel J et al[5], the total IDS score was '0' in 25 out of 30 patients, in TAScope Group. Similar results were found in the study done by ALI et al [7] wherein they observed that the IDS were significantly less in the King Vision video laryngoscope group as compared with McCoy and Macintosh laryngoscope groups (P= 0.001). Similarly, Jain et al [8] observed that IDS score was significantly less in the CMAC Group compared to the McCoy Group (P < 0.05). Hema Saxena et al in his study also observed that IDS score with Truview Group was significantly low as compared to McCoy Group (P<0.001).

In a study done by George B et al [1], majority of the study participants (98%) with King-Vision video laryngoscope had successful intubation at 1st attempt. In a study done by Zhu H et al[9], all the study participants with KVVL had successful intubation at 1st attempt and 85% with macintosh had successful intubation at 1st attempt. In a study done by Erdivanli B et al [10], 96.6% and 94.3% of the study participants with KVVL channeled version and Macintosh laryngoscope had successful intubation on the first attempt respectively. In a study done by Kaur R et al [6], Successful intubation in the first attempt was higher with TASscope group as compared to Macintosh laryngoscopy Group (93% vs 80%, P < 0.05). The results obtained in our study is in concordance with the above-mentioned studies wherein 94% of the study participants in Group K, 96% of the study participants in Group T and 94% of the study participants in Group M had successful intubation. With the P value being 0.646, the association was not found to be statistically significant between the 3 Groups of the study participants.

In our study we observed that the hemodynamic responses to laryngoscopy and intubation in terms of systolic BP, diastolic BP, mean arterial pressure and Sp02 were not statistically significant between the three Groups. However, the heart rate changes immediately post intubation and at 2 minutes post intubation in Group M was slightly more compared to Group K and Group T and was found to be statistically significant. This difference maybe because of the lesser lifting force required with KVVL and TAScope to view the glottis leading to lesser heart rate changes.

In agreement with our study, Mogahed et al[11] compared the heart rate, mean arterial pressure, SpO2 changes between KVVL and MDL at baseline, pre-laryngoscopy and 2 minutes and 5 minutes after intubation. They noted statistically significant increase in heart rate and mean arterial pressure with MDL at 2 minutes and 5 minutes after intubation. Similarly, Elhadi et al[12] showed that the mean arterial pressure and heart rate immediately after intubation and 10 minutes after intubation were significantly less in the KVVL Group than the MDL Group. Woo et al[13] compared Pentax AWS and MDL in burns patients and observed that there were no significant differences in systolic and diastolic pressures between both the Groups at various time intervals. But heart rate was significantly increased after intubation in MDL Group compared to Pentax group. These findings were comparable to our study. In disagreement with our study, Parasa et al [14] observed that the hemodynamic response was clinically evident with Glidescope than MDL though the differences were not statistically significant. They found that the patients in Glidescope Group had a higher rise in systolic BP, diastolic BP, mean arterial pressure and heart rate immediately and 3 minutes after intubation. Different results were obtained from the study by Pournajafian et al [15] where they observed no statistically significant differences in the hemodynamic response between the Glidescope and MDL Groups. So also the study by Tempe et al[16] found and MDL were almost similar. In agreement with the above results is the study by Kanchi et al[17] wherein they observed no difference in hemodynamic changes between Pentax video laryngoscope and MDL in cardiac patients posted for CABG. In all the above studies showing no difference in hemodynamic changes between video and direct laryngoscopes, they postulated that if the time duration taken for video laryngoscopy and intubation could be reduced,

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

they would have been able to realize the benefit of video laryngoscope in terms of hemodynamic response.

This study demonstrated that despite being associated with a prolonged time to intubation, the TAScope achieves higher intubation success rates compared with the King Vision laryngoscope, with a similar success rate of intubation at first attempt and a similar level of desaturation. Some of the advantages of TAScope are its light weightedness and blade angled as per average Indian neck, the main disadvantage is that the technique needs at least 1.5 cm of mouth opening for oral guidance of the VLS blade, i.e., oral route is not completely eliminated, another drawback is gradual learning curve, as the technique is time consuming when newly introduced.

Another advantage of TAScope is that it is very cost effective compared to King Vision Video Laryngoscope (KVVL) which makes it handy in limited resource settings. Despite its numerous benefits both King Vision Video Laryngoscope's (KVVL) and TAScope's implementation faces hurdles such as technical challenges with device connectivity and the need for specialized training, which could affect procedural efficiency. The camera on the both TAScope and King Vision Video Laryngoscope (KVVL) could be blocked by secretions, blood, or even fogging from exhaled breath. Complications can also arise from malfunctions, stuttering, and low battery of monitoring screens.

LIMITATIONS

- Single blinded study as it is not possible to blind the anaesthesiologist to the device used for the intubation.
- Study findings might not be applicable to a larger population, bigger sample size might be required to document its advantage.
- This study was conducted on patients with normal airways without the predictors of difficult airways. Hence the results might not extrapolate to a difficult airway
- Hemodynamic responses were documented in ASA 1 and 2 patients. The hemodynamic parameters might vary in a hypertensive/ ASA 3 or ASA 4 patients.

CONCLUSIONS

On the basis of the study, it was concluded that even though Macintosh laryngoscope was found to be faster than KVVL and TAScope in the aspect of time taken for intubation, we cannot deny the fact that the visualization of glottis was much better with KVVL and TAScope.

There was no significant difference in the number of attempts achieved by each device in all the three Groups.

There was no major statistically significant difference in hemodynamic changes in all three Groups.

In aspect to airway injuries and assisted maneuvers, no statistically significant difference was found between the Groups.

From this study we also conclude that TAScope being a device designed by an Indian fraternity member showed great flexibility and portability in use. With our initial experience, TAScope is definitely regarded as a valuable device in settings with limited resources as well as sophisticated healthcare environment. Future research, development and integration efforts will be key to realising TAScope's full potential in transforming airway management across diverse clinical settings.

FINANCIAL SUPPORT AND SPONSORSHIP: NONE
CONFLICTS OF INTEREST: NIL

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

REFERENCES

1. Joseph S, George B, Surekha . Comparison of hemodynamic responses to laryngoscopy and orotracheal intubation between Macintosh laryngoscope and king vision video laryngoscope in adult surgical patients. Indian J Clin Anaesth 2019;6(4):607-613.
2. Burkle CM, Zepeda FA, Bacon DR, Rose SH. A historical perspective on use of the laryngoscope as a tool in anesthesiology. Anesthesiology 2004;100:1003-6.
3. Myatra SN, Shah A, Kundra P, Patwa A, Ramkumar V, Divatia JV, et al. All India Difficult Airway Association 2016 guidelines for the management of unanticipated difficult tracheal intubation in adults. Indian J Anaesth 2016;60:885-98.
4. Cooper RM. Implementing universal videolaryngoscopy: How to do it and what to expect. Br J Anaesth 2018;120:13-5.
5. Patel, J., Shah, R., Jain, A., Shah, A., & Chauhan, D. (2022). A comparative study between McCoy laryngoscope versus the tascope in orotracheal intubation in adult surgical patients undergoing general anaesthesia. International Journal of Health Sciences, 6(S2), 2842–2854. https://doi.org/10.53730/ijhs.v6nS2.5717
6. Kaur R, Parikh B, Patel N, Butala B. Early clinical experience with The Anesthetist Society (TAS) scope (an indigenous videolaryngoscope). Indian J Anaesth 2019;63:494-6.
7. Ali QE, Comparative evaluation of King Vision video laryngoscope and Macintosh laryngoscope for tracheal intubation in patients with immobilized cervical spine.
8. Jain AP, Randomized controlled study on nasotracheal intubation comparing King Vision video laryngoscope and Macintosh laryngoscope in patients undergoing oromaxillary surgery.
9. Zhu H, Randomized controlled comparison of non-channeled King Vision, McGrath MAC video laryngoscope, and Macintosh direct laryngoscope for nasotracheal intubation in patients with predicted difficult intubations.
10. Erdivanli B, Prospective randomized controlled clinical trial comparing King Vision video laryngoscope and Macintosh laryngoscope in adult patients.
11. Mogahed MM, Elghamri MR, Anwar AG. Comparative Study of Intubation Performance between Macintosh, the Channeled King Vision and the C-MAC D-Blade Video laryngoscope in Controlled Hypertensive Patients. J Anesth Clin Res. 2017;8(780):2.
12. Elhadi SM, Rady WK, Elfadly AM. A comparative study between the macintosh laryngoscope and the king vision video laryngoscope in endotracheal intubation. Res Opin Anesth Intensive Care. 2016;3(4):168–168.
13. Woo CH, Kim SH, Park JY, Bae JY, Kwak IS, et al. Macintosh laryngoscope vs. Pentax-AWS video laryngoscope: comparison of efficacy and cardiovascular responses to tracheal intubation in major burn patients. Korean J Anesthesiol. 2012;62(2):119.
14. Parasa M, Yallapragada SV, Vemuri NN, Shaik MS. Comparison of GlideScope video laryngoscope with Macintosh laryngoscope in adult patients undergoing elective surgical procedures. Anesth, Essays Res. 2016;10(2):245–245.
15. Pournajafian AR, Ghodraty MR, Faiz SH, Rahimzadeh P, Goodarzynejad H, et al. Comparing GlideScope video laryngoscope and Macintosh laryngoscope regarding hemodynamic responses during orotracheal intubation: A randomized controlled trial. Iranian Red Crescent Med J. 2014;16(4).
16. Tempe DK, Chaudhary K, Diwakar A, Datt V, Virmani S, et al. Comparison of hemodynamic responses to laryngoscopy and intubation with Truview PCDTM, McGrath and Macintosh laryngoscope in patients undergoing coronary artery bypass grafting: a randomized prospective study. Ann Card Anaesth. 2016;19(1):68.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 07, 2024

17. Kanchi M, Nair HC, Banakal S, Murthy K, Murugesan C. Haemodynamic response to endotracheal intubation in coronary artery disease: Direct versus video laryngoscopy. Indian J Anaesth. 2011;55(3):260–260.