Section: Anaesthesiology and Critical Care

Original Research Article

A COMPARATIVE STUDY OF KING VIDEO LARYNGOSCOPE ASSISTED VS FIBEROPTIC ASSISTED ORAL TRACHEAL INTUBATION IN DIFFICULT AIRWAY MANAGEMENT: A RANDOMIZED CONTROL STUDY

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Abstract

Background: The efficacy and safety of videolaryngoscopes for tracheal intubation in difficult airway management after general anaesthesia as compared to gold standard awake fiberoptic intubation is conflicting. **Materials and Methods:** Fifty patients of American Society of Anaesthesiologists (ASA) physical grades II, III and IV, aged 18-70years undergoing elective surgical procedures, were divided into two groups of 25 patients each. Group K was intubated using King Video Laryngoscope (KVL) and Group I was intubated using Flexible Fiberoptic Scope (FFS). **Result:** The time for Intubation was lesser in group I (Mean 41.12 Sec with SD 13.902 Sec) as compared to group K (Mean 51.28Sec with SD 23.748Sec) (P<0.05). Minimum SPO2 was higher in group I (98.72% with SD 1.948) as compared to group K(96.88% with SD 3.140) (P=0.009). **Conclusion:** Flexible fiberoptic scope decreased the intubation time and the drop in saturation as compared to King video laryngoscope but no difference in intubation difficulty score.

INTRODUCTION

Endotracheal intubation is an essential skill in care of the unconscious, anesthetized or critically ill patients. Endotracheal intubation can be difficult and may result in many complications, the most serious being hypoxemic brain damage and death. Soft tissue damage can be caused by traumatic attempts at intubation. Maintenance of oxygenation must take precedence over all other considerations when difficulty with intubation is experienced and intubation attempts should be deferred until oxygenation is restored.

Laryngoscopy occupies a unique position in anesthesia because it is a procedure which is only a means to an end. The ultimate aim is to safely and atraumatically intubate the trachea and secure the airway.[1] Difficult tracheal intubation is a cause of severe patient damage and death documented in several studies of closed claims, national audits, and patient complaints. Confirmed difficulties with previous airway management or a preoperative airway examination can assist anesthesiologists in a risk assessment of potential difficulties. Mallampati classification, head and neck mobility, mouth opening, the ability/inability of prognathism, body weight, and the thyromental distance are included in the simplified airway risk index (SARI) in the predictors of difficult airway. Difficult airway algorithms recommend awake tracheal intubation as the gold standard for patients with at least one variable associated with a difficult airway.[2] Awake intubation using flexible fibre‐optic scope (FFS) is the gold standard technique in anticipated difficult intubation patient.[3] A minimum number of 50 intubations is necessary to achieve a first pass Intubation success rate of >85% using direct laryngoscopy. To obtain optimal visualisation of the glottis, direct laryngoscopy requires alignment of the oropharyngeal-laryngeal axes. However,

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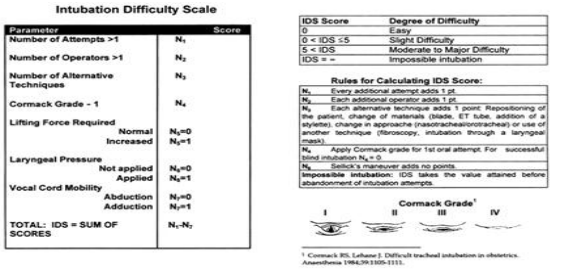
duration of intubation and the success rate for securing the airway by tracheal intubation might have a significant impact on undesirable events like hypoxia or regurgitation. Recently, the use of video laryngoscopy has become a widely accepted method in both emergency medicine and clinical anesthesia. It facilitates easy visualization of the glottis without a direct line of sight. Ease of handling, high success rate in patients with normal and with difficult airways, high success rate in difficult airway situations and a steep learning curve makes these devices very popular among physicians.[4] It can sometimes be challenging to place an endotracheal tube (ETT) in front of the glottis and advance it despite good visualization on the monitor, especially when a video laryngoscope (VL) with a hyper angulated blade is used. This phenomenon (great view but unable to intubate) is linked to VL blades that are, unlike the traditional Macintosh blade, hyperangulated. Because of the unique profile that follows the anatomical shape of the human airway, alignment of the oropharyngeal-laryngeal axes becomes unnecessary to visualize the glottis. The new challenge is now to also bring the tip of the ETT to the level of the glottis, pass the glottis and advance the tube inside the trachea. Several techniques have been proposed to meet this challenge; many authors proposed using a stylet to give the tube the shape of a hockey stick to follow the curvature of the video blade. However, ETT placement is often associated with a prolonged time for intubation. Additionally, stylet use for video laryngoscopy has been linked to an increased risk of soft tissue injury of the upper airway. VLs with an embedded tube-guiding channel might resolve this issue, because the tube is already loaded on the curved blade allowing the tube to be advanced once the glottis is visualized. This technique removes the need for a stylet and additional manipulations to steer the tube through the upper airway. The only difference between these single-use blades is the presence of tube guidance in the channelled blade. The term tube-guiding is representative for the King Vision channelled blade. The King Vision Video Laryngoscope can improve visualization of the glottic structures one to two grades using the Cormack-Lehane classification system compared with conventional laryngoscopy using a Macintosh laryngoscope. In the current study ,we tried to find out ease of orotracheal intubation and time required for intubation by King video laryngoscope and fiberoptic assistance in difficult airway patients.

MATERIALS AND METHODS

This prospective, single center, single blined, randomized controlled trial was conducted after approval from institutional ethic committee AFMRC project 4447/2013.In the study fifty patients of American Society of Anaesthesiologists (ASA) physical grades II, III and IV, aged 18-70years undergoing elective surgical procedures with informed consent were included. Exclusion criteria were age more than 70 years, ASA IV, patients having Predictors of difficult mask ventilation, mouth opening less than 20 mm,poor dental status,neck irradiation ,patients with BMI>30 and patient refusal were randomly allocated into two groups of 25 patients each. Group K was intubated using King Video Laryngoscope (KVL) and Group I was intubated using Flexible Fiberoptic Scope (FFS).

All patients underwent an adequate preoperative assessment. On the day of surgery intravenous access was established and standard monitoring system consisting of pulse oximeter,non invasive blood pressure monitor and 5 lead electrocardiogram monitor was applied to all cases. These patients were preoxygenated and anaesthetized using intravenous agent and ventilation was confirmed and subsequently non depolarising muscle relaxant was given. An assistant performed jaw thrust to expand the oropharyngeal space specially in flexible fiberoptic intubation. The time to intubation calculated as from removal of facemask to inflation of cuff was noted. Endotracheal tube placement was confirmed with capnography and bilateral auscultation. Intubation Difficulty Scale was used to assess the difficulty in intubation.



Intubation Difficulty Scale

Parameter	Score
Number of Attempts >1	N_1
Number of Operators >1	N_2
Number of Alternative Techniques	N_3
Cormack Grade - 1	N_4
Lifting Force Required	
Normal	N_5=0
Increased	N_5=1
Laryngeal Pressure	
Not applied	N_6=0
Applied	N_6=1
Vocal Cord Mobility	
Abduction	N_7=0
Adduction	N_7=1
TOTAL: IDS = SUM OF SCORES	N_1-N_7

IDS Score	Degree of Difficulty
0	Easy
0 < IDS ≤5	Slight Difficulty
5 < IDS	Moderate to Major Difficulty
IDS = ∞	Impossible intubation

Rules for Calculating IDS Score:

N_1 Every additional attempt adds 1 pt.

N_2 Each additional operator adds 1 pt.

N_3 Each alternative technique adds 1 point. Repositioning of the patient, change of materials (blade, ET tube, addition of a stylette), change in approache (nasotracheal/orotracheal) or use of another technique (fibroscopy, intubation through a laryngeal mask).

N_4 Apply Cormack grade for 1st oral attempt. For successful blind intubation N_4 = 0.

N_6 Sellick's maneuver adds no points.

Impossible intubation: IDS takes the value attained before abandonment of intubation attempts.

Cormack Grade[1]

I II III IV

[1] Cormack RS, Lehane J. Difficult tracheal intubation in obstetrics. Anaesthesia 1984;39:1105-1111.

The variables were compared using the paerson Chi -square test for categorical data. Mann Whitney U test for continuous data. P values less than 0.05 were considered significant. The statistical analysis was performed using statistical package for social sciences (SPSS) Version 20.

RESULTS

A total of 50 patients were recruited for participation in the study. The demographic characteristic and nature of surgeries undertaken were comparable in both groups. The Intubation difficulty scale was higher in group K as compared to group I, but the difference between the two groups was not statistically significant [Table 1]. The time for Intubation was lesser in group I as compared to group K, and the difference between the two groups was statistically significant [Table 2]. Minimum SPO2 was higher in group I as compared to group K, and the difference between

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the two groups was statistically significant [Table 3].

Table 1: Comparison of Intubation Difficulty Scale in the two groups

Group	Mean	Standard deviation	p-value
I	1.76	1.012	0.51
K	2.96	1.670	
Total	2.36	1.495	

Table 2: Comparison of Time for Intubation in the two groups

Group	Mean	Standard deviation	p-value
I	41.12	13.902	0.047
K	51.28	23.748	
Total	46.20	19.930	

Table 3: Comparison of minimum SPO2 observed in the two groups

Group	Mean	Standard deviation	p-value
I	98.72	1.948	0.009
K	96.88	3.140	
Total	97.80	2.748	

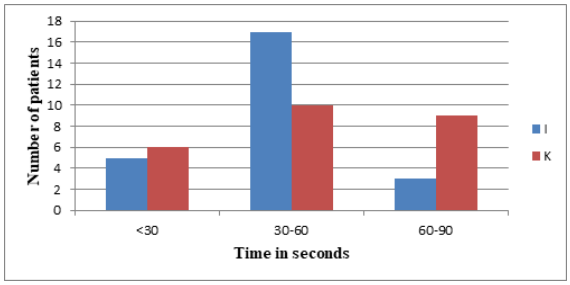

Figure 1: Time for Intubation

Duration for endotracheal intubation is Group K is more as compared to Group I, 60 to 90 seconds and 30 -60 seconds respectively [Figure 1].

DISCUSSION

The study clearly shows that the mean time required for intubation is higher using King Video Laryngoscope. Although there was no statistical difference in the intubation difficulty scale observed between the two groups the mean time and the drop in SpO2 was larger in the King vision video laryngoscope as compared to the fiberoptic group.

In the study by Basar E et al,[5] compared the efficiency of the King Vision video laryngoscope and the Macintosh laryngoscope, they founds that King Vision requires longer time to visualize the glottis and to intubate the trachea.

In a comparative study on "Using King Vision video laryngoscope with a channeled blade prolongs time for tracheal intubation in different training levels, compared to non-channeled blade" by Marc Kriege, Christian Alflen, Ruediger R et al.[4] Using a video laryngoscope is associated with an improved visualization of the glottis. However, correctly placing the endotracheal tube might be challenging. Channeled video laryngoscopic blades have an endotracheal tube already pre-loaded, allowing to advance the tube once the glottis is visualized. It was hypothesized in our study that use of a channelled blade with pre-loaded endotracheal tube results in a faster intubation, compared to a curved Macintosh blade video laryngoscope. It was concluded that compared with the King Vision channelled blade, time for tracheal intubation was shorter with the control group using a non-channelled blade. First attempt success and visualization of the glottis were comparable. These data do not support the hypothesis that a channelled blade is superior to a curved video laryngoscopic blade without tube guidance. This was particularly found during the study that placing the tube required more effort and time with King video laryngoscope which had channelled blade as compared with flexible fiberoptic scope.

In the study of "Comparison of King Vision and Truview Laryngoscope for Postextubation Visualization of Vocal Cord Mobility in Patients Undergoing Thyroid and Major Neck Surgeries: A Randomized Clinical Trial done by Anto Sahaya Priyanka, Kusha Nag et al,[6] in which Glottis visualization was graded in all patients undergoing thyroid and major neck surgeries. Once patients satisfied extubation criteria, laryngoscopy was performed using respective video-laryngoscopes in each group, patients were extubated under vision and assessed for vocal cord visualization and mobility grade and patient reactivity score (PRS). It was concluded that both Kings Vision and Truview Video-laryngoscopes provided comparable laryngoscopic view with similar patient comfort, although clinically Truview may be a better choice due to less time consumed for visualisation and rating vocal cord movement during extubation. In our study too fiberoptic proved to be less time consuming as compared to king vision video laryngoscope which is in concurrence with the findings of the study.

In another study "Comparison of the C-MAC video laryngoscope to a flexible fiberoptic scope for intubation with cervical spine immobilization by Roya Yumul, Ofelia L. Elvir-Lazo et al,[7] compared the C-MAC video laryngoscope to the standard flexible fiberoptic scope (FFS) with an eye piece (but without a camera or a video screen) for intubation of patients undergoing cervical spine surgery with manual inline stabilization. The glottic view at the time of intubation did not differ significantly with the 2 devices however, the C-

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MAC facilitated more rapid tracheal intubation compared with the FFS. It was concluded in this study that the C-MAC video laryngoscope may offer an advantage over the FFS with respect to the time required to obtain glottic view and successful placement of the tracheal tube in patients requiring cervical spine immobilization. However in the study that has been conducted Flexible Fiberoptic scope is showing less intubation time as compared to King video laryngoscope. The above findings are not consistent with the findings of this study, this may be because of the fact that the C-MAC video laryngoscope is different video laryngoscope as compared with the King video laryngoscope. The angulations, material, camera angle and visualisation as well as endotracheal tube control is different in both the video laryngoscopes.

In the study of "Awake Fiberoptic or Awake Video Laryngoscopic Tracheal Intubation in Patients with Anticipated Difficult Airway Management by Charlotte V. Rosenstock, Bente Thøgersen, Arash Afshari et al,[2] compared the awake Flexible fiberoptic intubation (FFI) to awake McGrath video laryngoscope, (MVL) intubation in patients with an anticipated difficult intubation. The authors found no difference in time to tracheal intubation between awake FFI and awake MVL intubation performed by experienced anesthesiologists in patients with anticipated difficult airway. In the present study however there was a difference between Flexible fiberoptic scope and King video laryngoscope with former being better on the time taken for intubation. This may be attributable to the fact that both king video laryngoscope and McGrath video laryngoscope are different in their structure and laryngoscopic visualisation as well as angle of entotracheal tube insertion.

In another study "A comparative evaluation of King vision video laryngoscope (channelled blade), McCoy, and Macintosh laryngoscopes for tracheal intubation in patients with immobilized cervical spine" by QE Ali, SH Amir, S Ahmad et al,[8] which was a randomized prospective study designed to compare the laryngeal view and ease of intubation with the Macintosh, McCoy, and King Vision video laryngoscopes in patients with immobilized cervical spine. The use of a King Vision video laryngoscope in this study resulted in better glottis visualization, easier tracheal intubation, and higher first attempt success rate as compared to Macintosh and McCoy laryngoscopes in immobilized cervical spine patients. However in this study they had not compared with flexible fiberoptic scope. King vision video laryngoscope had produced better results as compared with Macintosh and McCoy laryngoscope.

A study of "C-MAC Video Laryngoscopy Versus Flexible Fiberoptic Laryngoscopy in Patients with Anticipated Difficult Airway" which was a randomized controlled trial by Salama, Hemy, Raouf et al.[1] The aim of this study was to investigate laryngoscopic view and intubation success using the C-MAC video laryngoscope in comparison with traditional flexible fiber-optic laryngoscopy in patients with anticipated difficult airway. The study compared the techniques for time of intubation, hemodynamic changes, success rate, number of attempts and complications in both groups. The study concluded that C-MAC Video laryngoscope has become a good alternative and is associated with better visualization of laryngeal structures in shorter time and less intubation attempts as compared to traditional flexible fiber-optic laryngoscopy. In our study King video laryngoscope was used which is different from C-MAC video laryngoscope so the results may not concur with this study.

A Comparative randomised study of "GlideScope video laryngoscope versus flexible fiber‐optic bronchoscope for awake nasal intubation of oropharyngeal cancer patients with anticipated difficult intubation" was done by Essam Abd El‐Halim Mahran, Mohamed Elsayed et al.[3] In both groups, they compared the intubation time in seconds, success rate of the first intubation attempt, percentage of Cormack and Lehane glottic score and incidence of complications. It was concluded that GlideScope could be a suitable alternative to FFS in nasal intubation of oropharyngeal cancer patients. This study utilised glidescope which is having different angulation than the king video laryngoscope used in our study. The main limitation of this study was that, anaesthetisiologist performing the procedure was not blinded to the study groups and hence possibility of bias existed. The reason for increased time for intubation with King vision laryngoscope can be also due to unfamiliarity and lesser experience with this device as compared with the flexible fiberoptic scope.

CONCLUSION

With increasing incidences of difficult airway in today's era, the need to develop more and more options to counter the difficulty in endotracheal intubation is ever increasing. Though awake fiberoptic intubation remains the gold standard in difficult airway management, newer devices like video laryngoscopes are emerging techniques that can be used. While comparing the two techniques of endotracheal intubation through flexible fiberoptic scope and King video laryngoscope it was clearly observed that even when conditions were kept similar, flexible fiberoptic scope decreased the intubation time and the drop in saturation. There was no significant difference observed in intubation difficulty scale between the two techniques. Though glottic visualisation was adequate with King video laryngoscope, however insertion of endotracheal tube required greater effort and time. Thus flexible fiberoptic remains the mainstay for management of difficult airway patients.

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REFERENCES

1. Salama AK, Hemy A, Raouf A, Saleh N, Rady S . C MAC Video Laryngoscopy Versus Flexible Fiberoptic Laryngoscopy in Patients with Anticipated Difficult Airway: A Randomized Controlled Trial. Journal of Anesthesia and Patient Care. 2016;1(1).
2. Rosenstock C, Thøgersen B, Afshari A, Christensen A, Eriksen C, Gätke M. Awake Fiberoptic or Awake Video Laryngoscopic Tracheal Intubation in Patients with Anticipated Difficult Airway Management. Anesthesiology. 2012;116(6):1210-1216.
3. Mahran E, Hassan M. Comparative randomised study of GlideScope® video laryngoscope versus flexible fibre-optic bronchoscope for awake nasal intubation of oropharyngeal cancer patients with anticipated difficult intubation. Indian Journal of Anaesthesia. 2016;60(12):936.
4. Kriege M, Alflen C, Noppens R. Using King Vision video laryngoscope with a channeled blade prolongs time for tracheal intubation in different training levels, compared to non-channeled blade. PLOS ONE. 2017;12(8):e0183382.
5. Erdivanli B , Sen A , Batcik S , Koyuncu T, Kazdal H et al. Comparison of King Vision video laryngoscope and Macintosh laryngoscope: A prospective randomized controlled clinical trial. Braz J Anesthesiol. 2018 Sep-Oct;68(5):499-506.
6. Priyanka AS, Nag K, Hemanth Kumar VR, Singh DR, Kumar S, Sivashanmugam T. Comparison of King Vision and Truview Laryngoscope for Postextubation Visualization of Vocal Cord Mobility in Patients Undergoing Thyroid and Major Neck Surgeries: A Randomized Clinical Trial. Anesth Essays Res. 2017 Jan-Mar;11(1):238-242.
7. Yumul R, Elvir-Lazo OL, White PF, Durra O, Ternian A, Tamman R, Naruse R et al. Comparison of the C-MAC video laryngoscope to a flexible fiberoptic scope for intubation with cervical spine immobilization. J Clin Anesth. 2016 Jun;31:46-52
8. Ali, Q.E., Amir, S.H. and Ahmed, S. A comparative evaluation of King Vision video laryngoscope (channelled blade), McCoy, and Macintosh laryngoscopes for tracheal intubation in patients with immobilized cervical spine. Sri Lankan Journal of Anaesthesiology,2017 25(2):70-75.

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