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A Study to Compare the Efficacy of Two Modern Video Laryngoscopes (King Vision and Hugemed) that Aided in Betterment of Securing the Airway in Patients Undergoing Surgery Under General Anaesthesia

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Abstract: ***In order to successfully secure the airway with the endotracheal tube, with minimum complications, many technological advancements have been made to introduce an ideal intubating device into clinical practise. The most widely accepted of these devices are video laryngoscopes. This study was done to compare the efficacy of two video laryngoscopes: Hugemed and Kingvision in patients undergoing general anaesthesia. Eighty patients were taken and randomly allocated into two groups of 40 each. The primary outcomes were to assess Cormack- Lehane (CL) grading, time of intubation, ease of intubation, number of attempts & optimisation manoeuvres required for intubation. The secondary outcomes were hemodynamic response and complications related to laryngoscopy & intubation. Kingvision video laryngoscope (KVVL) was found to be significantly better than Hugemed video laryngoscope (HMVL) in terms of ease of intubation and requirement optimising manoeuvres used.***

Keywords: Kingvision video laryngoscope, Hugemed video laryngoscope, video laryngoscopy, anesthesiologist, intubation

1. Introduction

A life saving skill which has to be mastered be the anesthesiologist all over the world is securing the airway. In the early 20th century, advances in anaesthesia made the laryngoscope and the skills to successfully use it, essential for the anaesthesiologists (**Burkle CM et al., 2004).**

Ever since the introduction of video laryngoscope in anaesthesia practise, there has been a lot of evolution. Most of the anaesthetist are comfortable using video laryngoscopes due to obvious reason of better visibility improving the Cormack- Lehane grading hence, converting difficult airway into an easy one. Now a days there are so many devices available and it is difficult to make a choice.

We conducted a study to compare the performance of two VLs: Kingvision and Hugemed as both the video laryngoscopes have certain advantages over the other. The idea was to compare the performance of both the VLs with respect to Cormack- lehane view, ease of intubation, duration of intubation, optimization manoeuvres required and number of attempts of successful intubation which were taken as primary objectives and the hemodynamic response to intubation and complications related to intubation which were considered secondary objectives.

Hugemed video laryngoscope is a new portable device, launched in 2019. The blade has an angle of 66°, available in neonatal, paediatric, and adult sizes, in both reusable and disposable version. It has an added advantage that it can be charged easily with its portable charger.

The King Vision Video Laryngoscope was introduced into practice in 2010. The King Vision Video Laryngoscope is a portable, battery operated, rigid, video laryngoscope with an integrated reusable display and a choice of disposable blades. The lens has an anti-fog coating.

2. Materials and Methods

After obtaining approval from the Institutional Ethical Committee, the present, prospective, randomized study "Comparative evaluation of performance of two video laryngoscopes: Hugemed and kingvision for endotracheal intubation in patients undergoing surgery under general anaesthesia" was conducted in the Post- Graduate Department of Anaesthesiology and Intensive care, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu over a period of one year. After calculating power of study, total of 80 patients were taken, in age group of 15- 70 years undergoing elective surgery under general anaesthesia. They were randomly assigned to undergo intubation using Hugemed and Kingvision video laryngoscope.

After obtaining informed written consent from patients, they were allocated into one of the 2 study groups randomly according to a computer- generated table of randomisation, each group comprising of 40 patients.

Group I (n=40): Patients in this group were intubated using Kingvision video laryngoscope standard (non channelled) blade.

Group II (n=40): Patients in this group were intubated using Hugemed video laryngoscope.

Our study included patients between 15-70 years of age, of either sex, American Society of Anaesthesiology Grade 1 and 2 and MPG Grade 1, 2, 3, 4. Pateints excluded from the study

were those who refused to participate in the study, age <15 and >70.

ASA Grade 3 and 4, patients with risk of aspiration of gastric contents (eg. Full stomach, pregnancy), patients with history of uncontrolled hypertension and patients with history of raised intra-cranial pressure.

In Pre- op room, after securing cannula an IV line, and attaching standard monitors, Inj. ondansetron 0.1mg /kg IV and Inj. pantoprazole 40mg were given. Induction was done with Inj. fentanyl 1-1.5ug /kg IV, Inj. propofol 2-2.5mg /kg IV and muscle relaxant – Inj. succinylcholine 1.5mg /kg IV after pre- oxygenation. With patient's head in neutral position, laryngoscopy and intubation was attempted. Succinylcholine by an experienced anaesthesiologist.

During laryngoscopy and intubation a note was made of:

1) Cormack – Lehane grading-
- Grade I: Visualization of entire vocal cords.
- Grade II: Partial view of glottis.
- Grade III: Only epiglottis seen, none of glottis visible.
- Grade IV: Neither glottis nor epiglottis visible.

2) Ease of intubation which was graded as follow-
- GRADE I: Intubation easy
- GRADE II: Intubation requiring an increased anterior lifting force and assistance to pull the right corner of the mouth upwards to increase space.
- GRADE III: Intubation requiring multiple attempts.
- GRADE IV: Failure to intubate with assigned laryngoscope.

3) Number of intubation attempts and optimising manuoevres required:

An attempt is defined as the time from introduction of laryngoscope into the oral cavity until its removal. Three attempts at intubation were allowed for all patients. Failure to intubate is defined as the inability to intubate after three attempts (or time required>120 seconds). Requirement of optimization manuoevres like use of bougie, external laryngeal pressure, tube rotation was noted.

4) Time of intubation-time from insertion of Laryngoscope through dental arches to the intubation of trachea, verified by first deflection of capnograph.

5) After intubation, blade of laryngoscope was checked for blood staining. Inspection of teeth and soft tissue was done for any trauma.

Statistical analysis

At the end of the study all the data was compiled and analysed statistically. Qualitative data was expressed as numbers and percentages. Association between categorical variables were analysed by using Chi- square test. Quantitative data was expressed as mean and standard deviation. Unpaired t- test was used to test the significance of difference between two quantitative variables. A p value less than 0.05 was considered as statistically significant.

3. Results

Both the groups were comparable with regard to demographic data i. e, age, sex, ASA class, MP grading.

The difference in Cormack and lehane grading was statistically insignificant between the Kingvision and Hugemed (p=0.28) groups (*Fig 1.)*. With regard to ease of intubation, 2 patients in Kingvision group were grade 2 whereas 10 patients in Hugemed group were grade 2. Although, statistically insignificant (p value = 0.01), Kingvision was superior to Hugemed video laryngoscope in this comparison (*Fig 2.)*. The mean time of intubation in Kingvision group (10.7 seconds) and Hugemed group (9.12 seconds) was comparable (p value = 0.06), statistically insignificant (*Fig 3.)*. The difference in use of additional manoeuvres was statistically significant (p value = 0.004), indicating the use of less number of additional manoeuvres with Kingvision video laryngoscope when compared to Hugemed video laryngoscope (*Fig 4.)*. Intubation was successful in the first attempt in 38 (95%) patients in the Kingvision group, 37 (92.5%) patients in the Hugemed group. Statistically, the difference of number of attempts were comparable among the two groups (p value = 0.64) (*Fig 5.).2* patients intubated with Kingvision video laryngoscope had trauma (slight bleed from either upper or lower lip) and 3 patients intubated with Hugemed video laryngoscope had trauma (bleed at uvula and slight bleed from either upper or lower lip) (*Fig 6)*. Haemodynamic response to laryngoscopy and intubation with respect to heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure and oxygen saturation was similar in both the groups.

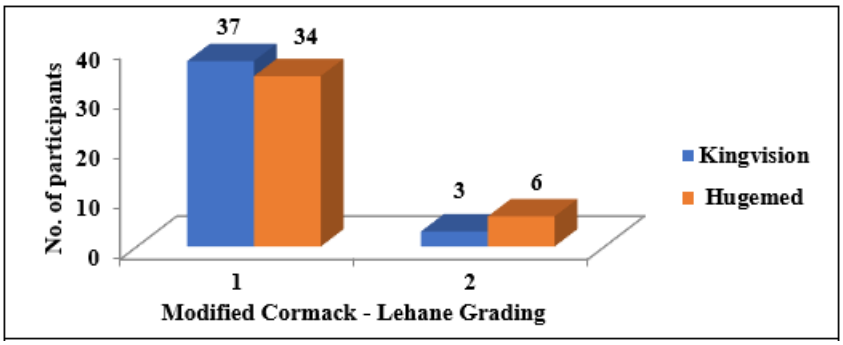

Figure 1: Modified Cormack - Lehane Grading of the study participants

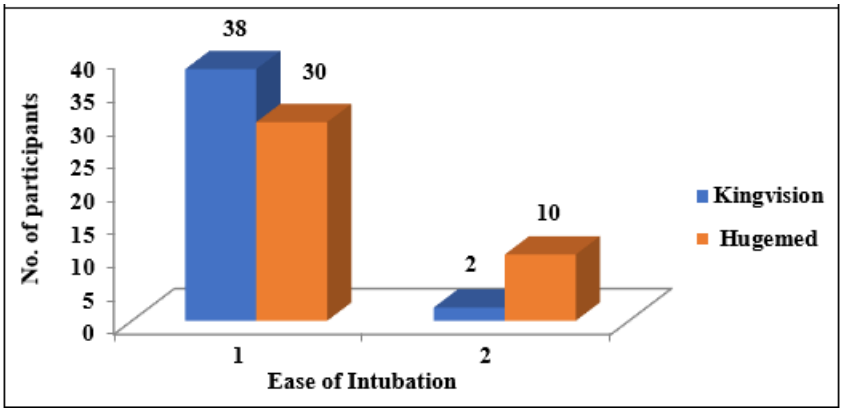

Figure 2: Ease of Intubation of the study participants

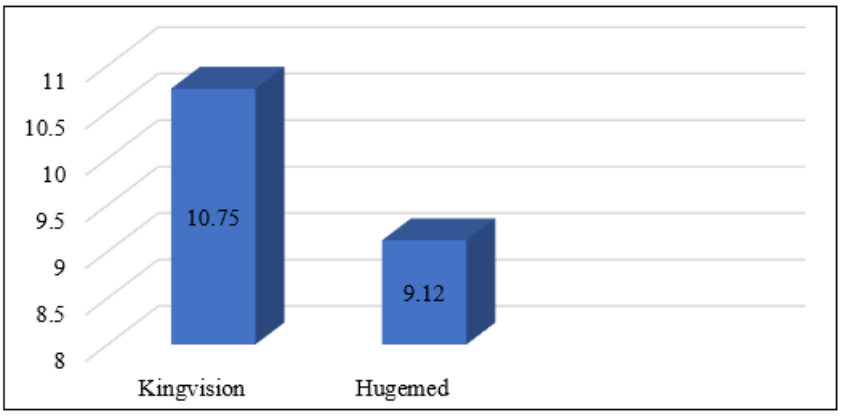

Figure 3: Mean time of Intubation of two groups

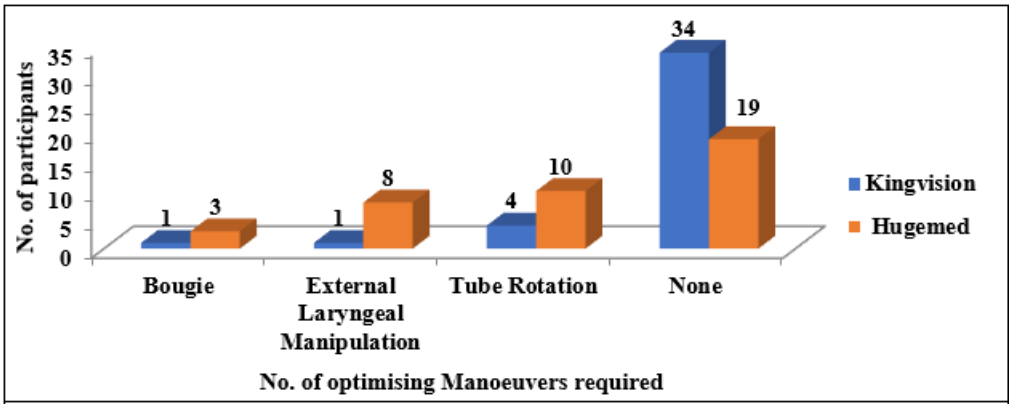

Figure 4: No. of optimising Manoeuvers required of the study participants

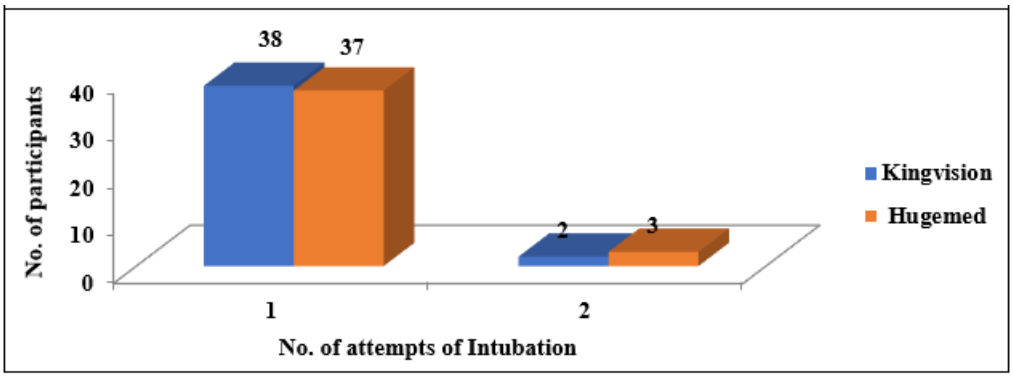

Figure 5: No. of attempts of Intubation of the study participants

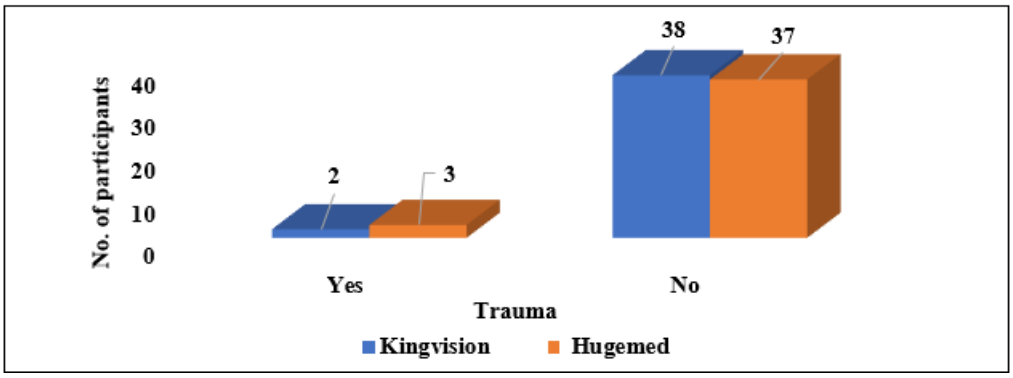

Figure 6: Trauma of the study participants

4. Discussion

The aim of airway management is to successfully secure the airway with the endotracheal tube both in controlled settings (Operation theatres) and in emergency settings. In order to attain high success rate of endotracheal intubation in first attempt, laryngoscopes have been modified over the years since their introduction into clinical practice. In the modern era, anaesthesiologists have a wide variety of tools for securing the airway. Video laryngoscopes are the most recent and significant modification in this field. The reason for their immense popularity within a short period of time is that they improve the Cormack- Lehane grading as compared to Macintosh and help to visualize the larynx without the need for alignment of oral, laryngeal and pharyngeal axes and in addition to this, they are associated with lesser intubation related complications. The recent introduction to the field of video laryngoscopes is Hugemed video laryngoscope launched in 2019.

In our study there was no statistically significant difference between the two groups with regard to mean age, sex, ASA physical status and Mallampati grade.

On comparing the two groups, we found that CL grading was a little better in Kingvision group as 92.5% had CL grade 1 compared to Hugemed group where 88.8% patients CL grade 1 but the difference is not significant statistically (p value = 0.28). **Giuseppe Pascarella, et al., (2020)** observed in their prospective observational pilot study that only in 4 (7.1%) out of 56 patients Hugemed VL offered CL grade 2.

In our study we observed better ease of intubation with Kingvision VL as 90% patients were graded as grade 1 and only 5% patients graded as grade 2 compared to Hugemed group where 75% patients were graded 1 and 25% patients were graded 2. The difference was statistically significant showing (p value= 0.012). Kingvision VL was found to be superior to Hugemed VL with regard to ease of intubation. In agreement to our study, **Mogahed MM et al., (2017)** documented in their study conducted on 105 patients, easier intubations in patients intubated with King Vision compared to C-MAC and Macintosh laryngoscope.

Intubation time was slightly longer with Kingvision VL as compared to Hugemed VL (10.75 VS 9.12 sec) but no statistical significant difference was found between the two groups (p value= 0.06). The longer intubation time with Kingvision video laryngoscope may be due to the fact that anaesthesiologists are more comfortable with use of channelled blade of this laryngoscope and we used unchanneled blade for the purpose of unbiased comparison as Hugemed VL comes with unchanneled blade. In another study **Raj Sahanjandal et al., (2019)** compared King Vision Video Laryngoscope with cMAC d-Blade in obese patients with anticipated difficult airway and concluded that there was no significant difference in time to intubation between two groups.

In the current study, 85% patients intubated with Kingvision video laryngoscope required no additional manoeuvres compared to Hugemed video laryngoscope where 47.5% patients required no additional manoeuvres. On statistical analysis, difference was significant (p value =0.004) indicating the use of less number of additional manoeuvres with Kingvision video laryngoscope. The increased incidence of use of various manoeuvres further strengthens the fact there is a learning curve with every new gadget as all the anaesthesiologists have been using KVVL in the department for 4-5 years and HMVL has been introduced very recently. **Giuseppe Pascarella et al., (2020)** observed in their study that out of 56 patients only 1 case intubated with Hugemed VL required external laryngeal pressure during the intubation although they included MPG 3 and MPG 4 patients in their study.

In our study, first attempt of successful intubation was achieved in 95% patients in Kingvision group compared to 92.5% patients in Hugemed group. The difference between two groups was not statistically significant (p value 0.64), but Kingvision group had slightly higher number of patients intubated in first attempt compared to Hugemed group. In a prospective observational pilot study conducted by **Giuseppe P et al., (2020)** out of total patients intubated with Hugemed VL, 85.7% were intubated successfully in first attempt.

Use of video laryngoscopes lowers tissue trauma rates compared to direct laryngoscopy as they do not put undue pressure over the lips, gums and other peri glottic structures for complete visualisation of glottis. In our study, there was no statistical difference between two groups with respect to the trauma cause (p value=0.171). Similar to our study, **Lewis SR et al., (2016); M Kliene-Brueggeney et al., (2017)** reported that use of video laryngoscopes lowers the incidence of airway and laryngeal trauma.

Due to the angulated blades of video laryngoscopes, use of stylet becomes mandatory for the proper placement of

endotracheal tube. This can be associated with increased haemodynamic response. In our study, we observed a transient increase in heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure which was not statistically significant (p value = 0.05) in both the groups and the parameters gradually came back to baseline within 10 minutes.

5. Conclusion

In our study we concluded that more number of patients who were intubated with Hugemed VL required optimising manoeuvres and ease of intubation was more with Kingvision VL but still both Kingvision VL and Hugemed VL are effective and safe devices for performing endotracheal intubations. However, as Hugemed VL is a newer device so, the anaesthetists need to use it more often to overcome the learning curve.

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