A comparative evaluation of the Airtraq® and King Vision® video laryngoscope as an intubating aid in adult patients


Abstract: Airtraq® has been shown to improve ease of intubation in patients with normal and difficult airway. King Vision® video laryngoscope is a newly introduced intubating device with an attached monitor. We here hypothesized that the King Vision® video laryngoscope with channeled blade performs better during intubation as compared to Airtraq®. In this study, we performed a comparison between the King Vision® video laryngoscope and the Airtraq® with regard to time needed for intubation, number of attempts required to intubate, and complications. Fifty ASA grade I and II adult patients posted for a routine surgical procedure were randomly divided into two groups of 25 patients each. All patients were anesthetized using similar techniques. The time required to intubate patients was significantly shorter when the King Vision® video laryngoscope with channeled blade was used as compared to the Airtraq® (p < 0.05). The number of attempts to successfully intubate patients was also significantly lower (p < 0.05) for the King Vision® video laryngoscope than for the Airtraq®. The use of the Kings Vision® video laryngoscope with channeled blade should be encouraged in difficult intubation situations in adult patients with a mouth opening of more than 18 mm.

Key words: King Vision® video laryngoscope; Airtraq®; intubation.

Introduction

The leading cause of anesthesia-related injury is the inability to intubate the trachea and secure the airway (1). A survey conducted in Britain concluded that difficulty with tracheal intubation is the most common factor related to serious airway complications during anesthesia, suggesting that the problem is still persisting (2).

Video laryngoscopy consists in using an enlarged video image to visualize the structure of the airway. The King Vision® video laryngoscope is the newest among other video laryngoscopes (3). It is a portable device. The Airtraq®, which is also a recent device, was developed before the King Vision® (4, 5). Airtraq® provides improved laryngeal visualization, insofar as alignment between mouth, larynx, and trachea is not necessary when using it, as opposed to direct laryngoscopy (6). Less force is also needed than during direct laryngoscopy, and cervical spine movement is less pronounced. It also produces less hemodynamic stress response to laryngoscopy and intubation, and needs a shorter learning curve for correct use than other conventional laryngoscope. It provides good laryngeal view, thanks to its special optical equipment. However, its disadvantages relate to possible blurred vision by secretions, and stock acquisition and maintenance costs.

We here hypothesized that the King Vision® video laryngoscope with channeled blade performs better during intubation than the Airtraq®. We compared both devices regarding time needed to intubate, number of attempts, and complications. The primary end point was the time needed to intubate with the two devices, and secondary end points were the number of attempts, ease of intubation, and complications if any when using those two devices.

Method

After approval from our Institutional Ethics Committee, J.N. Medical College, AMU, Aligarh, UP, India, and written informed consent, 50 ASA grade I and II adult patients were randomly divided into two groups of 25 patients each through a computer-generated random number list. The study was conducted in the Department of Anesthesiology, J.N. Medical College, AMU, Aligarh. In group A,

Correspondence address: Professor Qazi Ehsan Ali, Dept of Anaesthesiology, JNMCH, A.M.U., Aligarh, U.P., India.
E-mail: qaziehsanali@gmail.com
patients were intubated using the Airtraq®, and those of group K were intubated using the King Vision® video laryngoscope with channeled blade. Inclusion criteria encompassed ASA grade I and II, all Mallampati grades, age range between 20 and 60 years, and weight between 40 and 70 Kg. All patients were scheduled for elective surgeries. Patients with cardiovascular diseases, any oral pathology, neck flexion deformity, and patients with a mouth opening narrower than 18 mm for males and 16 mm for females were excluded from the study, because such mouth opening is required for the introduction of the channeled blade of the King Vision® in the oral cavity. Patients with a Mallampati grade IV were not excluded if they had a mouth opening of more than 18 mm. The anesthetist in charge of the procedure was always the same. This person had had training with both devices on 25 patients. Patients in both groups were monitored using standard anesthesia monitors, including pulse oximetry, capnometry, cardioscope, and temperature. After preoxygenation, anesthesia was induced intravenously using fentanyl 1 μg.kg⁻¹ and propofol 2 mg.kg⁻¹. After confirmation of adequate bag mask ventilation, neuromuscular relaxation was instituted using 1.5 mg.kg⁻¹ of succinylcholine. Once adequate muscle relaxation was achieved, laryngoscopy and tracheal intubation occurred. Two attempts were allowed with either of the two devices, and, in case of failed intubation, classic laryngeal mask airway of the appropriate size was to be considered as a rescue maneuver. Intubation was performed after centralizing the vocal cord in view in both the groups. Correct placement of the tube was confirmed by the appearance of evident end tidal CO₂ on the capnometry screen. Anesthesia was maintained using vecuronium bromide, nitrous oxide (66%), and sevoflurane (1-2%) in oxygen. At the end of surgery, residual neuromuscular paralysis was reversed using a neostigmine-glycopyrolate combination. An independent observer recorded tracheal intubation duration, which was defined as the time between introduction of the device between the two incisors and appearance of the capnographic tracing. The number of attempts was also recorded. The percentage of glottic opening was defined as corresponding to 100% when the entire opening was seen in a linear fashion from the anterior commissure to the posterior cartilage, and 0% when no glottis opening was seen. If the first attempt failed, then the patient was ventilated using bag and mask and 100% oxygen to avoid desaturation, and the duration of subsequent attempt added to the time required to secure the airway. Eventual airway trauma was noted, and was assumed when the blade of the intubating aid was stained with blood. A pilot study, with 5 subjects in each group, was conducted and it was found that an average of 38 sec was required to intubate group A patients, whereas an average of 28 sec was required to intubate group K patients, with an equal standard deviation of ± 12 sec for both the groups. The sample size required for the study was calculated keeping α threshold at 0.05, and the power of the study to be more than 60%. Data were statistically analyzed using Student’s t tests, Z tests, and Fisher’s exact tests. A P value < 0.05 was regarded as statistically significant.

**Results**

Patients of both groups had a similar demographic profile (Table 1).

The number of patients with Mallampati scoring I, II, III, and IV were 16, 4, 3, and 2 in group A, and 17, 5, 2, and 1 in group K, respectively. Out of the total number of patients in each group (25), 21 were intubated at first attempt in group A, as compared to 24 in group K (NS). One patient of group A required more than 2 attempts, and none in group K (NS). The patients needing two attempts or more, and those who experienced airway trauma during intubation had a Mallampati class III or IV. Complications such as esophageal intubation were not encountered, whereas airway trauma occurred in 2 patients of group A and 1 patient of group K.

**Discussion**

Our observations in the present study (Table 2 and fig. 1) show that the King Vision® video laryngoscope seems to provide better intubating conditions as compared to the Airtraq® laryngoscope, resulting in less consumption of time to secure airway and, apparently a lower number of attempts to achieve successful intubation (Table 2), although this should be confirmed with a larger sample of

<table>
<thead>
<tr>
<th>Table 1 Demographic data of the patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Age (yrs)</td>
</tr>
<tr>
<td>Weight (kg)</td>
</tr>
<tr>
<td>Height (cm)</td>
</tr>
</tbody>
</table>

© Acta Anaesthesiologica Belgica, 2015, 66, nº 3
patients. Complications also seem to be less frequent with the King Vision®.

Studies have not been conducted on live patients to understand the performance of King Vision® video laryngoscope, but much work has been done on the Airtraq®. Difficulty in airway management has been associated with serious complications, especially when intubation fails (7). Sometimes there are situations in which the anesthesiologists face a condition where they can neither ventilate with a facemask or intubate. This is one of the most critical situations in anesthetic practice. If this situation is not promptly dealt with within a few minutes, severe outcome may occur (8). When using conventional laryngoscope, anesthesiologist have only a narrow view of the airway structure, whereas video laryngoscopes provide high quality video images, that are enlarged on the video monitor for easier visualization. With a channeled blade, it is easier to intubate. In that case, intubation can even occur in patients with head in a neutral position. Moreover, looking at the screen by the operator creates a new dynamic interaction during airway management. The entire operating room team can assess progress in real time, which enhances communication and improves teaching (9). A minimum mouth openings of 13 mm is required for a standard non-channeled blade, and 18 mm mouth opening is required for the channeled blade of the King Vision® laryngoscope, making it usable for the majority of adults (10).

King Vision® video laryngoscope, which is the latest in the series of video laryngoscopes, consists of two detachable pieces. It has a reusable monitor that attaches to a disposable blade (Fig. 1). The two pieces simply come together by sliding them on each other. The King Vision® blades are available as channeled and non-channeled (standard blade). The channeled blade acts as a conduit for the tube, just like the Airtraq®. The display is on an OLED (Organic Light Emission Device) design, with surprisingly good clarity and resolution. It creates clear image viewing in a 160° panoramic field, and can be turned on with a single power button on the back side and switched off by pressing it for 3 sec (10). There is a mini USB port for video output. The lead light on the blade tip has a very good intensity, with pale white illumination. The device is powered by Standard AAA size batteries.

**Table 2**

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group K</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP score I, II, III, IV</td>
<td>16, 4, 3, 2</td>
<td>17, 5, 2, 1</td>
</tr>
<tr>
<td>Durations (sec) ± SD</td>
<td>38 (± 18)</td>
<td>26 (± 11)*</td>
</tr>
<tr>
<td>% of glottic opening visible ± SD</td>
<td>94% (± 4)</td>
<td>99% (± 1)*</td>
</tr>
<tr>
<td>Number of patients intubated in one attempt</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Number of patients intubated in two attempts</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Number of patients intubated in more than two attempts</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Airway Trauma</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Oesophageal Intubation</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

* statistically significant difference (P < 0.05).
Insofar as the King Vision® laryngoscope with curved blade has an especially designed blade curvature and a video system, it needs minimal manipulation or even extension of the head at the atlanto-occipital joint, requires less effort for blade introduction into the oral cavity and to push the tube into the trachea through the inbuilt conduit. Airtraq®, as assessed by us, requires more skill. It needs a perfect hand-eye co-ordination over the eye piece, which gives an indirect view of the larynx. However, after the learning curve, Airtraq® is comparable to King Vision® video laryngoscope regarding ease of intubation. It has been found that video-laryngoscopes yield better glottic visualization, higher success rate for difficult airways, and faster learning curve, resulting in higher success rates for intubations by novice physicians (9).

Airtraq® has been successfully used in several difficult situations (11, 12), whereas King Vision® video laryngoscope has not been studied so much. Only one manikin study and an study on cadaver video laryngoscope has not been studied so much. Regarding ease of intubation. It has been found that the indirectly visualized vocal cords and guiding channel for tracheal tube placement plays a vital role in achieving successful intubation, and providing better intubating conditions.

Complications such as esophageal intubation, pulmonary, and other major complications are reported to occur relatively frequently during emergency tracheal intubation outside the operating room (14, 15). The reason for less airway trauma when using King Vision® laryngoscope may related to the absence of laryngoscopy like maneuver and has softer blade material. But effective lower incidence of trauma still have to be confirmed by larger studies.

The disadvantages of the King Vision® laryngoscope are few. They include the need for adequate before using it as an expert and being able to use it in emergency situations. This simplifies the intubation to a level that it poses a threat to the regular use of conventional laryngoscopy.

CONCLUSION

King Vision® seems to be easier to use after acquiring experience with it. It permits shorter delays to intubate, and probably a lower number of attempts, although this has to be confirmed in a larger study. It compares to the Airtraq® with regard to airway trauma and cost, insofar as both devices require disposable blades. It gives a background confidence to the anesthesiologist, as multiple persons visualize the intubation at the same time.

This intubating device may be considered as a part of the safe alternative to airway equipment. However, a larger sample size needs to be evaluated for further recommendations.

References

