Video laryngoscopes

Tracheal intubation by video laryngoscope is the most innovative advancement and a completely different experience as compared with conventional Macintosh laryngoscope, and skills needed for the former method of indirect laryngoscopy are very different from those needed for direct laryngoscopy by Macintosh or Miller blade laryngoscopes. The latter method definitely requires training to be an experienced laryngoscopist and tracheal intubator, while in case of video laryngoscopy (VL), even the novices can successfully do laryngoscopy and intubate the trachea.

There are several studies recently conducted in the medical students and paramedics which conclude that VL and intubation was successfully and satisfactorily done in shorter time as compared to conventional direct laryngoscopy with Macintosh laryngoscope. One such study is published in this issue of *Saudi Journal of Anesthesia* by Kaki and his colleagues.[1]

Since 1941 and 1943, Miller's straight blade and Macintosh's curved blade laryngoscopes, respectively, have been widely used for direct laryngoscopy and tracheal intubation. Most of the patients are successfully intubated without major problems; however, there are some patients in whom the laryngoscopy and intubation could be difficult. Difficult intubation may be anticipated preoperatively or it may be unexpectedly confronted even in Mallampati I and II class airway.

There is fairly uniform reporting of the incidence of failed intubation in the literature; it occurs in approximately 0.05% or 1:2230 of surgical patients[2] and in approximately 0.13–0.35% or 1:750 to 1:280 of the obstetric patients.[3] The incidence of unsuspected difficult intubation is estimated to be higher at 3%. One factor that contributes to difficult intubation is poor visualization of the glottic opening.

Failure to intubate may result in dental damage, laryngeal spasm, bronchospasm, bleeding from the upper airway, hypoxia, hypecarbia, regurgitation/vomiting, various dysrrhythmias, cardiac arrest, brain damage or even fatalities. It has always been a challenge for the anesthesiologist; therefore, he should be forearmed for such situations. In pursuit of this, it became necessary to have certain tools or access to advanced airway instrumentation for better visualization of the larynx, should the encounter with the difficult airway or failed intubation occur. This led to the invention of the lighted stylet and a number of indirect fiber optic laryngoscopes such as flexible fiber scope, Bullard scope, Usher scope and the Wu scope.[4] Although these devices can be effective alternatives to the direct laryngoscopy, they all have some limitations and none of them is an effective solution in all challenging conditions.

With digital technology revolution and complementary metal oxide semiconductors (CMOS), video chip was developed by several manufacturers. This then led to the development of the video laryngoscopes to view the glottis so that the trachea can be intubated. The GlideScope was one of the first such video devices, which was invented in 2001 by a vascular and a general surgeon, John Pacey of Canada.[5,6]

This has led to VL which has certainly made this task easy for both experienced anesthesiologist and non-anesthesiologist in the field of anesthesia, resuscitation and even in the pre-hospital settings by emergency care providers.

The VL is visualization of an enlarged video image of airway structures. In contrast, using conventional laryngoscopy, anesthesiologists have only a narrow view of the airway structures, which can be further obscured during attempts to pass the endotracheal tube (ETT), and therefore, sometimes the ETT may slip into esophagus.

There are several potential advantages of a video image in contrast to direct laryngoscopy. The system provides high-quality video images that are enlarged on the video monitor for easier visualization. If laryngeal manipulation is required to improve visualization of laryngeal structures, the intubator and the person assisting can coordinate movements such as Sellicks maneuver as they observe simultaneously the image on the video monitor. With the video image projected from the distal end of the laryngoscope blade, laryngeal structures are kept in view

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as the ETT is passed through the oro-pharynx into the trachea.

In almost all the videoscopes, the anatomy of the blade is such that there is a steep bend for alignment of oral, pharyngeal and laryngeal axes for viewing the glottis. Also, the percentage of glottic opening (POGO) score is better than the Cormack and Lehane classification of laryngeal appearance. The VL improves the Cormack Lehane grade of visualization of glottis and navigation or advancement of ETT. Thus, less or no pressure is exerted on the upper airway structure with videoscopes.

Many studies have been performed on manikins with normal and simulated difficult airway and with objective trauma assessment, following brief demonstration to novice medical students and paramedics with very little superiority of one videoscope over the other.

With appropriate training, there is usually a fairly short learning curve for the VL and a good view of the larynx can nearly always be obtained and recorded and the learner need not be on the shoulder of the anesthesiologist.

The more difficult skill to acquire seems to be the passage or navigation of the tracheal tube. The traditional skill of manipulating the tube under direct vision (as in Macintosh intubation) does not apply and the tube tip must be directed either by tube manipulation whilst watching a projected image on the screen or in the case of guided devices by manipulating the laryngoscope which in turn changes the direction of the tube tip.

VIDEO LARYNGOSCOPY

Advantages

1. Improved laryngeal visualization because eye and airway need not be lined up as in direct laryngoscopy
2. Less force used than during direct laryngoscopy
3. Less cervical spine movement
4. Possibly less hemodynamic stress response to laryngoscopy and intubation
5. Short learning curve
6. Improved portability and cost compared to flexible fiber optic laryngoscopes
7. Useful teaching tools
8. Generally higher success rate, especially in difficult situations.

Disadvantages

1. Passage of the ETT may be difficult despite good view or higher POGO score; often stylet is needed
2. Fogging and secretion may obscure the view
3. Loss of depth perception
4. Economic issues over stock acquisition and maintenance
5. No single videoscope is ideal
6. Greater processing time
7. Different techniques of laryngoscopy and intubation with different makes and models.

Types of Video Laryngoscopes

Stylets
- Bonfils
- Rigid and flexible laryngoscope (RIFL)
- SensaScope

Guide channels
- AirTraq
- Pentax AWS
- Res-Q-Scope II

Traditional (non-guided)
- GlideScope

Coopdech VLP-100
- Storz DCI
- Storz C-Mac
- McGrath

Current videoscopes

As of December 2010, there were six video laryngoscopes on the market in the UK, but now few more are marketed and few more are in preproduction. They are GlideScope (Standard and Ranger with different sized blades), McGrath laryngoscope, AirTraq optical laryngoscope, Daiken Medical Coopdech C-Scope VLP-100, the Storz C-Mac, Pentax AWS (airway scope), AP Advance VL, SensaScope and the Berci DCI laryngoscopes, and Co-pilot VL and King Vision video laryngoscopes to be launched. In this issue of *Saudi Journal of Anaesthesia*, there is a review article written on SensaScope, describing the combination of rigid and fiber optic technology in one scope.[7]

Video laryngoscopy in the pre-hospital setting

Providers of emergency care may be faced with a rapidly deteriorating airway condition due to severe facial trauma, neck or cervical spine injury, oropharyngeal edema secondary to angioedema or anaphylaxis. Emergency medical services (EMS) providers are routinely involved in managing the most difficult airways, and pre-hospital patients frequently have concomitant head injuries, multi-system trauma, or presumed cervical spine injuries. It therefore warrants that a definitive airway should be secured with the safest and most efficient method that has the lowest morbidity rate. VL, therefore, could be a good choice for safer laryngoscopy and intubation. The pre-hospital use of VL has not been widely explored, but has the potential to be a useful tool.[8]

In conclusion, although the role of VL is expanding beyond anesthesiology, such as in ICU, ER, Field resuscitation and

Aviation medicine, the gold standard still remains the art of mastering the direct laryngoscopy with conventional laryngoscopes such as Macintosh and Miller laryngoscopes.

Every experienced anesthesiologist passes through the sigmoid curve of direct laryngoscopy, but once the anesthesiologist reaches the plateau of the curve (which every trainee will achieve), it becomes immaterial which method is going to be used for intubation. The trainee anesthesiologist, therefore, must learn and maintain the art of direct laryngoscopy and intubation.

However, there are few circumstances of anticipated difficult airway or unforeseen scenarios of difficult or failed intubation in Mallampati class I or II airway, obese patients, cervical cord injury, trauma victims and some anatomical deformities of the face and upper airway, where VL could be the technique of choice. In our institute, VL is routinely used for anticipated difficult airway.

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REFERENCES

1. Kaki AM, AlMarkabi WA, Fawzi HM, Boker AM. Use of Airtraq, C-Mac, and Glidescope laryngoscope is better than Macintosh in novice medical students' hands: A manikin study, Saudi J Anaesthesia 2011;5:376-381.
2. Benumof JL. Management of difficult adult airways with special emphasis on awake tracheal intubation. Anesthesiology 1991;75:1087-110.
3. Cormack RS. Failed intubation in obstetric anesthesia. Anesthesia 2006;61:505.
4. Wu TL, Chou HC. New Laryngoscope. The combination intubating device. Anesthesiology 1994;81:1085-7.
5. Cooper RM. Use of new video laryngoscope (Glidescope) in the Management of difficult airways. Can J Anesth 2003;50:611-3.
6. Cooper RM, Pacey JA, Bishop MJ, McClusky SA. Early clinical experience with new video laryngoscope (Glidescope) in 728 Patients. Can J Anesth 2005;52:191-8.
7. Bir P. The SensaScope® - A new hybrid video intubation stylet. Saudi J Anaesthes 2011;5:415-417.
8. Bjoernsen LP, Lindsay P. Video Laryngyscopy in the prehospital Setting. Prehospital and Disaster Med 2009; 24:265-70.

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