

The Use of a GlideScope[®] Video Laryngoscope in Multiple Clinical Settings

In the Operating Room

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In the Emergency Department

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In Ambulatory Surgical Centers

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In the Morbidly Obese

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In Pediatric Outpatient Surgery

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In-Use Techniques

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Video laryngoscopes were developed to integrate video technology with laryngoscopy, providing reliable, real-time visualization during intubation.

Traditional laryngoscopes have been used for placement of endotracheal tubes in the practice of anesthesia for about one hundred years.

Their requirement for "Line Of Sight" maneuvers induces neck flexion, head extension, laryngeal depression and other stress-related movements. And often, intubation is still a blind procedure.

The following monograph is offered to describe the use in intubation of GlideScope® Video Laryngoscopes, such as those at right.

Currently these devices are used in the OR, ED, ICU, and emergency carts, as well as in EMS and military critical care settings.

The views of leading Anesthesiologists and Emergency Medicine experts expressed in this monograph address many of the questions that are asked about application of these systems.



GlideScope® GVL®
Video Laryngoscope



GlideScope® Cobalt
Single-use Video Laryngoscope



GlideScope® Ranger
Video Laryngoscope

The GlideScope® Video Laryngoscope

The Cleveland Clinic Experience

D. John Doyle, MD PhD

At Cleveland Clinic, we have been using the GlideScope® Video Laryngoscope (GVL®) since March 2003, having completed over 1300 cases to date for which we have recorded anecdotal and demographic information. In addition, in many of the cases we recorded video clips electronically, a selection of which may be viewed at www.GlideScope.net or on YouTube (<http://youtube.com/watch?v=tPPy-qjQnrc>). We began with a single black-and-white model; we now have four additional color models, as well as Ranger and Cobalt models.

It has been our experience that the use of the GVL® requires almost no prior training to use. In most cases I merely instructed new users to use the device like a regular Macintosh laryngoscope with the exception that users are told to intubate with the head in the neutral position and told to watch the display monitor instead of looking directly. In almost all cases, no difficulties are encountered in obtaining an adequate view in the few seconds it takes most users to learn to manipulate the laryngoscope. Also, we found the fact that several individuals can simultaneously witness the intubation on the display to be of enormous teaching value.

Like many others, we also found that the principal limitation in using the GVL® is not in getting a good view of the glottis, but rather in manipulating the endotracheal tube (ETT) through the vocal cords; successful placement via the oral route requires some form of stylet, such as a Mallinckrodt Satin-Slip® Intubating Stylet, bent at 60 or 90 degrees. (A stylet is not used for intubation via the nasal route).

We found that the GVL® was generally very easy to introduce into the oropharynx. While it is likely that in some patients with very limited mouth opening the width of the blade could present a problem, this was not our experience in all but a few patients.

Of the over 1300 cases to date, we have analyzed 747 cases. Of these 747 cases, intubation was successful in 718 cases (about 96%). Of the 29 failures, in 11 cases it was not readily possible to obtain an adequate view of the glottis; in 7 cases a good view was obtained but the ETT could not easily be made to enter the trachea (often because the ETT impacted against the anterior tracheal wall); in 4 early cases use of the GVL® was unnecessarily abandoned because of inexperience; in 2 cases technical failures occurred; and the remaining failures occurred for miscellaneous reasons.

Using the GlideScope® for Awake Intubation

Besides regular intubations with the GVL® we have performed a considerable number of awake intubation procedures with the system. In this situation the airway is usually anesthetized with

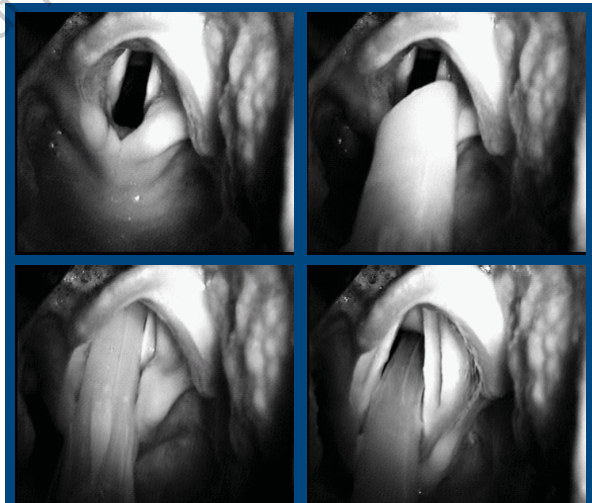


FIGURE. Close-up views from the GlideScope®, as the endotracheal tube (ETT) passes through the vocal cords, from case 112 of the author's series. Note that during ETT placement the tube tip often tends to hit against the anterior tracheal wall. This problem is easily handled by pulling back the stylet by about 3 cm and then advancing the ETT. Sometimes it also helps to rotate the ETT 180 degrees to direct the ETT tip more posteriorly (once the stylet has been removed).

gargled and atomized 4% lidocaine; superior laryngeal and transtracheal blocks are generally not required. Note that the GVL® can be particularly helpful in ensuring that topical anesthesia is sprayed directly on the vocal cords under direct vision using a device such as the MADgic Laryngo-Tracheal Drug Delivery Device from Wolfe Tory Medical, Inc. As with any awake intubation method, judicious sedation is usually also administered.

There are several potential advantages of using the GVL® for awake intubation. **First**, the view is excellent. **Second**, the method appears to be less affected by the presence of secretions or blood as compared to the use of fiberoptic intubation. (It has not been my practice to administer glycopyrrolate when using the GVL® for awake intubation, while it is when performing awake intubation using the fiberoptic bronchoscope.) **Third**, everyone can see what is going on, while this is the case only with fiberoptic intubation carts with a video option. (This is an important point for teaching.) **Fourth**, with the GVL® the whole process can be recorded electronically using a regular camcorder. **Fifth**, it is possible to add a spray device to the GVL® to spray additional topical anesthesia into the glottis under direct vision. **Sixth**, there are no special restrictions on the type of ETT that can be placed when using the GVL®, while this is not the case for fiberoptic methods. **Seventh**, the GVL® is much more rugged than a fiberoptic bronchoscope, and is far less likely to be damaged with use. **Eighth**, the GVL® is much more easily cleaned than a fiberoptic bronchoscope. **Finally**, while it is well known that advancing the ETT into the trachea over the fiberoptic bronchoscope often fails as a result of the ETT impinging on the arytenoid cartilages, this is not a problem with the GVL®.

Using the GlideScope® for Fiberoptic Intubation

The GVL® can also be used to assist in fiberoptic intubation (FOI), either for teaching purposes, or in difficult cases. The technique is simple. Following anesthetic induction (or in an awake topicalized patient), the GVL® is introduced in the usual manner, followed by introduction of the fiberoptic bronchoscope (FOB). While the primary operator manipulates the FOB into position, a second person holds the GVL® in position, monitors the GVL® display to see where the tip of the FOB is located, and provides verbal feedback to the operator as to the location of the tip of the FOB. Once the FOB has entered well into the trachea, the ETT is then passed over the FOB into the glottis. Here, use of the GVL® can again be helpful, since should the endotracheal tube get caught on the arytenoids or other laryngeal structures, it becomes evident on the GVL® display, and appropriate corrective action (such as twisting the endotracheal tube) can easily be taken.

Based on using this technique in a number of anesthetized patients to date, I have found it to be particularly valuable, especially in averting lengthy detours to peripheral structures such as the piriform fossae. It was also my experience that this technique offers a “macro view” that is helpful even when a video bronchoscope is available.

Influence on Clinical Practice

The GVL® has had an important impact on our clinical practice at Cleveland Clinic. For many clinicians it has become the preferred backup device where difficulties in direct laryngoscopy are encountered, displacing the FOB in this setting for many individuals. In the early days of our GVL® use at Cleveland Clinic, I was occasionally called in for assistance when attempts at direct laryngoscopy were unsuccessful. When subsequent intubation with the GlideScope® then turned out to be easy, many staff were quickly converted into enthusiasts.

The ease of intubation using the GVL® in otherwise difficult cases has led to some clinical practice changes for some Cleveland Clinic staff, especially when dealing with very obese patients or ENT patients with oropharyngeal tissues deformed by surgery or radiation. For instance, the use of the FOB is no longer the universal technique employed for awake intubations or to intubate patients asleep when direct laryngoscopy is deemed unsuccessful. In my own practice, my use of succinylcholine has declined as a result of an increased confidence that intubation will be successful with the GVL® available as a backup device. Similarly, many cases that would be done using awake intubation I now do using the GVL®, with an LMA-based technique as backup.

A letter to the editor by Ivan Hronek, in the May 2007 issue of the Airway Gazette, the newsletter of the Society for Airway Management (www.samhq.com), is entitled "Let's Just Say it out Loud: Video Laryngoscopy is Better & Safer than Conventional Laryngoscopy."

I couldn't have said it better myself.



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The GlideScope® Video Laryngoscope For Emergency Airway Management

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In 2001, we incorporated the GlideScope® Video Laryngoscope into our emergency department at University Medical Center in Tucson, Arizona. The following provide several examples how video laryngoscopy has added tremendous value for emergency airway management within our busy Level 1 Trauma Center.

The patient population in the emergency department presents added difficulties and challenges. Many of them have traumatic injuries and require immobilization of the cervical spine. The GlideScope® 60-degree anteriorly directed viewing angle greatly helps visualize the glottic opening without manipulation of the neck. Also, many of these patients have blood, vomitus, and increased secretions in the upper airway. GlideScope® technology permits visualization through fluids and its patented anti-fog mechanism provides a clear and panoramic view of the upper airway anatomy. Unlike direct laryngoscopy, the operator can visualize the intubation on a color monitor while maintaining a safe distance from the patient's mouth and potentially infectious secretions.

Verathon Medical®, the manufacturer of the GlideScope®, has recently introduced several innovative video laryngoscopes that we have trialed in our emergency department. The Cobalt GlideScope® is a variation of the original GlideScope® that incorporates a disposable plastic blade into a video baton. The Cobalt also incorporates the extremely effective anti-fog mechanism and displays the image on the same color monitor as the original GlideScope®. We are very impressed with the optical view the Cobalt provides and the convenience of a disposable blade cannot be overstated. While managing multiple critical patients, we were able to intubate the first one, quickly dispose of the blade and be ready for an additional intubation within seconds. Without the Cobalt system, the blade would require sterilization and consequently the GlideScope® would be out of service for a couple of hours. This feature also reduces damage or loss of the videoscope during the sterilization process because the Cobalt baton remains with the GlideScope® unit in the emergency department.

Another innovation within the GlideScope® family is the GlideScope® Ranger. This extremely rugged and portable unit can be taken on a moments notice to any area of the ED, the ICU, radiology suite or even the ambulance bay to perform a crash intubation. The Ranger is small enough to wear on your belt and yet gives a crisp reliable view on very compact glare resistant screen. We have found the portability and unique Ranger blade design provide beneficial assets within our emergency department. Given this unique design, the GlideScope® Ranger would be of great utility for pre-hospital providers.

In addition to performing intubations, the GlideScope® system has other useful applications in the emergency department. For example, it has been very helpful in confirming tube placement on patients intubated in the field. We have detected several esophageal intubations and recently detected a supraglottic nasal intubation where the patient had equal breath sounds, positive end tidal CO2 and excellent O2 saturations. The GlideScope®, however, revealed that the cuff was supraglottic and allowed us, under direct visualization, to advance the tube into the trachea.

The GlideScope® has also been used in our emergency department for ET tube exchanges for patients that were initially difficult to intubate. The GlideScope® blade elevates the soft tissue facilitating passage of the ET tube over the airway exchange catheter while both operators visualize the entire procedure on the GlideScope® monitor. In one instance, the ET tube engaged the right arytenoid preventing the ET tube from entering the trachea. The GlideScope® allowed us to recognize and correct the problem.

We have also used the GlideScope® for diagnostic laryngoscopy in the emergency department. Recently, a patient presented to our emergency department with a muffled voice and suspected foreign body of the upper airway. Using the GlideScope® with light sedation, Magill forceps were used to carefully extract multiple crumpled dollar bills from the supraglottic area and relieve the obstruction.

In addition to its clinical utility, the GlideScope® is a wonderful adjunct for teaching laryngoscopy and intubation. Until now airway management education could not be done effectively or in real time because only the operator could visualize the airway. The GlideScope® provides a tremendous educational resource by allowing the teaching physician to visualize the intubation process along with the operator. The instructor can provide advice for successful intubation while allowing the operator to maintain control of the GlideScope® handle. The training can include

