A Novel Special-shaped Stylet Technique for Intubation with GlideScope® Video Laryngoscope Devices

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Abstract
The GlideScope® video laryngoscope (VL) provides direct visualization of the larynx in patients with a potentially difficult airway. A specialized rigid stylet or tracheal introducer should be used to guide the tip of the endotracheal tube (ETT) into the glottis while using the GlideScope® devices. Several studies showed the success of the GlideScope® VL. However, there have been reports of problems, complications, including failure to intubate patients successfully. Laryngeal exposure is generally the simple part of the procedure, and conversely, tube delivery to the glottic opening and advancement into the trachea is sometimes not straightforward. Alekberli-Yarmush technique: Our novel technique for improving the GlideScope® intubation’s success requires preparation of the stylet and ETT before the intubation. Requirements are the following: any brand and model shapable ETT stylet, ETT, and lubricant. Furthermore, in the unexpected difficult airway scenario, VLs offer a useful rescue technique for failed DL intubation. Consequently, video laryngoscopy is now widely used to manage both expected and unexpected difficult endotracheal intubations in anesthetized patients.

Keywords: Airway, Difficult intubation, GlideScope, Laryngoscope, Videolaryngoscope.

Introduction
The video laryngoscope (VL) is a device that allows indirect laryngoscopy, or visualization of the vocal cords and related airway structures without a direct line of sight, and it is used to facilitate endotracheal intubation in cases of a suspected or unexpected difficult airway. With an improved laryngeal view, video laryngoscopy can facilitate better endotracheal intubation. Compared with conventional direct laryngoscopy (DL), video-assisted indirect laryngoscopy improves tracheal intubation’s first-attempt success rates and decreases intubation difficulty. Furthermore, in the unexpected difficult airway scenario, VLs offer a useful rescue technique for failed DL intubation. Consequently, video laryngoscopy is now widely used to manage both expected and unexpected difficult endotracheal intubations in anesthetized patients.

An acute-angle VL blade allows better visualization of anterior laryngeal structures than a more gently curved blade. Examples of devices with acute-angle blades include several GlideScope® products (Fig. 1) (Titanium, AVL and Spectrum, GlideScope® Go, Verathon Medical). The GlideScope® blade is oriented upward at a 60° angle, with the recessed wide-angle CMOS camera located one-third of the way from the blade’s distal tip. The GlideScope® VL provides direct visualization of the larynx in patients with a potentially difficult airway. A specialized rigid stylet or tracheal introducer should be used to guide the tip of the endotracheal tube (ETT) into the glottis while using the GlideScope® devices. The use of these devices without an introducer is contrary to the manufacturers’ recommendations and may require repeated attempts at laryngoscopy. The GlideRite® stylet (Fig. 2) (GRS; Verathon Medical) is placed into the ETT to help direct the ETT through the glottic opening. Several studies showed the success of the GlideScope® VL. However, there have been reports of complications, including failure to successfully intubate...
A Novel Special-shaped Stylet Technique for Intubation with GlideScope® VL Devices

Figs 1A to F: GlideScope® products. (A) GlideScope® screen; (B) AVL single-use blade; (C) AVL video camera and light source cable; (D) GlideScope® Go; (E) Titanium re-usable blades; (F) Spectrum single-use blades

Figs 2A and B: The GlideRite® specialized rigid stylet for GlideScope® intubation. (A) GlideRite® specialized rigid stylet; (B) Tube insertion with GlideRite®

Figs 3A to F: Steps (timeline A–F) of preparation of the unique shaped ETT with Alekberli-Yarmush technique
A Novel Special-shaped Stylet Technique for Intubation with GlideScope® VL Devices

With these devices, laryngeal exposure is generally the simple part of the procedure, and conversely, tube delivery to the glottic opening and advancement into the trachea is sometimes not straightforward. We describe a novel method using a special-shaped stylet to increase intubation success by using the GlideScope® VL devices.

**Description of the Novel Methods**

**Alekberli-Yarmush Technique**

Our novel technique for improving the GlideScope® intubation’s success requires preparation of the stylet and ETT before the intubation. Requirements are the following: any brand and model shapable ETT stylet (a device that allows the ETT to be stiffened and the shape molded as desired), ETT, and water-soluble lubricant.

**Preparation of the Stylet**

Lubricate stylet with a water-soluble gel, insert the stylet into ETT (Fig. 3A), and bend the stylet into the unique shape. Firstly bend the ETT into the two-dimensional circular C shape (Fig. 3B), then bend the tip again two-dimensionally, approximately 100–110° against the circular angle (Fig. 3C). For the final step, bend the tip toward the 3rd dimension medially proximally 45° (Fig. 3D). The final version of the special-shaped ETT showed in Figures 3D to F.

Endotracheal tube insertion is usually performed in our method, as the manufacturer recommends a four-step insertion technique while using the GlideScope®. However, holding the tube with two fingers, palm up, 2/3 of the way down the tube toward the tip, is different from the traditional technique.

First, the GlideScope® should be introduced into the midline of the oropharynx with the left hand. When the epiglottis is identified on the screen, the scope should be manipulated, and the tip of the blade should be put in vallecula and elevate the epiglottis to obtain the best view of the glottis (Fig. 4A). The ETT should then be guided into position under direct vision. The ETT should be hugging the undersurface of the tongue. When the distal tip of the ETT disappears from the direct view, it should be viewed on the monitor (Fig. 4B). In this time, rotation and angulation maneuvers are not required in our technique different than the traditional technique to direct the ETT through the glottis (Figs 4C to F). After visualizing the successful intubation, a stylet should be pulled out to remove easily from the ETT.

**Discussion and Conclusion**

Video laryngoscope devices can provide remarkably easy laryngeal exposure due to the video camera’s positioning and location. These devices are transforming airway management in many respects, both in difficult airway management and education. Although...
they bypass DL mechanics, all alternative devices create different potential challenges in getting the tube to the glottic opening and advancing the tube into the trachea. Acute-angled, unchanneled VLs like GlideScope® usually require stylets to aid tube delivery, but the stylet must be partially withdrawn to permit tube advancement. Tube rotation, use of a tube introducer, or using specialized ETs may also help with tube advancement. However, the special rigid stylet (Gliderite®) does not guarantee the success of intubation. In this regard, new and more unique shapes of the stylets may increase the success rate. The unique shape of the novel Alekberli-Yarmush technique described here (Fig. 3) may improve the GlideScope® intubation by decreasing the manipulation, rotation, and angulation maneuvers. Due to the medially 45° shaped tip of the ETT, the intubation may be smoother and more comfortable. The ET’s C type circular shape allows it to hug the tongue’s undersurface (Fig. 3) and slide quickly and smoothly to the laryngeal space.

Studies with large patient populations are needed to determine if the new technique is improving the GlideScope® intubation, better understand the mechanisms and the clinical significance, and ascertain whether this technique evolves into a useful method.

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