CLINICAL TECHNIQUE

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

Tural Alekberli[1], Leslie Yarmush[2]

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. Firstly, lubricate the stylet with a lubricant, insert the stylet into ETT, and bend the stylet into a unique shape. Firstly bend the ETT into the two-dimensional circular C shape, then bend the tip again two-dimensionally, approximately 100–110° against the circular angle. For the final step, bend the tip toward the 3rd dimension medially, proximally 45°. Endotracheal tube insertion is usually performed in our method, as the manufacturer recommends a four-step insertion technique when 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. To intubate using our novel technique, first, the GlideScope® should be introduced into the oropharynx's midline 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 vollecula and elevate the epiglottis to obtain the best view of the glottis. 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. 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. After visualizing the successful intubation, a stylet should be pulled out to remove easily from the ETT. The unique shape of the novel technique described here can 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 ETT's C type circular shape allows it to hug the tongue's undersurface and slide quickly and smoothly to the laryngeal space. Studies with larger patient populations are needed to determine if the new technique improves the GlideScope® intubation, better understand the mechanisms and the clinical significance, and ascertain whether this technique evolves into a useful technique.

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

Research and Innovation in Anesthesia (2021): 10.5005/jp-journals-10049-0108

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.[1] With an improved laryngeal view, video laryngoscopy can facilitate better endotracheal intubation.[2,3] Compared with conventional direct laryngoscopy (DL), video-assisted indirect laryngoscopy improves tracheal intubation's first-attempt success rates and decreases intubation difficulty.[4–6] Furthermore, in the unexpected difficult airway scenario, VLs offer a useful rescue technique for failed DL intubation.[7,8] 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.[9] The GlideRite® stylet (Fig. 2) (GRS; Verathon Medical) is placed into the ETT to help direct the ETT through the glottic opening.[10,11] Several studies showed the success of the GlideScope® VL.[12–15] However, there have been reports of complications, including failure to successfully intubate

[1,2]Department of Anesthesiology, Critical Care and Pain Medicine, Hadassah Medical Center, The Hebrew University, Jerusalem, Israel

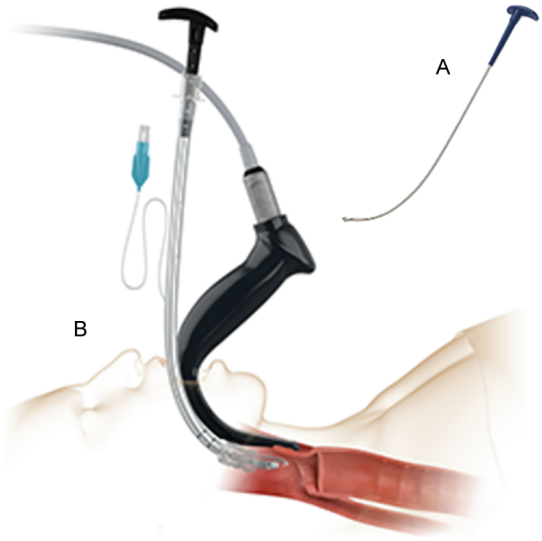
Corresponding Author: Tural Alekberli, Department of Anesthesiology, Critical Care and Pain Medicine, Hadassah Medical Center, The Hebrew University, Jerusalem, Israel, Phone: +972 504048435, e-mail: turalalek@gmail.com

How to cite this article: Alekberli T, Yarmush L. A Novel Special-shaped Stylet Technique for Intubation with GlideScope® Video Laryngoscope Devices. Res Inno in Anesth 2021;XX(X):1–4.

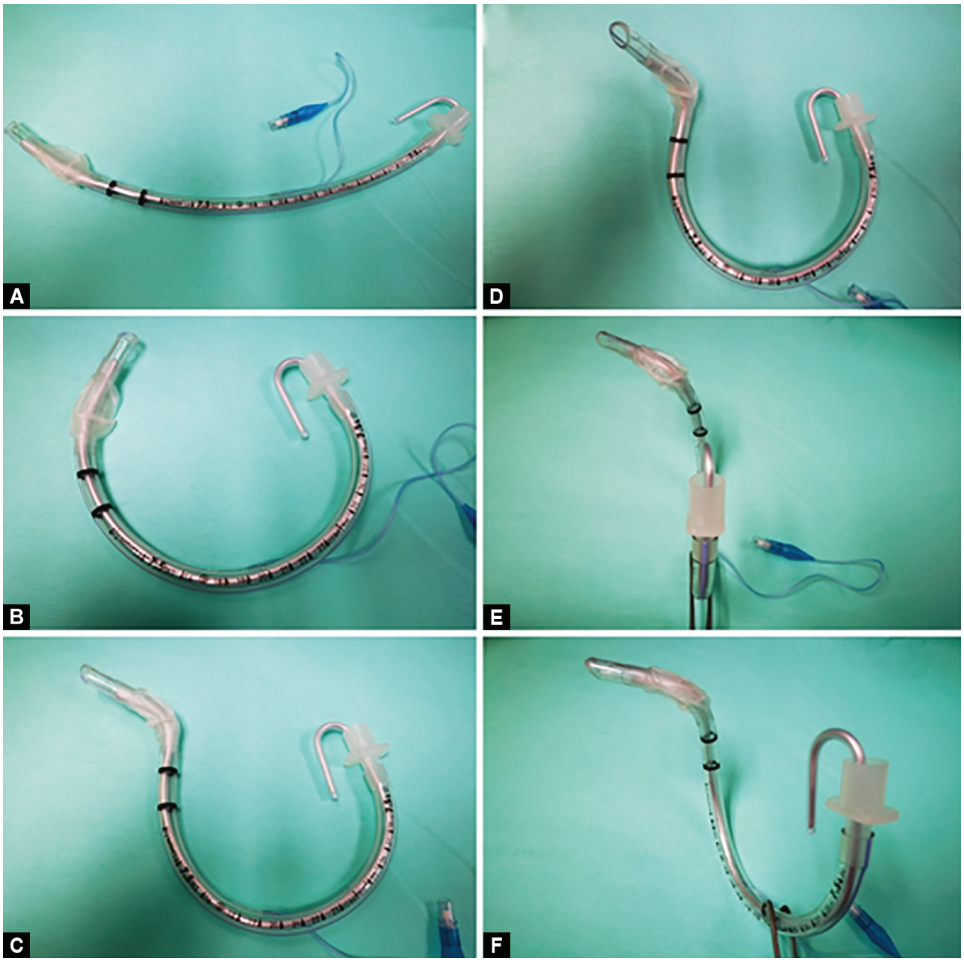
Source of support: Nil

Conflict of interest: None

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

patients.[16–19] 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.[20] 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

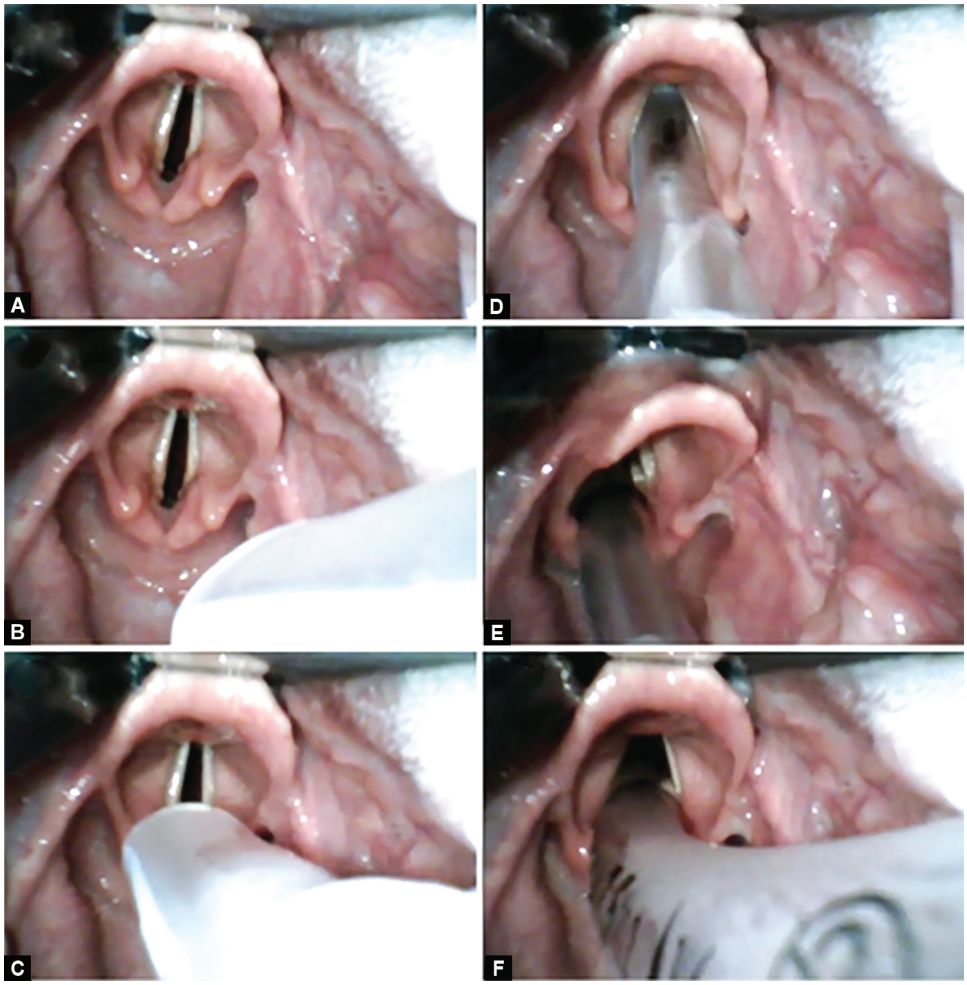
Lubricate stylet with a water-soluble gel, insert the stylet into ETT (Fig. 3A), and bend the stylet into the unique shape. Firstly bend the ETT into the two-dimensional circular C shape (Fig. 3B), then bend the tip again two-dimensionally, approximately 100–110° against the circular angle (Fig. 3C). 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 vollecula 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



Figs 4A to F: GlideScope® monitor views (timeline A–F) while intubating using the new Alekberli-Yarmush technique (special-shaped stylet technique)

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 ETTs 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 ETT'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.

References

1. Apfelbaum JL, Hagberg CA, Caplan RA, et al. American Society of Anesthesiologists task force on management of the difficult airway. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists task force on management of the difficult airway. Anesthesiology 2013;118(2):251–270. DOI: 10.1097/ALN.0b013e31827773b2.
2. Kaplan MB, Hagberg CA, Ward DS, et al. Comparison of direct and video-assisted views of the larynx during routine intubation. J Clin Anesth 2006;18(5):357–362. DOI: 10.1016/j.jclinane.2006.01.002.
3. Cooper RM, Pacey JA, Bishop MJ, et al. Early clinical experience with a new videolaryngoscope (GlideScope) in 728 patients. Can J Anaesth 2005;52(2):191–198. DOI: 10.1007/BF03027728.
4. Aziz MF, Dillman D, Fu R, et al. Comparative effectiveness of the C-MAC video laryngoscope versus direct laryngoscopy in the setting of the predicted difficult airway. Anesthesiology 2012;116(3):629–636. DOI: 10.1097/ALN.0b013e318246ea34.
5. Jungbauer A, Schumann M, Brunkhorst V, et al. Expected difficult tracheal intubation: a prospective comparison of direct laryngoscopy and video laryngoscopy in 200 patients. Br J Anaesth 2009;102(4):546–550. DOI: 10.1093/bja/aep013.
6. Teoh WH, Saxena S, Shah MK, et al. Comparison of three videolaryngoscopes: pentax airway scope, C-MAC, Glidescope vs the Macintosh laryngoscope for tracheal intubation. Anaesthesia 2010;65(11):1126–1132. DOI: 10.1111/j.1365-2044.2010.06513.x.
7. Aziz MF, Healy D, Kheterpal S, et al. Routine clinical practice effectiveness of the Glidescope in difficult airway management: an analysis of 2,004 Glidescope intubations, complications, and failures from two institutions. Anesthesiology 2011;114(1):34–41. DOI: 10.1097/ALN.0b013e3182023eb7.
8. Cavus E, Neumann T, Doerges V, et al. First clinical evaluation of the C-MAC D-Blade videolaryngoscope during routine and difficult intubation. Anesth Analg 2011;112(2):382–385. DOI: 10.1213/ANE.0b013e31820553fb.
9. van Zundert A, Maassen R, Lee R, et al. A macintosh laryngoscope blade for videolaryngoscopy reduces stylet use in patients with normal airways. Anesth Analg 2009;109(3):825. DOI: 10.1213/ane.0b013e3181ae39db.
10. Rai MR, Dering A, Verghese C. The GlideScope® system: a clinical assessment of performance. Anaesthesia 2005;60(1):60–64. DOI: 10.1111/j.1365-2044.2004.04013.x.
11. GlideScope® GVL and Cobalt Quick Reference Guide. Bothwell, WA: Verathon Medical Inc; 2009-2011. pp. 30–31.
12. Cooper RM. Use of a new videolaryngoscope (GlideScope®) in the management of a difficult airway. Can J Anaesth 2003;50(6):611–613. DOI: 10.1007/BF03018651.
13. Sun DA, Warriner CB, Parsons DG, et al. The GlideScope® video laryngoscope: randomized clinical trial in 200 patients. Br J Anaesth 2005;94(3):381–384. DOI: 10.1093/bja/aei041.
14. Marrel J, Blanc C, Frascarolo P, et al. Videolaryngoscopy improves intubation condition in morbidly obese patients. Eur J Anaesthesiol 2007;24(12):1045–1049. DOI: 10.1017/S0265021507000889.
15. Alekberli T, Holger F, Mimouni C, et al. Indications for use of video laryngoscopy and flexible fiberoptic bronchoscopy for difficult airway management in a tertiary referral center. Eur J Anaesthesiol 2019;36(57):251.
16. Curran C. Case report: oropharyngeal injuries with GlideScope® usage in two obese patients. Southern Afr J Anaesth Analge 2016;22(1):30–32. DOI: 10.1080/22201181.2015.1110403.
17. Magboul MA, Shaw J. The video laryngoscopes' blind spots and possible lingual nerve injury by the GlideRite® rigid stylet - case presentation and review of literature. Middle East J Anaesthesiol 2010;20(6):857–860.
18. Rodney JD, Ahmed Z, Gupta D, et al. Straight to video: tonsillar injury during elective GlideScope® assisted intubation in a pediatric patient with adenotonsillar hypertrophy. Middle East J Anaesthesiol 2015;23(1):101–104.
19. Malik AM, Frogel JK. Anterior tonsillar pillar perforation during GlideScope® video laryngoscopy. Anesth Analg 2007;104(6):1610–1611. DOI: 10.1213/01.ane.0000264321.04403.06.
20. Levitan RM, Heitz JW, Sweeney M, et al. The complexities of tracheal intubation with direct laryngoscopy and alternative intubation devices. Ann Emerg Med 2011;57(3):240–247. DOI: 10.1016/j.annemergmed.2010.05.035.