cessful in four of 20 patients in the DL group ($P < 0.05$, Chi-square test). In the remaining four patients, the second attempt resulted in successful endotracheal intubation. No patient experienced esophageal intubation in the AWS group, while one trainee performed an esophageal intubation at the first attempt of the DL group. The incorrect tube placement was identified immediately and endotracheal intubation was successfully established. No patient experienced oxygen desaturation during laryngoscopy.

This preliminary study suggests that, in comparison with DL, the AWS provides personnel training in airway management superior intubation conditions, resulting in less time to secure the airway, and a higher success rate of first-attempt correct endotracheal tube placement. There are several potential advantages of the AWS for novice laryngoscopists. First, an unobstructed view of the glottis is easily secured without alignment of oral, pharyngeal, and laryngeal axes, requiring minimal airway manipulation during the management of routine and difficult airways. Second, everyone can view the intubation. The built-in LCD monitor screen has a wide viewing angle and is readily visible from behind and from the side of the scope, allowing the supervisor and other individuals, apart from the laryngoscopist, to verify the tracheal intubation status. The target signal shown on the monitor is also helpful for teaching. Third, the AWS appears to require less operator skill. Our observations are not directly applicable to experienced operators, because it is rare to require more than 30 sec to secure the airway with experienced anesthesiologists even with the Macintosh laryngoscope.[2] However, none of the participants in this study had prior experience in using the AWS in patients. A short demonstration of the device and a brief practice with a manikin were the only requirements to perfect tracheal intubations. The AWS may be advantageous for individuals who are required to perform tracheal intubation only infrequently, such as emergency room staff. Fourth, the AWS does not require manipulations of a stylet to facilitate intubation. Stylet-related complications are avoidable.[3] Finally, the blade of the AWS is for a single-use device. This removes the potential risk of contamination and infection. Since our observations were drawn from a small number of examinations, further clinical studies are warranted to confirm these initial positive findings.

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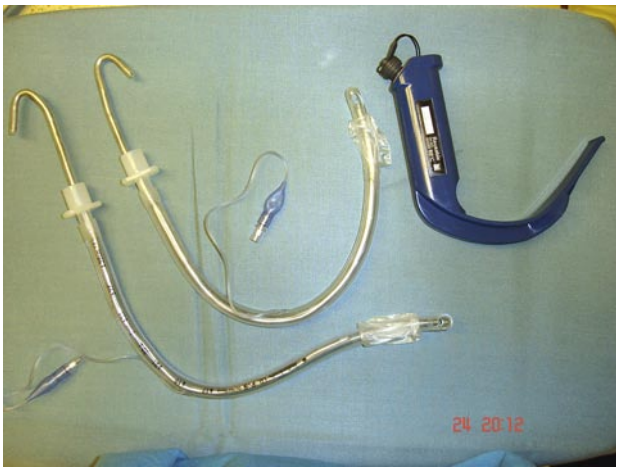
'Reverse loading' to facilitate Glidescope® intubation

To the Editor:
The two main challenges associated with endotracheal intubation using the Glidescope® videolaryngoscope have been identified as: 1) positioning the tip of the endotracheal tube (ETT) at the glottic opening, and 2) advancing the ETT off the stylet through the glottis into the trachea. In order to place the ETT at the laryngeal inlet Saturn Biomedical Systems™ (Burnaby, BC, Canada, now renamed Verathon™) recommend a 60° curvature to reproduce the curve of the Glidescope® blade.[1] This approach is advocated by Cooper.[2] Doyle *et al.* recommend a 90° "hockey stick configuration"[3] and Dupanovic *et al.* describe a 'gear stick' technique.[4] Other suggestions include U-shaped and J-shaped configurations – although these seem similar to the manufacturer's recommendation. Others have recommended using midline insertion of the blade and ETT, and slightly withdrawing or relaxing the elevation of the laryngoscope tip while applying external laryngeal pressure. Various adjuncts have been suggested and used, including the Mallinkrodt Satinslip® intubating stylet (Tyco Healthcare Group LP, Pleasanton, CA, USA), the Parker Flex-it-Stylet (Parker Medical, Englewood, CO, USA), a modified Eschmann guide, or a gum elastic bougie.

A second difficulty is that once positioned at the glottic opening, it can be difficult to advance the ETT off the stylet and forward into the trachea. The 60° angulation of the Glidescope® and the excellent 'upward' view this affords, improves glottic exposure. However, by placing a 60° curve or a 90° 'hockey stick' configuration in the styleted ETT means that the ETT will always have a tendency to advance ante-



FIGURE

riorly off the stylet, and thus become lodged in the anterior commissure, or stuck on a cartilaginous ring on the anterior tracheal wall. Rotating the tube at this point can help to free the obstruction, but rotating a styleted ETT is not very easy. We have been using a technique that reduces the incidence of problems when advancing the ETT. Hung *et al.* have previously described this technique for both Trachlight™ and Glidescope intubation[5] and we feel it warrants further discussion. We observe that most anesthesiologists use a 60° curvature, with the Satinslip® intubating stylet. Our method to overcome this obstruction is to load the ETT onto the stylet and lubricate in the same way, but to then bend the stylet in the direction opposite to the inherent memory of the ETT, i.e., the tube should be loaded and bent backwards against its natural curve. Thus, when the ETT is advanced off the stylet, or when the stylet is withdrawn, the ETT tip tends to angle more posteriorly, thus reducing the chance of impingement on the anterior glottis or anterior tracheal wall (Figure).

We assessed this approach by finely coating stylets with lubricating jelly (Triad Disposables Inc, Brookfield, WI, USA) prior to their insertion into size 7.5 ETT's (Hi-Lo®, Mallinkrodt, St Louis, MO, USA). The tube in the upper panel (Figure) was loaded normally along the curve of the inherent memory of the tube and bent to the exact curve of the glidescope blade. The tube in the lower panel (Figure) was loaded backwards against its inherent memory and bent in the same way. The stylets were both pulled back by 6 cm, to the proximal level of the cuff, to simulate stylet withdrawal and advancement of the ETT into the trachea. The difference in angle of advancement between the standard and reverse-loaded ETT can clearly be seen. This procedure was performed ten times and the average difference in angle of advancement between the two techniques was 70°. This maneuver may help to reduce the incidence of difficulty when intubating the trachea using the Glidescope®. To show a clinical difference would require a randomized controlled trial.

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