Maximizing the GlideScope[®] videolaryngoscope display using the video output port

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To the Editor,

Difficulties with tracheal intubation significantly contribute to the morbidity and mortality associated with anesthesia.^{1,2} The ideal device in a difficult airway scenario, especially an unanticipated difficult airway, is one that is designed to be used as a standard laryngoscope but also provides improved views of the larynx.¹ The GlideScope[®] videolaryngoscope (GVL; Verathon, Bothell, WA, USA) is a camera laryngoscope, which displays a colour view of the pharyngeal and laryngeal structures on a dedicated 7-in. liquid crystal display (LCD) monitor. Despite the excellent experience with this device in improving glottis visualization and achieving a high first-time endotracheal intubation success rate,³ there have been previous descriptions of difficulties directing and advancing the endotracheal tube through the vocal cords and reports of complications associated with its use.^{4,5} We have encountered two additional problems with the GVL. First, the screen has a tendency to reflect the operating room lights causing it to glare and therefore lessen the image quality. Second, when several anesthesia team members were required to assist with a difficult airway, optimal positioning of the mobile stand was cumbersome, making it difficult for some team members to see the 7-in. monitor. A key feature of the GVL system is its video output, which can be used to display the video on a separate screen. At our institution, each cardiothoracic operating room is equipped with the Black Diamond Video Distribution System[®] (Alameda, CA, USA), which permits the display of different sources of digital information in up to four

overhead 46-in. high definition (HD) 1080p LCD monitors (Fig. 1a, b). Herein we describe the use of an interface that simultaneously transfers and displays the GVL image on two of the overhead monitors.

We added three components to the GVL monitor to transfer and process the video: (1) a video output cable P/N 0600-0239 (Verathon, Bothell, WA, USA), which allows the connection to any NTSC-compatible device; (2) an SD-DVI converter (Black Diamond Video, Alameda, CA, USA); and (3) a digital video interfacing (DVI)-I dual link cable.

The video output cable allows the connection of the GVL video output (resolution 320 × 240) to the SD-DVI converter. The converter performs the video processing to provide a smooth clear HD video, and its output connects to a convenient DVI-I dual link wall plate connector via a 15-ft DVI cable (Fig. 1c). This HD video is transmitted to the video distribution system console where it can be selected for simultaneous display on the 46-in. HD monitors (model LN46A550P3F, Samsung Electronics America, Mount Arlington, NJ, USA).

In the first 20 cases, our initial experience with the system was excellent. Being able to enlarge the image better defines and identifies anatomic structures, and, due to the strategic position of the 46-in. HD screens, the images can be seen by all members of the anesthesia team during the procedure. The interface system is attached to the mobile stand such that only the connection to the wall plate is necessary to allow for immediate display of the image on the overhead monitors. Also, we have not observed any interference between the operating room lights and the 46-in. HD screens.

In conclusion, improving the image display can potentially increase the success rate of procedures and minimize associated complications. Furthermore, the GVL is

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◀ **Fig. 1 a** Floor plan of the cardiothoracic operating room depicting the position of the four overhead 46-in. high definition (HD) liquid crystal display (LCD) screens. (F-OS) = *Front* overhead screens; (B-OS) = *Back* overhead screens; (C) = Black Diamond Video Distribution System® console; (WP) = Digital video interfacing wall plate; (FD) = Front door. **b** View from the operating room front door showing the relationship between the anesthesiologist, the GlideScope® videolaryngoscope, and the back overhead screens. **c** The interface components: (1) Video output cable P/N 0600-0239; (2) SD-digital video interfacing (DVI) converter; and (3) Digital video interfacing (DVI)-I dual link cable

reconfirmed as an extraordinary teaching tool and could open opportunities for additional applications of the system as well as the development of new technologies.

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Conflicts of interest None declared.

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