Two-operator approach to improve eye–hand coordination using the GlideScope® videolaryngoscope

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To the Editor,

Although the GlideScope® videolaryngoscope (GVL) (Verathon, Bothell, WA, USA) has demonstrably improved visualization of the glottis, directing and advancing the endotracheal tube (ETT) through the vocal cords remains a problem.¹ Despite that several stylets, endotracheal tube configurations and maneuvers have been adopted to overcome this problem,¹ these solutions all rely upon a single operator to handle the GVL and simultaneously maneuver the ETT.

Unlike conventional laryngoscopy where the operator looks directly at the anatomic structures, during a procedure using the GVL, the operator must focus on the monitor. Such indirect viewing impairs eye–hand coordination,² thereby undermining the operator's ability to manipulate the ETT proficiently (Fig. 1a). On the other hand, using two operators, i.e., a videolaryngoscope or *camera operator* and an *ETT operator*, during the procedure reduces the number of tasks the ETT operator must perform, improving the visuo-motor dexterity.

At our institution, an interface³ was recently developed allowing us to improve GVL image size and quality by simultaneously transferring the image to two separate 46-inch high-definition 1080p liquid crystal display overhead monitors (model LN46A550P3F, Samsung Electronics America, Mount Arlington, NJ, USA). The interface allows two operators to be strategically positioned around the

patient, one operator to hold the GVL and the other to manipulate the ETT (Fig. 1b).

Our experience using this approach with the first ten patients has been excellent. First, since two monitors displayed the images, each operator had an uninterrupted view of the anatomic structures throughout the procedure. Second, although the ETT operator may have lost some degree of extra depth perception by not handling the GVL, the ETT could be maneuvered more proficiently because both of the operator's hands were free for the task. This freedom to maneuver proved especially valuable in three cases that required an additional tube rotation in order to advance the ETT into the trachea. In a fourth case, this approach allowed the ETT operator to insert a double lumen tube after a previous single operator had failed to fully rotate and advance the ETT into the trachea, although the operator had a clear view of the glottis. Finally, in situations where the GVL blade had to be repositioned to optimize the view, having a separate camera operator perform this task allowed the ETT operator to manipulate the tube without interruption.

This approach can potentially reduce the risk of oropharyngeal trauma associated with the GVL by minimizing or eliminating the *blind spot* during ETT insertion. Once the camera operator obtains the desired view, the ETT operator then inserts and advances the tube into the oropharynx while looking directly at the patient's mouth rather than at the monitor (Fig. 1c). The ETT operator redirects his attention toward the monitor to complete the intubation only after the camera operator confirms the tube's appearance on the monitor.

Coordinated assistance is not new to videolaryngoscopy; it has also demonstrated its advantages when the GVL is used.^{4,5} However, our initial experience goes a step further because two operators are in place from the onset of the

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Fig. 1 **a** The indirect manner of observing and manipulating disturbs eye–hand coordination. A single operator is not only confronted by an increased level of multi-tasking but is also placed in sub-optimal conditions to maneuver the endotracheal tube (ETT) because only one hand is available for this task. **b** Floor plan of the cardiothoracic operating rooms depicting the position of the two operators around the patient and their relationship with the overhead screens. The camera operator is at the patient's head and the ETT operator is to the patient's right. **c** By separating the videolaryngoscope handling and tube manipulation tasks between two operators, the ETT operator's level of dexterity is increased because both hands are available to maneuver the ETT. Continued verbal feedback between the operators has been essential in reducing the temporary *blind spot*, thus potentially reducing the risk of oropharyngeal trauma

procedure. This approach enhances the ETT operator's manual dexterity, potentially improving the success rate of intubation and decreasing its associated complications. Still, we recognize the need for further research to determine the precise impact that using the GVL may have on impairing eye–hand coordination.

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Conflicts of interest None declared.

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