



Original Contribution

Comparing the novel GlideScope Groove videolaryngoscope with conventional videolaryngoscopy: a randomized mannequin study of novice providers^{☆,☆☆}

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Abstract

Study Objective: To compare the GlideScope Groove (GG) with conventional GlideScope videolaryngoscopy (GVL) and direct laryngoscopy (DL) on intubation times, intubation attempts, and glottic visualization of an airway mannequin by medical students.

Design: Randomized crossover trial.

Setting: Intensive care unit of an academic tertiary-care hospital.

Participants: 34 medical students with no airway management experience.

Measurements: Each participant received standardized video instruction on all three laryngoscopes and was given 10 minutes to practice with each device. The participants had two attempts using DL, and then had two attempts each with either the GG or GVL in random order.

Measurements: Time-to-intubate the mannequin in seconds was recorded. Secondary outcomes were Cormack-Lehane grade and number of intubation attempts, also recorded.

Main Results: The median number of seconds required to successfully intubate the mannequin with DL, GVL, and GG were 17.4 seconds [interquartile range (IQR) 13.2 - 22.1], 17.7 seconds (IQR 14.9 - 21.0), and 21.7 seconds (IQR 15.4 - 37.0), respectively. No differences in time-to-intubate was noted among the three devices ($P = 0.45$). A Cormack-Lehane grade 1 view was obtained for 25 of 34 participants (74%) with DL, 32 of 34 participants (94%) with GVL, and 34 of 34 participants (100%) with GG. First-attempt intubation success was 30 of 34 participants (88%) with DL, 34 of 34

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^{☆☆} Conflicts of interest: none declared.

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participants (100%) with GVL, and 11 of 34 participants (32%) with GG. Using the GG, 6 of 24 participants (18%) required three attempts. More attempts were required for the GG than for DL ($P < 0.001$) or GVL ($P < 0.001$).

Conclusions: GG was not superior to DL or GVL in time-to-intubate an airway mannequin.

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1. Introduction

When performed by experienced providers in the elective operating room, intubation carries a low risk of complications [1]. In contrast, intubation of critically ill patients carries a much higher risk of severe life-threatening complications, which may occur in up to 28% of intensive care unit patients [2,3]. Multiple intubation attempts are associated with a three-fold increased risk of severe cardiopulmonary instability [3]. Furthermore, multiple attempts at intubation appear to be much more common when the first attempt is performed by a nonanesthesiology resident compared with their anesthesiology resident colleagues (62% vs 15%, respectively) [4]. Minimizing intubation attempts, particularly by novice providers, may help reduce complications in this high-risk patient population.

Videolaryngoscopes such as the GlideScope videolaryngoscope (GVL; Verathon Medical ULC, Burnaby, BC, Canada), incorporate a video camera near the end of the curved blade [5]. These devices have consistently resulted in an improved glottic view, particularly in patients with potential or simulated difficult airways [6]. However, this has not translated into increased first-attempt intubation success by expert providers [5-10]. A pilot randomized trial comparing videolaryngoscopy with direct laryngoscopy (DL) for the intubation of critically ill patients by novice providers demonstrated that multiple attempts were required in 63% of patients, regardless of the device used [11]. The failure to demonstrate improved clinical outcomes by novice providers despite improved glottic views is likely multifactorial in nature. The first mechanism is the hand-eye coordination required to bring the endotracheal tube (ETT) to the glottis [12]. The second postulated factor is the acute anterior angle of the ETT in relation to the tracheal axis, which complicates the passage of the ETT through the glottis [12,13]. Although these two limitations are minimized with experience, they may be more apparent in novice operators.

To address these issues, a new videolaryngoscope, the GlideScope Groove (GG), was developed by Verathon Medical ULC (Fig. 1). The GG incorporates a central channel on the anterior surface of the blade for placement of the ETT before laryngoscopy begins. During intubation, this feature brings the ETT automatically in line with the glottic opening once the glottic view is obtained. This novel device is predicted to alleviate the previously identified operator challenges in directing the ETT to the glottic opening during

intubation. As a result, the GG may be particularly beneficial to nonexpert providers.

Because of these favorable properties, we conducted a proof-of-concept randomized trial to assess if the GG indeed alleviated the problems associated with use of the GVL. The purpose of this study was to compare the GG with the GVL and direct laryngoscopy in times-to-intubate an airway mannequin in medical students.

2. Materials and methods

This manuscript reports on our randomized controlled trial in accordance with the CONSolidated Standards of



Fig. 1 GlideScope Groove videolaryngoscope (Verathon Medical ULC, Burnaby, BC, Canada). Note the central channel on the anterior surface of the blade for placement of the endotracheal tube prior to beginning laryngoscopy.

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