Archives of Anesthesiology and Critical Care (In Press); x(x): xx-xx.

Available online at http://aacc.tums.ac.ir

Research Article

Performance of a Portable Intubation Stylet Versus Direct Laryngoscopy: A Randomized Controlled Trial

Amir Sadrinia[1], Mohamadreza Neishabouri[1], Reza Shariat Moharari[2], Farhad Etezadi[2], Mohammadreza Khajavi[2], Atabak Najafi[2], Pejman Pourfakhr[2]*

[1]Department of Anesthesiology and Critical Care, Sina Hospital, Tehran University of Medical Sciences, Tehran, Iran.

[2]Anesthesia, Critical Care, and Pain Management Research Center, Tehran University of Medical Sciences, Tehran, Iran.

ARTICLE INFO

Article history:
Received 07 January 2026
Revised 28 January 2026
Accepted 11 February 2026

Keywords:
CamStylet;
Direct laryngoscopy;
Clinical trial;
Intubation time

ABSTRACT

Background: Portable video-assisted intubation devices may help bridge gaps in airway management when conventional video-laryngoscopes (VL) are not readily available. The CamStylet is a lightweight, smartphone-connected video stylet designed to provide real-time visualization without the need for external monitors.
Methods: In this randomized clinical trial, 180 adults undergoing elective surgery were allocated to direct laryngoscopy (DL) or laryngoscopy assisted by the CamStylet. Standardized anesthetic and intubation protocols were used. Intubation time, glottic view, first-attempt success, need for external laryngeal manipulation, and oxygen desaturation were recorded. Data from 176 patients were analyzed.
Results: Intubation time was slightly longer with the CamStylet, but first-pass success was high in both groups. The CamStylet provided a clearer glottic view and markedly reduced the need for external laryngeal pressure. Rates of desaturation and requirement for rescue videolaryngoscopy were low and comparable between groups. No major adverse events occurred.
Conclusion: Although the CamStylet added a few seconds to intubation time, it improved visualization and reduced the need for external manipulation. Its portability and rapid setup may make it a practical adjunct in settings where VLs are limited or unavailable. Further evaluation in difficult airway scenarios is warranted.

Introduction

Airway-related complications remain among the most serious contributors to adverse perioperative outcomes in anesthetic practice globally. Despite advances in airway devices, unexpected difficulty with laryngoscopy continues to occur in a small but clinically significant proportion of anesthetic cases, with reported failure rates remaining low but consequential [1-2]. When airway access is not secured promptly, the consequences, including severe neurological injury, cardiovascular instability, or escalation to invasive airway rescue techniques, can be catastrophic, particularly in environments where advanced airway tools are not immediately accessible [3]. A range of anatomical and patient-specific factors, including restricted mouth opening, diminished neck mobility, obesity, and previous head and neck surgery or radiotherapy, may render individuals susceptible to challenging laryngoscopy. However, a considerable proportion of difficult airways present without warning [4]. In these situations, repeated laryngoscopy attempts substantially increase the risk of complications such as dental trauma, soft tissue injury, airway edema, and hemodynamic instability [5-6]. Therefore, it is very important to have reliable, easy-to-use tools that improve visualization and speed up intubation in many different

The authors declare no conflicts of interest.
*Corresponding author.
E-mail address: pourfakhr@gmail.com
DOI:

clinical settings. Over the last two decades, video-laryngoscopes (VLs) and video-assisted intubation stylets have become valuable alternatives to conventional direct laryngoscopy (DL). These devices consistently improve glottic visualization and first-attempt success rates, especially in both predicted and unanticipated difficult airway conditions [7-8]. Nevertheless, their widespread adoption has been hindered by several practical limitations: high acquisition and maintenance costs, the need for external monitors or bulky hardware, and limited portability. Such constraints may restrict routine availability in resource-limited centers, prehospital environments, emergency departments, or situations where rapid deployment is essential [9].

To fill these gaps, the CamStylet, a new small Wi-Fi-enabled video intubation stylet, has been made. This device has a small camera and an LED light source that can be adjusted at the end. It sends live images wirelessly to a smartphone or tablet. Because it is light and semi-flexible, it can be carried in a pocket and turned on in seconds. This makes it a potentially very useful tool when there are unexpected airway problems where time and mobility are important.

Numerous studies have assessed alternative video stylets, including the Bonfils®, Trachway®, and OptiScope®; however, many of these systems continue to be costly, inflexible, or reliant on specialized video equipment [10-12]. There is a clear need for devices that are cheap, portable, and have better visualization. The CamStylet may help with this by giving clinicians a better view of the glottis while still allowing them to use DL, which could mean less need for external laryngeal manipulation and safer, faster airway management.

The present study was designed to compare the performance of the CamStylet with conventional DL in adult patients undergoing tracheal intubation for elective surgery. We hypothesized that, despite a potential modest increase in intubation time attributable to device handling and visualization steps, the CamStylet would enhance glottic visualization, elevate first-attempt success rates, and diminish dependence on external laryngeal maneuvers. By looking at these clinically important endpoints, this trial wants to find out if this portable video stylet can be a useful addition to modern airway management, especially in places where standard VLs are not available or are hard to use.

Methods

Study design and setting

This randomized, controlled, parallel-group clinical trial took place at Sina Hospital, Tehran University of Medical Sciences, from 2023 to 2024.

The study was conducted in accordance with the protocol, which received review and approval from the institutional ethics committee (approval number: IR.TUMS.SINAHOSPITAL.REC.1402.043). The trial was registered at a clinical trials registry (registration ID: IRCT20191023045213N2).

Participants

Adult surgical patients aged 18 years or older who were scheduled for elective procedures under general anesthesia necessitating orotracheal intubation with an endotracheal tube of internal diameter ≥7.0 mm were evaluated for eligibility.

Eligibility Criteria

Patients were eligible for enrollment if they were aged 18 years or older, had an American Society of Anesthesiologists (ASA) physical status of I to III, and were scheduled for elective surgery requiring endotracheal intubation with an endotracheal tube size of at least 7.0 mm. Furthermore, all participants provided written informed consent before inclusion.

Patients were excluded from the study for any of the following reasons: a predicted difficult airway, defined as a mouth opening of less than 3 cm, restricted cervical spine motion, or a history of cervical spine surgery or radiotherapy. Additional exclusion criteria included the need for an endotracheal tube smaller than 7.0 mm, known upper airway pathology such as tumors, abscesses, or trauma, a clinical need for rapid sequence induction due to aspiration risk, current pregnancy, or if the patient declined to participate.

These criteria ensured a homogenous elective surgical population while avoiding confounding by extreme airway conditions.

Randomization and Allocation

Participants were randomized to one of two study arms using variable block sizes of 2, 4, and 8 to maintain allocation balance. Randomization sequences were generated by a statistician not involved in clinical management, and assignments were concealed in sequentially numbered, sealed, opaque envelopes. The envelope was opened only after induction of anesthesia to prevent allocation bias.

Blinding of operators was not feasible due to the nature of the devices; however, data collectors who recorded time and intubation metrics were not involved in group allocation. They were instructed not to interfere with the intubation process.

Study Groups

DL Laryngoscopy Group (Control): Intubation was conducted utilizing a standard Macintosh laryngoscope (blade size 3 or 4 as necessary) and a conventional malleable stylet. CamStylet Group (Intervention):

The Macintosh laryngoscope was used to intubate the patient, and the portable Wi-Fi-enabled video intubation stylet (CamStylet) was put inside the endotracheal tube.

The laryngoscope was mainly used to move the tongue, and the CamStylet's camera system, shown on a smartphone, was used to see the glottis.

Device Description

The CamStylet consists of a semi-flexible 40-cm shaft (diameter 6 mm) containing a 5.5-mm distal camera surrounded by six adjustable LED lights. The device connects via Wi-Fi to a smartphone application, providing real-time visualization without requiring an external monitor.

The stylet was shaped according to manufacturer recommendations into a gentle 60–70° curvature at the distal end. Before each intubation, the image quality, LED brightness, and Wi-Fi connection were checked.

(Figure 1,2) illustrate the CamStylet and its positioning within the endotracheal tube.

Figure 1- Camstylet with WIFI dongle

Figure 2- Tip of Camstylet in endotracheal tube

Anesthesia and Intubation Protocol

To maintain consistency, all patients underwent a standardized anesthesia protocol:

- Monitoring: ECG, non-invasive blood pressure, pulse oximetry, and capnography.
- Preoxygenation: 3 minutes of 100% oxygen.
- Induction: Contained fentanyl 1–2 μg/kg, propofol 2–2.5 mg/kg, and rocuronium 0.6 mg/kg for neuromuscular relaxation
- Mask ventilation: Performed for 90 seconds after neuromuscular blockade.
- Operator training: Before the study was initiated, each operator did at least 10 supervised intubations with the CamStylet to reduce the effects of the learning curve.

All intubations were performed by anesthesia attendings or senior residents with at least 3 years of clinical experience.

Definitions and Measurements

To ensure reproducibility, variables were defined as follows:

Primary Outcomes

- Intubation Time: Interval from insertion of the laryngoscope blade between the lips until successful confirmation of end-tidal CO_2.
- First-Attempt Success: Successful placement of the endotracheal tube on the first attempt without mask ventilation in between.

Secondary Outcomes

- Cormack-Lehane (CL) grade: Based on DL view (control group) or combined direct + video view (CamStylet).
- BURP Maneuver requirement: Use of backward, upward, and rightward pressure.
- Desaturation: SpO_2 < 90% at any point during intubation.
- Number of attempts: A new attempt was defined as a full withdrawal of the laryngoscope from the mouth.
- Need for rescue video laryngoscope.

Failed Intubation Protocol

If intubation was unsuccessful after two attempts, the operator proceeded to VL as a rescue technique, following institutional difficult airway guidelines.

Data Collection

Data were recorded on a standardized checklist including demographics (age, sex, BMI, ASA class), airway characteristics (Mallampati score, thyromental distance, mouth opening, neck mobility), intubation variables, and adverse events (dental trauma, mucosal bleeding, airway injury).

Data collectors were not involved in performing the intubation and were trained to use uniform timing methods.

Sample Size Calculation

The sample size calculation relied on detecting a clinically significant difference in intubation time of 5 seconds between groups, with an assumed standard deviation of 10 seconds (derived from preliminary observations). The minimum sample size needed was 86 patients per group (172 total), with a power of 80% and $\alpha = 0.05$. One hundred eighty patients were enrolled to make up for possible dropouts.

Statistical Analysis

We used SPSS version 26 (IBM Corp., Armonk, NY) to look at the data. Continuous variables were represented as mean ± SD and analyzed using Student's t-test or the Mann-Whitney U test as suitable. We used the chi-square

or Fisher's exact test to compare categorical variables. A P value of less than 0.05 was seen as statistically significant.

Results

A total of 180 patients were enrolled in the study. Four patients were excluded from the final analysis due to protocol deviations or incomplete data, leaving 176 participants for statistical evaluation (89 in the DL group and 87 in the CamStylet group). (Figure 3) presented the consolidated Standards of Reporting Trials (CONSORT) diagram of the study.

Baseline Characteristics

The two groups were comparable in demographic and airway-related variables. Age, sex distribution, BMI, ASA physical status, Mallampati score, thyromental distance, mouth opening, and neck mobility showed no statistically significant differences between groups, indicating successful randomization and balanced baseline characteristics (Table 1).

Primary Outcomes

Intubation Time

The mean intubation time was significantly longer in the CamStylet group compared with the DL group (CamStylet: 35.81 ± 7.44 s vs. DL: 30.07 ± 6.38 s, $p < 0.001$). Although the time difference was statistically significant, no episodes of oxygen desaturation due to prolonged intubation occurred, and the clinical impact of this delay appeared minimal (Table 2).

First-Attempt Success Rate

First-pass success was high in both groups, with a slightly higher rate in the DL group (CamStylet: 95.5% vs. DL: 91.95%, $p = 0.057$). This difference did not reach statistical significance (Table 2).

Secondary Outcomes

Cormack–Lehane grade

The distribution of CL grades differed significantly between the two groups (Table 2).

The CamStylet group demonstrated a markedly better laryngeal view, with grade III visualization occurring in only 2% of intubations, compared with 7% in the DL group.

Grade I–II views constituted the majority of laryngoscopic findings in both arms. This difference in CL grade distribution was statistically significant ($p = 0.046$), indicating superior glottic visualization with the video-assisted stylet.

Similarly, the proportion of patients exhibiting a difficult pharyngo-epiglottic (Ph/E) view during laryngoscopy did not differ significantly between groups (Camstylet: 23.0% vs. DL: 21.3%; $p = 0.793$), indicating comparable laryngoscopic conditions at the time of device use.

Need for External Laryngeal Manipulation (BURP Maneuver)

The BURP maneuver was required far less frequently in the CamStylet group (CamStylet: 1.1%, DL: 14.6%, $p = 0.001$).

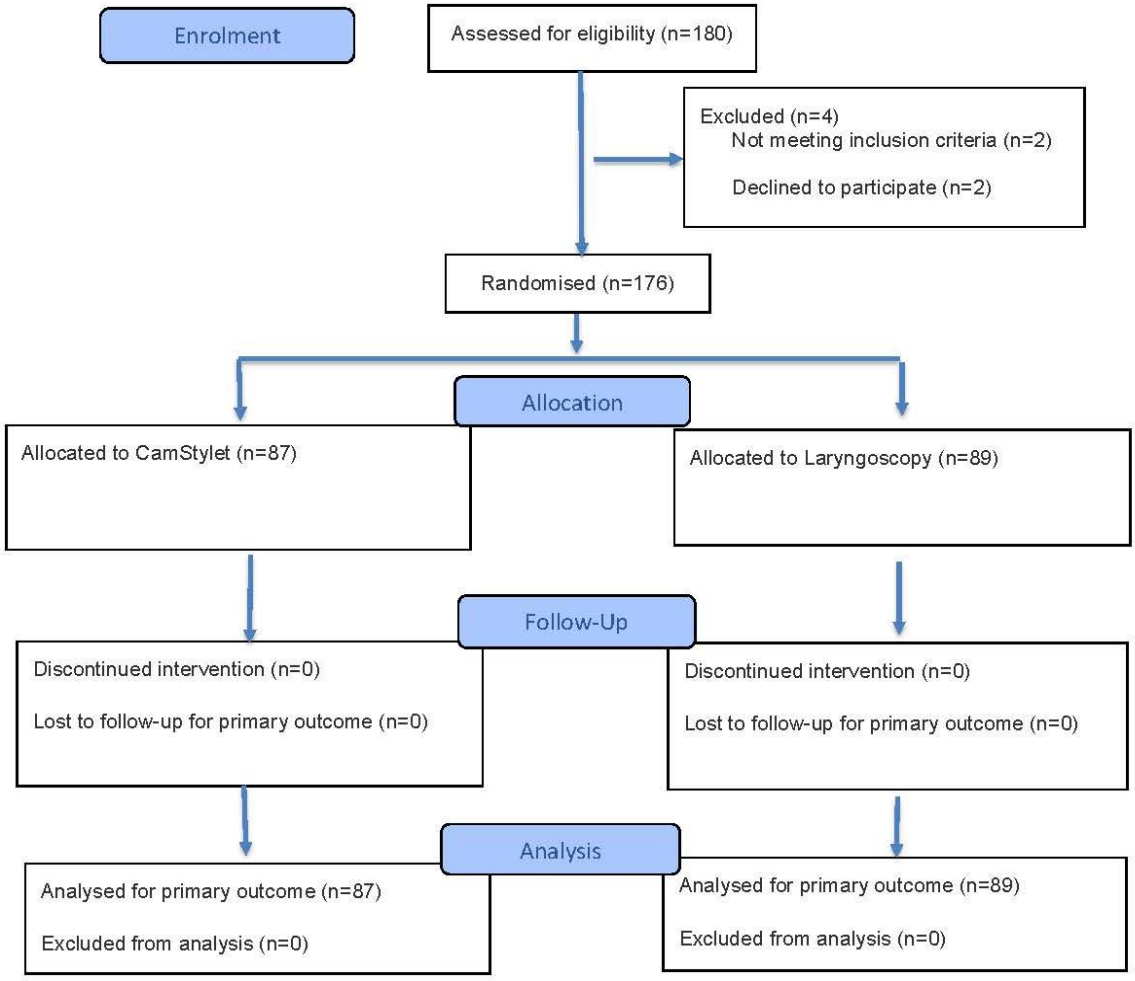

Figure 3- Consolidated Standards of Reporting Trials (CONSORT) diagram of the study

Table 1- Baseline Characteristics of Participants

Variable		Direct laryngoscopy (n=89) Mean ± SD; N(%)	Camstylet (n=87) Mean ± SD; N(%)	P value
Age, years; mean ± SD		44.18 ± 10.91	42.73 ± 11.26	0.389
Sex; n (%)	M	53 (60.91)	37 (41.57)	0.024
	F	34 (39.1)	52 (58.4)	
BMI, kg/m²; mean ± SD		26.40 ± 2.73	26.46 ± 3.53	0.900
Mallampati class; n(%)	I	35 (39.3)	35 (40.2)	0.987
	II	42 (47.2)	40 (46.0)	
	III	12 (13.5)	12 (13.8)	
MO, cm; mean ± SD		3.91 ± 0.43	3.85 ± 0.40	0.401
TMD, cm; mean ± SD		6.59 ± 0.65	6.64 ± 0.63	0.627
Limited neck mobility; n(%)		6 (6.7)	3 (3.4)	0.497
OSA history; n(%)		7 (7.9)	9 (10.3)	0.567
Dentition present; n(%)		86 (96.6)	85 (97.7)	1
Type of surgery; n(%)	General	25 (28.1)	24 (27.6)	0.21
	Neurosurgery	25 (28.1)	16 (18.4)	
	Orthopedic	23 (25.8)	34 (39.1)	
	Urology	16 (18)	13 (14.9)	

Abbreviations: ASA: American Society of Anesthesiologists physical status; BMI: Body Mass Index; MO: Mouth Opening; TMD: Thyromental Distance; OSA: Obstructive Sleep Apnea; M/F: Male/Female

Table 2- Comparison of Intubation-Related Parameters Between Groups

Outcome		Direct Laryngoscopy (n=89)	Camstylet (n=87)	P value
Intubation Time; s		30.07 ± 6.38	35.81 ± 7.44	<0.001
First Attempt Success; n(%)		80 (91.95)	85 (95.5)	0.057
Difficult Ph/E View; n(%)		19 (21.3)	20 (23.0)	0.793
Need for External Laryngeal Manipulation (BURP); n(%)		13 (14.6)	1 (1.1)	0.001
Desaturation (SpO_2 < 90%); n(%)		5 (5.6)	2 (2.3)	0.444
Need for VL; n(%)		6 (6.7)	2 (2.3)	0.278
CL grade; n(%)	I	38 (42.7)	34 (39.1)	0.046
	IIa	41 (46.1)	37 (42.5)	
	IIb	4 (4.5)	14 (16.1)	
	III	6 (6.7)	2 (2.3)	
CL grade change after BURP		5 (5.6)	1 (1.1)	0.211

Abbreviations: S: second; CL grade: Cormack–Lehane grade; BURP: Backward, Upward, Rightward Pressure; SpO_2: Peripheral Oxygen Saturation; VL: Video-laryngoscope; Ph/E view: Pharyngo–Epiglottic view; ETT: Endotracheal Tube

This indicates better natural alignment and visualization during laryngoscopy when using the CamStylet (Table 2).

Desaturation Episodes

Rates of oxygen desaturation were low and comparable between groups (Camstylet: 2.3% vs. DL: 5.6%, p = 0.444). No intubation attempts were stopped due to hypoxia (Table 2).

Rescue Video-laryngoscopy

The need for rescue VL use was minimal and did not differ significantly between groups (Camstylet: 2.3% vs. DL: 6.7%; p = 0.278).

All rescue interventions were successful, and no escalation to fiberoptic or surgical airway techniques was required (Table 2). However, the numerical reduction in the CamStylet group suggested a potential trend toward decreased escalation to advanced airway devices.

Adverse Events

No major airway complications, such as dental trauma, mucosal tears, or airway bleeding, were recorded in either group. Minor transient airway irritation was observed in a few patients but showed no between-group differences (Table 2).

Discussion

The present trial compared a compact, smartphone-connected video stylet with standard DL in routine elective surgical patients. The principal differences we observed were the improved view of the glottis and the substantially reduced need for external laryngeal pressure when the CamStylet was used. These advantages are consistent with what clinicians expect when the camera is positioned at the distal tip of a stylet rather than relying solely on the laryngoscopist's line of sight. Because the prevalence of difficult pharyngo-epiglottic view was similar in both groups, differences in intubation performance cannot be attributed to unequal baseline airway difficulty. According to the 2022 ASA Difficult Airway Guidelines, comparable pre-intubation airway characteristics are essential to ensure unbiased evaluation of airway devices and prevent misinterpretation of device-related benefits [2].

Although intubation took a few seconds longer with the CamStylet, this delay did not appear clinically meaningful. Operators frequently reported that once the camera image was centered, advancing the tube required less force and less manipulation than with DL. This experience mirrors what has been described with earlier video-assisted stylet systems such as the Bonfils®, Trachway®, and OptiScope® devices, all of which rely on indirect visualization and have demonstrated similar advantages in both simulated and clinical settings [7,10–11]. The difference in the current device is the absence of bulky optical components or the need for a dedicated external monitor, which has been a practical limitation of some of those earlier tools.

One of the more striking findings was the reduction in the need for a BURP maneuver. In many cases, the glottis became visible as soon as the stylet reached the oropharynx, and only minor adjustments were needed to center the cords on the screen. Reducing the need for external pressure is not trivial; fewer hands are required, and the risk of inadvertently worsening the view or applying excessive dental pressure is lower. Repeated manipulations and forceful adjustments have traditionally been associated with greater mucosal and dental trauma [12], so minimizing these maneuvers may translate to a gentler and safer intubation.

The improved CL grading observed in the CamStylet group aligns with previous evidence supporting enhanced visualization with video-assisted intubation stylets. These devices provide indirect glottic visualization and therefore reduce reliance on achieving strict anatomical axis alignment during laryngoscopy required during conventional DL. Clinical trials have similarly reported that video stylets reduce the proportion of high-grade CL views and facilitate easier endotracheal tube advancement.

Biro et al. demonstrated that a video-optical stylet significantly improved the laryngeal view compared with

a conventional malleable stylet in simulated difficult airways [8]. Yung Gu et al. reported superior glottic exposure and reduced optimization maneuvers when using a video stylet versus a Macintosh laryngoscope in adult elective surgery [13]. Likewise, randomized data indicate that video-assisted stylet intubation improves glottic visualization and intubation performance (e.g., higher first-pass success and clearer glottic view) in routine surgical and difficult airway scenarios compared with conventional techniques [14]. Our results are consistent with these findings, as the CamStylet yielded a clear shift toward lower CL grades, with only 2% of patients exhibiting grade III views compared with 7% in the DL group. This enhanced laryngeal visualization provides a plausible explanation for the markedly reduced requirement for external laryngeal manipulation observed in the CamStylet group. Although the difference did not reach statistical significance, the lower need for rescue VL in the Camstylet group aligns with previous evidence indicating that improved primary glottic visualization reduces the likelihood of escalation to advanced airway devices. National audit data have emphasized that multiple intubation attempts and progressive escalation of airway techniques are closely associated with adverse outcomes [1].

The longer intubation time seen with the Camstylet likely reflects normal early-use behavior. Early increases in intubation duration are consistent with the familiar adaptation period reported when clinicians transition to indirect visualization devices [14-15].

The portability of the CamStylet deserves emphasis. Conventional VLs provide excellent views, but they may not always be immediately available, particularly outside the operating room or in lower-resource environments. A device that fits inside a coat pocket, requires no external screen, and can be activated through a smartphone may help bridge this gap. From the users' perspective, the setup time was far shorter than with a standard VL, and the lightweight design made it easy to handle.

The device is not without limitations. The camera size restricts its use to tubes ≥7.0 mm, which excludes many smaller adults and nearly all pediatric patients. Patients with severely restricted mouth opening or limited cervical motion were not included in this trial, so the results cannot be generalized to those scenarios. Finally, we also did not evaluate the device in the presence of blood or heavy secretions, both of which can impair visibility on any camera-based system.

Despite these constraints, the trial suggests that a simple, relatively low-cost Camstylet can meaningfully improve visualization during intubation without increasing complications. The combination of portability, good image quality, and minimal setup makes the device attractive for emergency carts, remote areas, and even teaching environments. Further studies in more challenging airways, both predicted and unanticipated, would help clarify the device's broader clinical role.

Conclusion

In summary, the CamStylet provided a clearer view of the glottis and reduced the need for external laryngeal pressure compared with standard DL. Although intubation took slightly longer, the difference did not appear to carry clinical consequences. The device's small size, wireless image transmission, and rapid setup make it a practical option when conventional VLs are unavailable or when a portable backup is needed. While further work is necessary to define its performance in difficult airway situations, this trial suggests that the CamStylet can serve as a useful adjunct for routine airway management.

Acknowledgment

We are indebted to the research and development center of Sine Hospital for their support.

AI Declaration

This work utilized QuillBot®'s AI-powered grammar-checking and paraphrasing tools to improve readability and correct linguistic errors. All AI-generated edits were manually evaluated and adjusted by the authors to ensure alignment with the intended meaning and academic integrity. The authors confirm that AI was not used to generate hypotheses, analyze data, or draw conclusions.

References

[1] Cook TM, Woodall N, Frerk CO. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: anaesthesia. Br J Anaesth. 2011; 106(5):617-31.

[2] Apfelbaum JL, Hagberg CA, Connis RT, Abdelmalak BB, Agarkar M, Dutton RP, et al. 2022 American Society of Anesthesiologists practice guidelines for management of the difficult airway. Anesthesiology. 2021; 136(1):31-81.

[3] Higgs A, Cook TM, McGrath BA. Airway management in the critically ill: the same, but different. Br J Anaesth. 2016; 117 Suppl 1:i5-i9.

[4] Shiga T, Wajima Z, Inoue T, Sakamoto A. Predicting difficult intubation in apparently normal patients: a meta-analysis of bedside screening test performance. Anesthesiology. 2005; 103(2):429-37.

[5] Mort TC. Complications of emergency tracheal intubation: immediate airway-related consequences: part II. J Intensive Care Med. 2007; 22(4):208-15.

[6] Michailidou M, O'Keeffe T, Mosier JM, Friese RS,

Joseph B, Rhee P, et al. A comparison of video laryngoscopy to direct laryngoscopy for the emergency intubation of trauma patients. World J Surg. 2015; 39(3):782-8.

[7] Aziz MF, Dillman D, Fu R, Brambrink AM. Comparative effectiveness of the C-MAC video laryngoscope versus direct laryngoscopy in the setting of the predicted difficult airway. Anesthesiology. 2012; 116(3):629-36.

[8] Biro P, Weiss M, Gerber A, Pasch T. Comparison of a new video-optical intubation stylet versus the conventional malleable stylet in simulated difficult tracheal intubation. Anaesthesia. 2000; 55(9):886-9.

[9] Mazères JE, Lefranc A, Cropet C, Steghens A, Bachmann P, Pérol O, et al. Evaluation of the Bonfils intubating fibrescope for predicted difficult intubation in awake patients with ear, nose, and throat cancer. Eur J Anaesthesiol. 2011; 28(9):646-50.

[10] Abdullah HR, Li-Ming T, Marriott A, Wong TG. A comparison between the Bonfils Intubation Fiberscope and McCoy laryngoscope for tracheal intubation in patients with a simulated difficult airway. Anesth Analg. 2013; 117(5):1217-20.

[11] Chen IW, Li YY, Hung KC, Chang YJ, Chen JY, Lin MC, et al. Comparison of video-stylet and conventional laryngoscope for endotracheal intubation in adults with cervical spine immobilization: A PRISMA-compliant meta-analysis. Medicine (Baltimore). 2022; 101(33):e30032.

[12] Mort TC. Emergency tracheal intubation: complications associated with repeated laryngoscopic attempts. Anesth Analg. 2004; 99(2):607-13.

[13] Gu Y, Zhou Q, Zhou H, Liu M, Feng D, Wei J, et al. A Randomized Study of Rigid Video Stylet versus Macintosh Laryngoscope for Double-Lumen Endobronchial Tube Intubation Assistance in Thoracoscopic Pulmonary Surgery. J Clin Med. 2023; 12(2):540.

[14] Zhang T, Zhao KY, Zhang P, Li RH. Comparison of video laryngoscope, video stylet, and flexible videoscope for transoral endotracheal intubation in patients with difficult airways: a randomized, parallel-group study. Trials. 2023; 24(1):599.

[15] Khajavi M, Kazeroni R, Ramezani R, Biderafsh A, Kianpour P, Neishaboury M. Tracheal intubation with GlideScope vs. Sanyar video laryngoscopes in adults with predicted difficult intubation: a non-inferiority clinical trial. Anaesthesiol Intensive Ther. 2025; 57(1):80-6.