

Successful Tracheal Intubation With Airway Scope After Failure With McGrath

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The use of video laryngoscopy is growing in patients with anatomical factors suggestive of a difficult airway. This case report describes the successful tracheal intubation of a 54-year-old female patient with limited mouth opening scheduled for third molar extraction under general anesthesia. The Airway scope (AWS) along with a gum-elastic bougie was used to secure the airway after failed direct laryngoscopy and video laryngoscopy using the McGrath MAC with an X-blade. The AWS has a J-shaped structure in which the blade approximates the curvature of the pharynx and larynx. This blade shape makes it easy to match the laryngeal axis with the visual field direction, enabling successful tracheal intubation even for patients with limited mouth opening. A major key to successful video laryngoscopy is to select a video laryngoscope based on the anatomical characteristics of patients with a difficult airway.

Key Words: Video laryngoscopes; McGrath MAC; Airway Scope; Tracheal intubation.

Video laryngoscopes have gained popularity as intubation devices to manage difficult airways. The Airway Scope AWS-S200NK (AWS; Nihon Kohden) is a channeled video laryngoscope (VL) that has a built-in charge-coupled device camera and a liquid crystal display monitor. It has a polycarbonate resin thermoplastic (Lexan) disposable blade that mounts over the optical image bundle.¹ An endotracheal tube (ETT) can be inserted or preloaded into the channel on the curved blade. In contrast, the McGrath MAC MODEL AO3 (McGrath; Covidien) is a nonchanneled VL that is structurally similar to the classic Macintosh (Mac) blade of a traditional laryngoscope.

Here, we report a case of successful tracheal intubation using the AWS and a gum-elastic bougie (GEB) in an adult female patient with a difficult airway (Cormack-Lehane classification grade IV) after failed intubation with a McGrath VL. Written permission to publish the details of this case report was obtained from the patient.

CASE PRESENTATION

A 54-year-old woman (height 166 cm, weight 44 kg, body mass index 16.0 kg/m²) diagnosed with bilateral pericoronitis of the lower third molars was scheduled for extraction of the third molars under general anesthesia. One year previously, she had undergone a total hysterectomy under general anesthesia that included a noteworthy difficult tracheal intubation. The patient's maximal mouth opening was 27 mm, which was suspected to be caused by unknown/undiagnosed temporomandibular joint disorder, and her thyromental distance was 58 mm. In addition, she was classified as Mallampati IV during her airway assessment and had difficulty keeping her mouth open during dental treatment. The patient's medical history included dysautonomia, irritable bowel syndrome, and functional dyspepsia, for which she was prescribed clonazepam (15 mg/d), domperidone (10 mg/d), trimebutine (300 mg/d), acotiamide (100 mg/d), and magnesium oxide (990 mg/d). She denied any known drug allergies. Her preoperative clinical examination, urinalysis, chest radiography, electrocardiography, and respiratory function tests were otherwise normal.

Standard noninvasive American Society of Anesthesiologists monitors and an electroencephalography monitor (SedLine, Masimo) were placed, and a 22-gauge peripheral intravenous (IV) catheter was placed

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into the dorsum of the left hand. Following preoxygenation, general anesthesia was induced with a continuous IV infusion of remifentanyl 0.3 $\mu\text{g}/\text{kg}/\text{min}$, propofol target-controlled infusion at 5 $\mu\text{g}/\text{mL}$, and an IV bolus of rocuronium 10 mg. After adequate mask ventilation was confirmed, an additional dose of rocuronium 20 mg was administered, and tracheal intubation with a standard-shaped ETT with a spiral-wound reinforcing wire (Shiley, Medtronic) was attempted under direct laryngoscopy with a Mac #3 blade. However, the vocal cords and epiglottis could not be visualized (Cormack-Lehane classification grade IV). Tracheal intubation under VL with the McGrath X-blade was then attempted, but the vocal cords could not be visualized, although the epiglottis was.

Thereafter, tracheal intubation under VL was reattempted using the AWS with the spiral reinforced ETT preloaded into the blade's side channel. Although the epiglottis was visualized with this alternative VL device (Cormack-Lehane classification grade IIa), it was still difficult to introduce the ETT into the glottis. Therefore, a GEB was supplementally used to guide the ETT through the glottic opening. The GEB was successfully inserted into the glottis, and the ETT advanced along the GEB and to the trachea (Figure 1).

The operation was finished uneventfully, and sugammadex 200 mg was administered for neuromuscular blockade reversal. After confirmation of spontaneous respiration and recovery of consciousness, the patient was extubated. The duration of the surgical operation and anesthesia was 137 and 180 minutes, respectively. The patient was discharged 5 days after the operation due to paresthesia of the left inferior alveolar nerve.

DISCUSSION

In this case, we succeeded in tracheal intubation using VL with the AWS combined with a GEB for a patient with limited mouth opening and shorter thyromental distance after failed intubation with a traditional laryngoscope and using a McGrath VL. Under direct laryngoscopy with a traditional laryngoscope, the glottis can be directly visualized when the 3 axes of the airway (oral, pharyngeal, and laryngeal axis) are aligned.^{2,3} In contrast, alignment of the 3 axes is not necessary when using VL because the glottis can be visualized through the camera lens and monitor.^{4,5}

In this case, the AWS and a GEB were selected after the previous failed intubations, including with the McGrath VL. The main difference between the 2 VL systems is the shape of the blade: the McGrath blade is slightly curved like a classic Mac laryngoscope blade, whereas the AWS blade has a J-shaped structure that

Figure 1. Lateral View of the Patient After Successful Orotracheal Intubation.



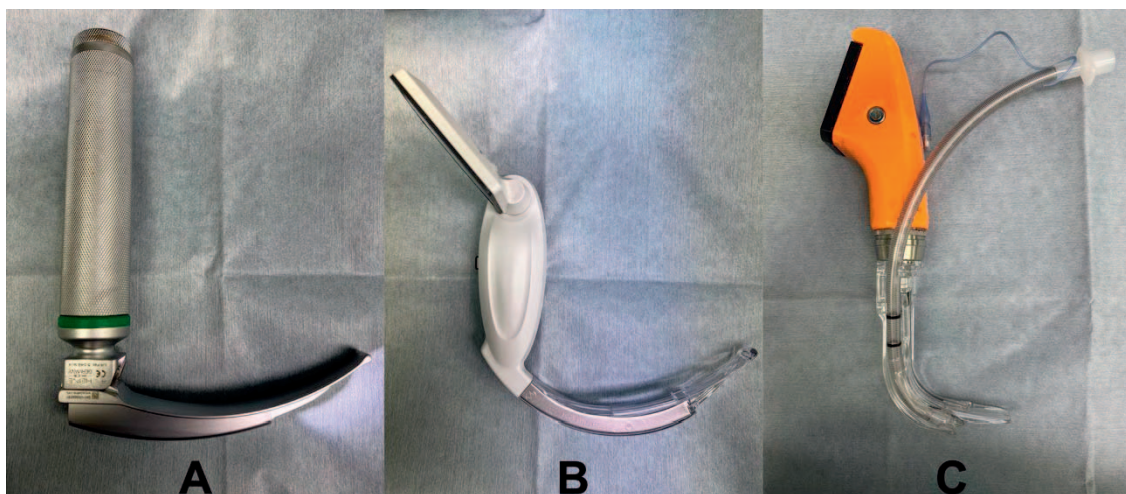
The patient's thyromental distance was 58 mm. Successful intubation was confirmed by capnography and the patient's thoracic motions.

resembles the curvature of the pharynx and the larynx⁶ (Figure 2). The AWS was reported to have higher success rates for tracheal intubation than the McGrath in patients with restricted cervical movements.²

In tracheal intubation using a VL, the key to successful intubation is to match the laryngeal axes with the visual field direction (VFD).² However, in patients with limited mouth opening (ie, this patient) or restricted cervical spine movement, a slightly curved blade, such as the McGrath, will not be able to align the VFD with the laryngeal axis without lifting the epiglottis, resulting in failed intubation. On the other hand, the AWS has an advantage for tracheal intubation in those types of patients because the J-shaped blade easily enables the alignment of the VFD and laryngeal axis.² In addition, differences in the soft-tissue manipulation produced by the McGrath versus the AWS may affect the success rate of tracheal intubation. According to the instructions in the package insert of the McGrath, it lifts the epiglottis indirectly by advancing the blade tip into the epiglottic vallecula. In contrast, the AWS lifts the epiglottis directly, making it easier to visualize the vocal cords.¹

However, there may be some cases in which the McGrath is easier to use for intubation than the AWS. Because the AWS has a bulky blade design (18-mm thickness), it may be more difficult to insert the blade in patients with significant limited mouth opening than the McGrath X-blade, which has a thinner design (12-mm thickness). In addition, the bulky channeled AWS blade may also interfere with manipulation of the ETT using Magill forceps during nasotracheal intubation.⁷

Although intubation with a flexible fiberoptic bronchoscope is considered the gold standard for patients with difficult airway,⁸ a previous study reported that

Figure 2. Traditional and Video Laryngoscopes.

(A) Traditional laryngoscope with a Macintosh blade. (B) McGrath MAC VL with the X-blade. (C) Airway Scope with an ETT preloaded into its guiding channel.

fiberoptic intubation (FOI) required significantly longer time than VL intubation using the AWS and McGrath (86-93 seconds in the FOI group vs 23-29 seconds in the AWS group and 20-25 seconds in the McGrath group).⁹ Because the patient's interincisal distance was 27 mm and it was possible to insert the VL blades, video laryngoscopy was used for this patient to reduce the time for tracheal intubation following failed direct laryngoscopy.

CONCLUSION

We successfully intubated a patient with a difficult airway using the AWS combined with a GEB for guidance after failed intubation with the McGrath. The McGrath is a useful VL device for difficult intubation; however, if intubation with the McGrath is not successful, an alternative VL with a different shape, such as the AWS, may be more ideal. It is essential to select more effective VL systems according to the anatomical characteristics of patients with a difficult airway.

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