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Case Report Open Access

Failure of the Airway Scope to Visualize the Glottis: Two Case Reports

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Introduction

The AirWay Scope® (AWS, Hoya-Pentax, Tokyo, Japan) is a video laryngoscope for tracheal intubation that provides an excellent view of the glottis without requiring alignment of the oral, pharyngeal, and laryngeal axes through the use of an anatomically curved blade (PBlade®). It has been demonstrated that the AWS can achieve tracheal intubation with a high success rate in patients with difficult intubation [1]. It has also been demonstrated that the AWS is useful for difficult intubation with restricted cervical movement [2,3], and requires less extension of the cervical spine [4,5,6]. However, we encountered two cases of difficult airways with severely impaired cervical movement, in which an AWS could not visualize the patients' glottises.

Case Reports

Case 1

A 61-year-old woman, 140 cm, 38 kg, presented for emergency laparotomy due to colon perforation. She had a past history of rheumatoid arthritis (RA) for 50 years, and diabetes mellitus for several years. She had been confined to a bed in a nursing home for years, and her joints not only in the limbs but also in the neck were contractured. Preoperative physical examination revealed severely limited cervical movement and Mallampati class 4 with her interincisor distance 22mm. A difficult intubation was anticipated. Sedated awake intubation with the AWS was planned. Her SpO_2 was 96% under 5 L/min of oxygen administration through a face mask. No premedication was administered. In the operating room, first, topical anesthesia with 4% lidocaine was applied to the oropharynx using a hand nebulizer under oxygen administration (10 L/min) though a face mask and a nasal cannula. Next, incremental doses of fentanyl (100μg in total) and midazolam (1 mg in total) were given intravenously until level 2-3 sedation on the Ramsay scale was achieved. Then, the blade was inserted successfully, although it was considerably tight. On the monitor, no recognizable structure other than the posterior wall of the pharynx—i.e., glottis, epiglottis, or arytenoids—was visible, and the laryngeal view, proposed by Suzuki et al. [7], was grade 4. Consequently the AWS failed to intubate. After that, nasal intubation with a bronchofiberscope was attempted. Following the preparation of a nostril with epinephrine (×5000) and lidocaine jelly, nasotracheal intubation with a bronchofiberscope was successfully performed. There was no severe desaturation during the entire process of securing the airway. Stoma construction surgery was performed uneventfully. The endotracheal tube was not removed after the surgery, because the patient required ventilatory support due to concomitant respiratory failure. The patient died 2 months later from multiple organ failure secondary to sepsis.

Case 2

A 67-year-old woman, 136 cm, 40 kg, presented for an elective revision of right total knee arthroplasty due to loosening. The patient had a history of RA for 30 years, and had undergone occipitocervical fusion (Occi-C7) 15 years previously (Figure 1). Preoperative physical examination revealed that it was almost impossible for her to flex or extend her neck, and that her oropharyngeal view was Mallampati class 4 with her interincisor distance 20 mm. A difficult airway was anticipated, and sedated awake intubation with the AWS was planned. No premedication was administered. In the operating room, topical anesthesia with 4% lidocaine was applied into the oropharynx using a hand nebulizer under oxygenation (5 L/min) with a nasal cannula. Then, incremental doses of fentanyl (100μg in total) and midazolam (2 mg in total) were given intravenously until achieving level 2-3 sedation on the Ramsay scale. After that, only the blade loaded with a tracheal tube was barely inserted, because the main body of the AWS hindered insertion of the blade into the oral cavity, as it touched the patient's chest. Then, the main unit of the AWS was connected to the blade. It was almost impossible to maneuver the blade inside. The laryngeal view, proposed by Suzuki et al. [7], was grade 4, resulting in failure to visualize the glottis on the monitor. Consequently, nasal intubation with a bronchofiberscope was performed successfully. The surgery was uneventful. After surgery, in order to confirm that she could breathe without any difficulty, a tube exchanger (Airway Exchange Catheter®,

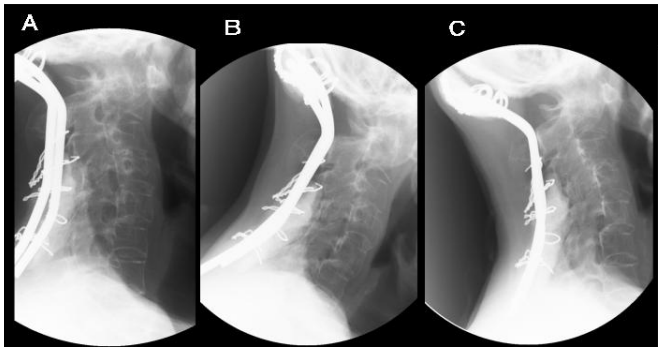

Figure 1: Lateral cervical radiograph of the case 2. (A) Neutral position; (B) Maximum flexion; (C) Maximum extension. Note no recognizable flexion or extension movement in the upper cervical spine due to occipitocervical fusion.

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Cook, USA) was inserted into the tracheal tube and left there when the tracheal tube was removed. Then, the tube exchanger was removed.

Discussion

It has been demonstrated that the AWS can achieve tracheal intubation with a high success rate in patients with difficult intubation [1]; also that it requires less cervical spine extension. [4,5,6] Takenaka et al. reported that the cervical movement was even less with an aid of gum elastic bougie [8]. But, of course, the glottis must be visualized at least a part on the screen to utilize the bougie. In both of the present cases, not even the epiglottis could be located with the AWS. Asai reported 3 cases of successful tracheal intubation using the AWS after intubation with bronchofiberscope failed in patients whose neck movements were severely restricted with halo vests [2], presenting the exact opposite scenario to those in the present cases. This discrepancy may have been caused by the suitability or not of the blade size for the patients; however, the heights of the patients were not given in his reports.

The movement of the upper cervical spine influences the degree of mouth opening substantially. As long as the interincisor distance is slightly wider than the blade (18mm), the blade can be inserted in the oral cavity. But maneuvering the AWS to get a clear view of the glottis, i.e., adjusting the depth of the blade and aligning the camera's view site toward the glottis at the same time, requires cervical movement. If only the jaw joints' movement is compromised without any trouble in the neck movement, such as ankylosis of the mandible, it is easier to maneuver the blade [9]. But in cases in which cervical spine movement is severely impaired, it appears to be more difficult, especially when the blade is placed more shallowly, presumably in short patients. The more shallowly the blade is placed, the more the upper cervical spine needs to be extended with the AWS tilted headward. In the present study, both patients had remarkably short statures. In such patients, it appears that the AWS must be tilted headward in order to visualize the glottis, placing the blade more shallowly, which requires substantial movement in the upper cervical spine due to the blade's natural curve.

We chose the AWS for sedated awake intubation in the first place for several reasons. First, it is easier to operate, and possibly less traumatic compared to the bronchofiberscope, because with the AWS the tracheal tube passage into the glottic aperture can be clearly observed; in contrast, a bronchofiberscope is a "blind" technique when the tracheal tube is advanced into the trachea. Second, the AWS has been reported to require less cervical movement [2-6]. However, the AWS may not be suitable for certain individuals as described above. One possible predicting measure may be to place the blade against the side of the patient's face with its tip at the thyroid cartilage level to check if the size is suitable. Further reliable screening methods to predict difficult cases for AWS use should be proposed and evaluated.

In case 1, the patient's neck movement was restricted not only in an extension-flexion way, but also in rotation. She could not face the front with her neck contractured in the right rotation position. This appears to be another factor causing failure to locate the glottis with the AWS. Since the blade is relatively bulky and the intubation direction is fixed by the incorporated tube channel, the AWS appears to have this kind of limitation in cases with anatomical variations in the larynx.

In both cases, the usage of a neuromuscular blocking agent would not have improved the glottic visualization, because in case 1 the degree of contracture did not change after administration of rocuronium during surgery and in case 2 the patient had her cervical spine fused (Figure 1).

Conclusion

Although the blade of the AWS has an anatomically curved shape, it has only one fixed size. Both patients presented with extremely limited cervical movement and short statures. In such patients, it may be difficult to adjust the depth of the blade and visualize the glottis with the AWS.

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