Case Report

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The use of the Sanuki airway™ in three patients with suspected difficult airway

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Abstract

The Sanuki airway is a single-use intubation oral airway designed for fiberoptic bronchoscope intubation. Sanuki airway has a bite block function and a wide lumen for the tracheal tube to pass through. Here, three cases are reported in which Sanuki airway was used for oral fiberoptic bronchoscope intubation. Case 1 is a patient who presented with reduced mouth opening and intraoral edema due to facial bone fracture. Case 2 is a patient who suffered from severe neck stiffness and had reduced mouth opening due to systemic psoriatic arthritis. Case 3 is a patient who suffered from multiple facial traumas and was in a full-stomach state. In all patients, advancing the tip of the bronchofiber into the larynx using Sanuki airway was possible under dexmedetomidine sedation, which contributed to the successful tracheal intubation. Using Sanuki airway may be considered an option for oral fiberoptic bronchoscope intubation in patients anticipated with difficult airways.

Keywords

Sanuki airway, difficult airway, anesthesia, fiberoptic bronchoscope intubation

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Introduction

During the induction of general anesthesia, face-mask ventilation is usually performed after the termination of the patient's spontaneous breathing and tracheal intubation is performed after adequate oxygenation is restored and ensuring appropriate anesthesia depth is achieved. However, for patients with possible difficulty using face-mask ventilation or at risk of aspiration, awake tracheal intubation rather than intubation after the induction of anesthesia should be considered.[1]

Traditional laryngoscopy or video laryngoscopy is usually used for awake tracheal intubation, but problems such as restricted mouth opening make it difficult. In such situations, although fiberoptic bronchoscope (FOB) intubation is occasionally used to advance the bronchoscope along the midline without any obstructions by the intraoral structures, it is sometimes challenging. To make it easier, insertion aids are used to smoothly introduce the fiberscope into the oropharynx.[2,3] Several intubating airways as insertion aids are available.[4] Among them, the Ovassapian airway (Teleflex Inc., NC, USA) (Figure 1), the Williams airway (SunMed Inc., MI, USA), and the Berman airway (Vital Signs, NJ, USA) are widely studied as typical devices.[3,5,6] However, there is limited information of comparisons in severe difficult intubation cases. In addition, to the best of our knowledge, the Ovassapian airway, which has been the standard intubating airway, is no longer being sold in Japan as of 2021.

The Sanuki airway™ (SAW; Fuji Medical Inc., Tokyo, Japan) (Figure 1) released in 2016 in Japan is a single-use intubation oral airway designed for FOB intubation. It has a bite block function and a wide lumen (13 mm × 17 mm at its orifice) for a tracheal tube to pass through it. As far as we know, no reports of the clinical use of SAW exist, despite its outstanding design. Herein, three cases are reported in which SAW was used for oral FOB intubation before the induction of general anesthesia.

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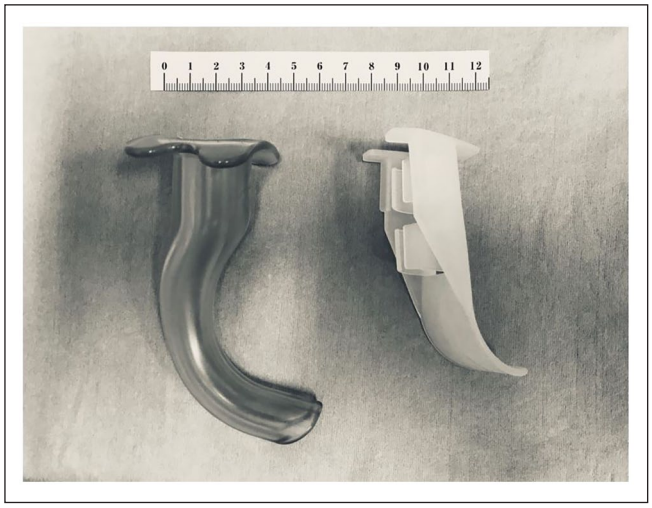

Figure 1. The Sanuki airway (left) and the Ovassapian airway (right) in cm.

Case presentations

A written informed consent was obtained from each patient for the publication of this case report.

Case 1

An 18-year-old boy (height, 170 cm; weight, 68 kg) was scheduled to undergo surgery for severe facial injury, including fracture of the nasal bone, right zygoma, and bilateral maxilla. The patient presented with an edematous oral cavity and a 2-cm inter-incisor distance. His Mallampati score was IV, and the thyromental distance was 7 cm. Both nostrils were packed with gauze due to continuous nasal hemorrhage. Dexmedetomidine (loading of 0.5 μg/kg for 5 min followed by 0.6 μg/kg/h) was administered, and his tongue and pharynx were sprayed with 4% lidocaine. SAW was inserted under moderate sedation (i.e. purposeful response to tactile stimulation) smoothly, and the larynx was directly detected below the tip of the airway. The trachea was then intubated with a 7-mm ID tube via the FOB, and general anesthesia was introduced.

Case 2

A 33-year-old woman (height, 165 cm; weight, 50 kg) with a history of systemic psoriatic arthritis was scheduled to undergo laparoscopic ovariectomy at a different hospital. However, performing mask ventilation after the induction of anesthesia was difficult, and oral and nasal tracheal intubation using McGrath® video laryngoscope (Medtronic, Minneapolis, MN, USA) and an FOB and the placement of i-gel (size #3, Intersurgical Ltd, Wokingham, England) were not possible probably due to her neck stiffness, narrow pharynx, and/or glossoptosis, even by three experienced anesthesiologists. After anesthetic recovery, the surgery was canceled, and she was referred to our hospital, where an open surgery was scheduled. Because she had systemic arthritis, she was not able to extend her neck. Her Mallampati score was IV, and the inter-incisor distance and the thyromental distance were 1.9 cm and 5.5 cm, respectively. Epidural anesthesia was attempted before the induction of general anesthesia; however, it proved to be futile due to ossification of the interspinal spaces and/or ligaments. Under minimal sedation (i.e. normal response to verbal stimulation) with dexmedetomidine (loading of 0.5 μg/kg for 5 min followed by 0.7 μg/kg/h), the tongue and pharynx were sprayed with 4% lidocaine and SAW was inserted. Although complete insertion of SAW was not possible because the front and rear length of the SAW flanges were longer than her inter-incisor distance, the larynx was visualized using FOB. General anesthesia was introduced after successful intubation with a 6-mm ID tube (Figure 2).

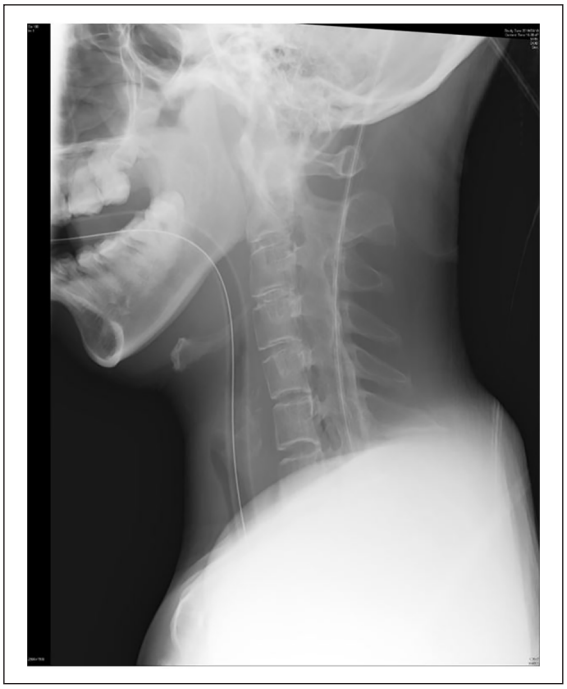

Figure 2. Lateral view of the neck X-ray of the patient after tracheal intubation. She was not able to extend her neck any further.

Case 3

A 64-year-old man (height, 165 cm; weight, 50 kg) with multiple facial traumas and an eyeball rupture after being attacked by a bear was scheduled to undergo surgery in a full-stomach state. His entire face, particularly the nose, was severely damaged, and bag-mask ventilation was considered impossible. We were unable to evaluate his Mallampati score, and the inter-incisor distance and the thyromental distance were 2.5 cm and 7.5 cm, respectively. Under light sedation with dexmedetomidine (loading of 0.3 μg/kg for 5

Figure 3. The picture of the patient after FOB intubating using the SAW.

min followed by 0.4 μg/kg/h), the tongue and pharynx were sprayed with 4% lidocaine, and SAW was inserted. The SAW opening was located immediately above the larynx, and FOB intubation using a 7-mm ID tube was easily performed (Figure 3), following which general anesthesia was induced.

Discussion

When difficulties using direct laryngoscopy are predicted, alternative intubation techniques and devices such as video laryngoscopy, the use of a bougie, intubation through a supraglottic airway, and FOB intubation are recommended.[1] El-Boghdadly et al.[7] reported that mouth opening <3.5 cm was the single most common indication cited during the performance of awake FOB intubation. In our cases, we did not choose to use traditional laryngoscopy or video laryngoscopy, because of the limited mouth opening (all cases) and information about previous failures (Case 2). In addition, performing FOB intubation after the induction of general anesthesia was risky, because it was expected to take a long time due to oral edema or morphological abnormalities, resulting in hypoxia due to the absence of spontaneous breathing and bag-mask ventilation. Therefore, intubation was performed under spontaneous breathing using SAW as an insertion aid.

During the oral FOB intubation process, a bite block is usually used to avoid damage to the FOB when the patient is not under general anesthesia, the use of the bite block is limited when the patient has difficulty in opening his or her mouth. In Cases 1 and 2, the diameters of the bite blocks (22 mm) routinely used for oral FOB intubation at our hospital were smaller than the inter-incisor distances of the patients. The external diameter (anterior–posterior diameter) of the tubular part of the SAW was 17 mm, and if the patient has this much of inter-incisor distance, it might be possible to insert it as well in our cases. If the oral cavity volume is limited due to swelling of the tongue or mucosa, advancing the FOB while maintaining its position at the center of the airway becomes difficult, resulting in failure in intubation. In our cases, the tip of the SAW was inserted smoothly just above the larynx and it functioned as a guide for FOB insertion without any problem.

According to the sales promotion material of SAW[8] (available only in Japanese), SAW is generally used as a guide for oral FOB intubation or gastric tube insertion, an airway for bag-mask ventilation, or as a route for sputum suctioning with an FOB under spontaneous breathing. Although the usefulness of SAW in patients with spontaneous breathing is not emphasized in this article, the patients in this report were able to tolerate the placement of SAW under the administration of intravenous dexmedetomidine and local lidocaine spray. However, the risk of vomiting reflex or laryngospasm should be addressed.

Several intubating airways are available.[4] Among them, the Ovassapian airway (Teleflex Inc.) (Figure 1), the Williams airway (SunMed Inc.), and the Berman airway (Vital Signs) are widely studied as typical devices.[3,5,6] In terms of the difference in structure, the distally curved portion of the Williams airway and Ovassapian airway[9] has no anterior and posterior walls, respectively. Conversely, the Berman airway has both walls. In addition, the SAW has a tubular structure that prevents the tracheal tube or fiberscope tip from compression by the mucosal tissue or contamination by secretions. In anesthetized patients there were no signs of possible difficult tracheal intubation after undergoing elective surgeries, Greenland et al.[3] reported that Williams airway was more likely to provide an unobstructed path for bronchoscopy than Ovassapian airway. The same study group also showed that the Williams airway was more likely to provide an unobstructed path than the Berman airway.[6] However, in patients whose oral cavity volume is limited due to swelling of the tongue, mucosa, or bleeding, the difference in structure may influence the usefulness of these devices. However, no comparison studies have been published to date; therefore, future studies including the SAW are warranted.

Recent guidelines by Difficult Airway Society state that there is no evidence or consensus among experts demonstrating the superiority of one route if both nasal and oral are feasible.[10] However, in our cases, oral intubation was chosen from the beginning because nasal intubation was not appropriate due to trauma (Cases 1 and 3) and there was a history of unsuccessful attempts even by skilled anesthesiologists (Case 2). If nasal intubation is feasible in a given situation, it should be an option without adherence to oral FOB intubation.

Conclusion

This case report indicates that the use of SAW could be considered as an option for oral FOB intubation under sedation in patients with anticipated difficult airways.

Authors' note

This work was carried out at the Fukushima Medical University Hospital, 1 Hikarigaoka, Fukushima 960-1295, Fukushima, Japan.

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Author contributions

K.K. and S.O. treated the patient and wrote the manuscript. S.T., Y.S., K.Y., C.H., and T.H. treated the patient and helped to design the case report. All authors reviewed and approved the final draft.

Declaration of conflicting interests

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Ethical approval

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Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

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