Difficult Nasal Intubation Using Airway Scope[®] for a Child With Large Tumor

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We report a case of difficult nasal intubation utilizing a Pentax-Airway scope[®] AWS-100. A 4-month-old female with a rapidly growing melanotic neuroectodermal tumor was scheduled for resection under general anesthesia. The tumor was a large rubbery mass located in the middle of the mandible. For nasal intubation using the AWS, guidance of the tube toward the glottis was attempted using pediatric Magill forceps. Although we could hold the tube with the Magill forceps, it was difficult to insert the tube into the trachea due to the limited space in her hypopharynx. We then used a standard laryngoscope with a Miller straight blade for direct visual laryngoscopy and successfully intubated the patient with the aid of the pediatric Magill forceps. We often experience difficulty navigating a nasal endotracheal tube toward the glottis even when a clear glottic view is obtained with video laryngoscopes, especially in children with a small oropharyngeal space. However, some reports have been shown that video laryngoscopes are useful for intubation of the difficult airway and causes less stress to the upper airway than direct visual laryngoscopy. Video laryngoscopy can be an excellent way to provide nasal intubation in some but not all children.

Key Words: Nasal intubation; Difficult airway; Airway scope[®].

Many studies have shown that the video laryngoscope is associated with a high rescue intubation success rate and that it is more commonly used than the other rescue techniques. Ono et al¹ reported that for nasal intubation in adults, video laryngoscopy was found to be useful. Another study showed that trainees using video laryngoscopes could perform nasal intubation faster than with direct visual laryngoscopes on manikins.² However, video laryngoscopy does not always lead to success in intubation. Here, we report a case of difficulty in guiding the tracheal tube for nasal intubation using an Airway scope[®] (AWS-100, Pentax Corporation, Tokyo, Japan; hereafter referred to as “AWS”) for a child with large oral tumor.

CASE PRESENTATION

A 4-month-old female patient with a height of 69 cm, a weight of 5.7 kg, and a rapidly growing melanotic neuroectodermal tumor (Figure 1) was scheduled for resection under general anesthesia. She had no underlying disease or perinatal abnormality and she did not snore during sleep. Preoperative testing including 12-lead electrocardiography (ECG), blood laboratory analysis, and chest radiograph revealed no abnormalities. The tumor was a large rubbery mass located in the middle of the mandible. Preoperative magnetic resonance imaging revealed that the tumor pushed her tongue rearward and upward (Figure 2). At her maximum mouth opening, the distance between the tumor and her maxilla was about 20 mm. Nasal intubation was planned to avoid dislodging or damaging an oral endotracheal tube during the operation. Our anesthetic plan is shown in Figure 3. Intravenous access was accomplished with sevoflurane and 60% nitrous oxide in oxygen via facemask. Anesthesia was then induced with sevoflurane in oxygen under spontaneous ventilation. After confirming smooth assisted mask ventilation, we started a continuous infusion of remifentanyl (0.5 µg/kg/min) and administered 10 mg of

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Figure 1. (a) Preoperative intraoral picture. Arrows indicate the margin of the tumor under the tongue (asterisk). (b) Picture of the tumor removed from the oral cavity.

rocuronium bromide. A 3.5-mm uncuffed oral endotracheal tube was inserted easily without a stylet using an AWS with a neonatal-type intlock blade (Figure 4). While maintaining general anesthesia, another 3.5-mm uncuffed straight endotracheal tube with an elbow connector attached was inserted into the nostril. The guidance of the nasal tube toward the glottis was attempted using pediatric Magill forceps. We were able to hold nasal tube with the Magill forceps; however, it was difficult to manipulate and advance the nasal tube into the trachea because the Magill forceps interfered with the intlock blade of the AWS and the oral endotracheal tube in the limited hypopharyngeal space.

Because her jaw mobility was better than we expected during the first intubation attempt, we used direct visual laryngoscopy with a standard laryngoscope with a Miller straight laryngoscope blade, size 1, for the second attempt. The glottic exposure was Cormack 2, and with enough room in the hypopharynx for the Magill forceps. Then the oral endotracheal tube was removed and the nasal endotracheal tube was intubated into the trachea. During the induction and maintenance of anesthesia, no adverse reactions including desaturation occurred. After the operation, the patient was extubated in the operating room when fully awake. No complications occurred during the perioperative period. She was discharged from our dental hospital at postoperative day 5.

DISCUSSION

In oral surgery, nasal intubation is often needed and video laryngoscopy is frequently used for nasal intubation, especially for difficult airway cases. However, even when a clear glottic view is obtained, it may be difficult to navigate a nasoendotracheal tube toward the glottic opening. In our case, prior to nasal intubation, oral intubation was performed to secure the airway while we attempted nasal intubation. Epistaxis, which is the most common complication of nasal intubation, can lead to blood in the airway with difficulty in visualizing the glottis with risk of aspiration and hypoxia. Our use of oral intubation prior to nasal intubation prevented these complications of nasal endotracheal tube passage. If the depth of anesthesia is not adequate and paralysis not present, laryngospasm is also possible. Therefore, we chose to paralyze this patient.

Figure 2. Magnetic resonance imaging showing small space of oral cavity due to the tumor (a) pushing the tongue (b) toward the pharynx.

Figure 3. Preformulated plan for airway management for this case.

Some techniques for nasotracheal tube guidance toward the glottis without using Magill forceps have been reported, such as the cuff inflation technique where cuff inflation can help direct the tube tip toward the glottis.^{3–5} Although this technique is effective in adults, it cannot be performed for children with small airways using uncuffed tubes. The flexible fiberoptic bronchoscope is regarded as the most reliable adjunctive tool for difficult nasotracheal intubation.⁶ As shown in Table 1, if nasal intubation with a direct visual laryngoscope had failed, we had planned to perform nasal intubation using a flexible bronchoscope placed within the nasal endotracheal tube (Seldinger technique). However, considerable skill is required to manipulate a pediatric fiberscope, and intubation time would likely be longer.⁸ If prolonged apnea occurred, it could lead to hypoxia, especially in infants. Similarly, a Seldinger technique can be used with a bougie as a guide for the nasal endotracheal tube, which has been reported to be easy to perform and reduces trauma to the nasal mucosa.⁷ However, an infant sized bougie was not available to us. For these reasons, we did not choose a Seldinger technique as our rescue choice. We sometimes perform tracheostomy in awake adult patients with difficult airways. Awake tracheostomy was not considered an option in this infant due to lack of patient cooperation. However, after oral intubation, tracheostomy could have been considered if needed.

In our case, muscle relaxant was used before intubation to avoid functional airway obstruction due to laryngospasm. Rocuronium bromide was chosen because it can be reversed quickly with sugammadex. However, some reports suggest that the reversal of neuromuscular blockade does not

always lead to an increase in airway patency.⁹ Therefore, intubation without muscular blockade could also be considered utilizing a combination of inhalational agent and short-acting or reversible agents like remifentanyl.¹⁰

Although there are no reports that have compared direct visual laryngoscope and video laryngoscope for

Figure 4. Lateral views of a neonatal-type intlock blade (ITL-N) for AWS-100 (a) and Miller Type Straight Laryngoscope blade (size 1) for a direct visual laryngoscope (b).

pediatric nasal intubation, according to a previous report,¹¹ the view of the glottis with a video laryngoscope is significantly better than that with a Miller laryngoscope in neonates and infants. Moreover, compared with a conventional laryngoscope, a video laryngoscope is less stimulating to the patient's upper airway.^{2,12} However, due to the limited space in the infant and young child airway, it may be difficult to utilize the Magill forceps while the video laryngoscope is in place. In many cases, however, the endotracheal tube can be easily manipulated into the glottis with the video laryngoscope in place or with head repositioning or pressure over the cricoid cartilage without need for Magill forceps. Therefore, video laryngoscopes can be an effective device for nasal intubation in children with difficult airways, but it was not so in our case.

CONCLUSION

Video laryngoscopy has definite advantages over classic direct laryngoscopy in complex patients when oral intubation is required. It may also be effective for many nasal intubations in patients with normal or difficult airways. However, the video laryngoscope may interfere with the use of Magill forceps, as it did in our case. The anesthesiologist may have to resort to direct visual laryngoscopy, in our case with a Miller straight blade. It is critical for anesthesiologists to maintain their skills in traditional laryngoscopy for scenarios where video laryngoscopy fails. For improvement in the success rate for nasal intubation using video laryngoscopy, other techniques for navigation of a nasotracheal tubes should be studied.

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