

Clinical reports

Pre-anesthetic evaluation can play a crucial role in the determination of airway management in a child with oropharyngeal tumor

YOSHIHIRO AOI, YOSHINORI KAMIYA, MASASHI SHIODA, RYOSUKE FURUYA, and YOSHITSUGU YAMADA

Department of Anesthesiology and Intensive Care Medicine, Yokohama City University Graduate School of Medicine, 3-9 Fukuura, Kanazawa-ku, Yokohama 236-0004, Japan

Abstract

We experienced a case of a huge hemangioma occupying the oropharyngeal space in an 11-year-old child. Although urgent surgical tracheostomy under local anesthesia was suggested initially, medical interview and findings of computerized tomography and fiberoptic laryngoscopy revealed that the airway of the patient was relatively stable when she was in the semi-left decubitus position. General anesthetic induction would have had potential risks of airway obstruction. Thus, after placing the patient in the semi-left decubitus position, we chose semi-awake induction to secure the airway. With a small dose of fentanyl, we accomplished orotracheal intubation. In this report, we discuss the importance of referring to an airway management algorithm when encountering a difficult airway.

Key words Airway management · Oropharyngeal tumor · Pre-operative examinations · Avoiding tracheostomy

Introduction

Tracheostomy is often the safest method for maintaining the airway in patients with upper airway obstruction. Today, advances have been achieved in the critical care of tracheostomized children, but tracheostomy-related complications and mortality have not improved significantly [1]. Therefore, it is important to assess the airway accurately in order to avoid an unnecessary tracheostomy whenever possible. We experienced a rare case of a hemangioma occupying the oropharyngeal space in a child. Prior to anesthesia, we referred to the American Society of Anesthesiologists (ASA) airway management algorithm [2] and came up with our own plans, arising from thorough physical examination and radiographic evaluation; we safely accom-

plished orotracheal intubation instead of performing a tracheostomy.

Case report

An 11-year-old girl (height 151 cm; weight, 34 kg) with a 1-year history of progressive discomfort in her throat was admitted emergently with some difficulty in breathing. Oral examination revealed a red and partially black tumor positioned in the pharyngeal space. In the emergency department, fiber laryngoscopy was performed with the patient in the sitting position, and it confirmed an occupying lesion in her mesopharynx (Fig. 1). Computerized tomography demonstrated a clear-bordered isodense mass, 4 cm in diameter, with a stem emerging from the mesopharynx (Fig. 2). The mass occupied nearly 80% of the pharyngeal space (Fig. 3).

Because of the risk of complete airway obstruction, the patient was initially scheduled for an emergency surgical tracheostomy under local anesthesia. The surgeons requested the induction and maintenance of general anesthesia for surgical resection of the mesopharyngeal tumor.

She had no previous anesthetic history. Her medical history only included bronchial asthma, which was treated with inhalations of fluticasone propionate and salbutamol sulfate and oral theophylline. On arrival at the emergency department, her respiratory rate was 14 breaths · min⁻¹. Although she looked anxious, there was no sign of respiratory distress, nor were there signs indicative of upper airway obstruction, such as tachypnea or a seesaw respiratory pattern. Other vital signs were stable, with blood pressure of 126/54 mmHg, heart rate of 95 beats · min⁻¹, body temperature of 37.3°C, and oxygen saturation of 98% under room air conditions. The result of her pre-anesthetic examination provided a valuable clue on how to maintain the airway. The patient felt slightly uncomfortable when breathing while

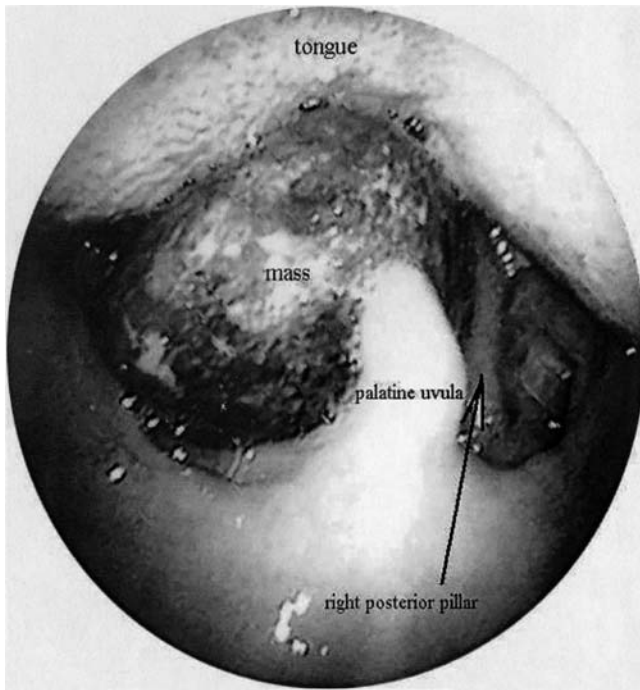


Fig. 1. Fiber laryngoscopy reveals a red and partially black tumor in the pharynx. The right posterior pillar is almost obscured

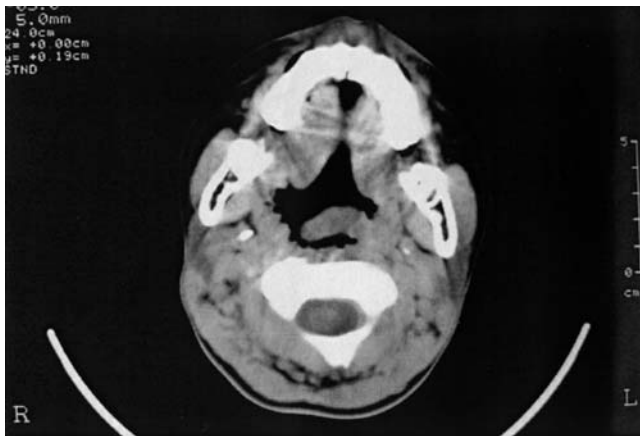


Fig. 2. Computerized tomographic scan shows a clear-bordered iso-dense mass with a stem emerging from the left mesopharynx

in the supine position, although no stridor was heard, and no deterioration of oxygen saturation was seen. However, left decubitus positioning allowed the child to breathe with less distress. Also, we were told that the patient had taken to sleeping facing the left side in the recent couple of months, because of easiness of breathing. We re-evaluated the videotape of the fiber laryngoscopy and found that the tumor's stem extended from the left tonsillar area, and the mass had good mobility,

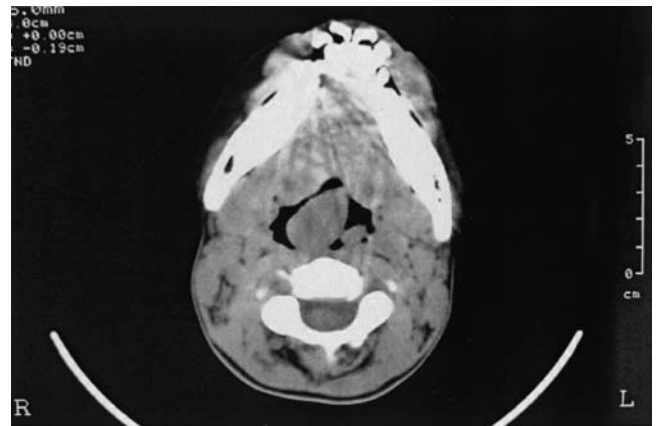


Fig. 3. Computerized tomographic scan. In this section, the mass occupies nearly 80% of the pharyngeal space

as assessed by computed tomography and her symptoms. Additionally, her past history of the complaint indicated that the mass had been slow-growing, and there had been no bleeding episode. Therefore, we concluded that accidental damage of the mass was preventable as long as sufficient pharyngeal space could be exposed and gentle insertion of the laryngoscope was performed. From all these findings, we concluded that semi-left decubitus positioning of the patient would allow us to obtain the view necessary for orotracheal intubation.

Even though examination of the patient's upper airway showed a mouth opening of more than 4 cm and full range of neck movement, a semi-awake intubation method, using a small dose of fentanyl and local spraying of 8% lidocaine, was selected because routine anesthetic induction with sedatives and muscle relaxants would have entailed an increased risk of the tumor caving in, leading to complete airway obstruction. Although nasal fiberoptic intubation is probably the most common method to manage a difficult airway, it was not chosen, because we felt that, even with some sedation, the stimulus of inserting an endotracheal tube into the patient's nose would have been intolerable for an 11-year-old girl. We were also concerned that nasal bleeding may have hindered visualization with the fiberoptics for intubation, and that such bleeding could have impaired the patient's breathing. Additionally, we were concerned with the difficulty of manipulating a fiberoptic bronchoscope (3.0 mm outside diameter [OD]) through a small-sized endotracheal tube that could be inserted through her small nose to the mesopharyngeal space. The patient and her parents were informed about the procedure and reassured. Informed consent was obtained from them.

The patient received ranitidine 20 mg i.v. as premedication 30 min before the procedure. In the operation room, an intravenous infusion of 0.5 mg atropine and

100mg hydrocortisone was added, for prevention of bradycardia and an asthma attack, respectively. Arrangements for emergency tracheostomy and fiberoptic-guided intubation devices were on standby, and constant monitoring of ECG, pulse oximetry, and indirect blood pressure was performed. The patient was turned to the semi-left decubitus position (about 30°), and was initially preoxygenated, followed by small amounts of fentanyl (10µg per dose titrated up to a total dose of 50µg). Concomitantly, with the patient's cooperation and with the careful use of a Macintosh laryngoscope, lidocaine was sprayed over her oral pharynx to adequately anesthetize the deeper pharyngeal membrane so as to reduce the cough and gag reflex. Left positioning successfully shifted the mass further left, allowing the laryngoscope blade to scoop up the tumor and expose a finer view of the glottis under direct vision. Because the exposed pharyngeal space was quite large, a size 6.5-mm cuffed reinforced endotracheal tube (Safety-flex; Mallinckrodt Medical, Athlone, Ireland) was inserted, and immediately afterward, 120mg of propofol, 50µg of fentanyl, and 5mg of vecuronium were administered as anesthetic induction. Sevoflurane and N₂O in oxygen were used to maintain anesthesia during the operation. Vital signs were stable throughout the operation. After orotracheal intubation was performed, almost all the space of the mesopharynx was occupied with the mass (Fig. 4). Operative findings showed the stem of the mass was protruding from the mucosa at the back of the left anterior pillar, and not from the tonsil. The mass had no adhesion to the neighboring tissues. Therefore, the stem (7mm in width) was simply clamped and ligated, and the mass removed. No bleeding was encountered during the process.

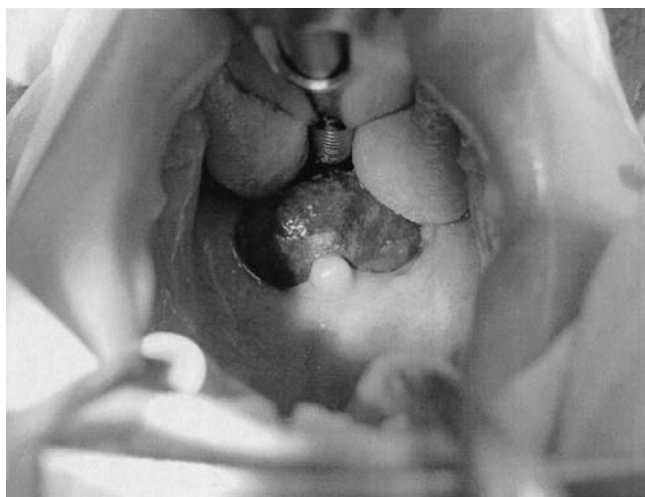


Fig. 4. Picture of the mass after orotracheal intubation was performed. The mass occupies almost all the space of the mesopharynx and is at the center of the pharynx

The patient emerged from anesthesia smoothly and she was extubated without incident, preceded by close examination of the oropharyngeal space for mucosal edema and bleeding. No further respiratory discomfort was experienced during the postoperative period. Oral intake was allowed on the following day. The patient was discharged on the fourth postoperative day.

The tumor weighed 8.36g and was 34 × 22 × 27 mm in size. The pathological diagnosis was mesopharynx hemangioma. Histologically, the tumor's surface consisted of squamous epithelium, partially coated with bacterial plaque. Bleeding and numerous capillary vessels were seen in the interstitial tissue.

Discussion

The presented case is a good example of using an airway management algorithm. The standard surgical tracheostomy techniques under local anesthesia seemed to be the safest choice at the time when no detailed explorations, other than computerized tomography and fiber laryngoscopy, were performed at the emergency department. In fact, the surgeons had originally planned a surgical tracheostomy. However, following further examination and evaluation of the patient, we discussed other options with the surgical staff, and chose orotracheal intubation. The primary reason was that the mass, though occupying nearly 80% of the pharynx, was assessed to have good mobility, with a stalk emerging from the left mesopharyngeal wall. Second, but most important, from our medical interview and physical examination, we noticed an improvement in the respiratory pattern when turning the patient's body to the left. Together with the findings of computerized tomography and fiber laryngoscopy, we anticipated that the tumor would shift leftward and that enough airway space for intubation would be obtained. All these findings, along with the fact that the patient was an 11-year-old girl and her condition was not immediately life-threatening, led us to conclude that orotracheal intubation was worth trying under a semi-awake condition in the semi-left decubitus position. In this patient, we did not re-evaluate the computerized tomography and fiber laryngoscopy findings in the left decubitus position. If we had done these examinations, the findings would have helped the decision-making and the intubation procedure.

Needless to say, accidental bleeding during intubation—from the tumor itself or the airway—caused either by the endotracheal tube or the laryngoscope, was our first concern. Thus, prior to anesthesia, we referred to the ASA airway management algorithm [2] and came up with our own backup plans (Fig. 5). We attempted the best patient position possible in order not to disturb

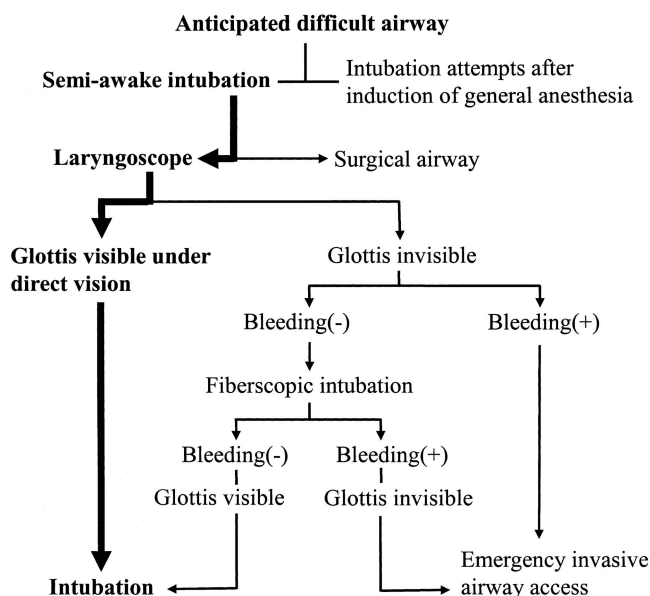


Fig. 5. Pre-anesthetic airway management flow chart for the patient. We chose a rigid laryngoscope initially, for fear of nasal bleeding and agitating the patient with nasotracheal fiberoptic bronchoscope-guided intubation. Orotracheal fiberoptic bronchoscope-guided intubation was not selected because of the need for deeper sedation. In this patient, we carried out anesthetic induction, with the idea of performing an emergency tracheostomy if the patient's situation became critical, with bleeding and/or airway obstruction

the pathologically unknown mass. Nasal fiberoptic intubation could have been an alternative method of airway control. It was not chosen primarily because the authors were not skilled at nasal fiberoptic bronchoscope-guided intubation for children, and thus we were afraid that it would agitate the patient, and that it could worsen the patient's respiratory status.

There are some reports of difficult airway management using nasotracheal fiberoptic intubation with spontaneous ventilation [3] or sevoflurane mask anesthesia followed by tracheostomy [4] for the uncooperative patient. In our patient, due to the tumor's size and mobility, we anticipated that it would completely block the airway when the patient lost consciousness and that the muscle tone of the mesopharynx would be reduced following routine anesthetic induction. In a survey of difficult airway management behavior in the United States, 75% of active anesthesiologists selected "awake but sedated induction" for an obstructing pharyngeal tumor; 52% of these anesthesiologists chose a fiberoptic bronchoscope, and 36% chose a direct rigid laryngoscope [5], as we did. That report also indicated that, for the scenario of a lesion above the vocal cords, a direct rigid laryngoscope was favored rather than a fiberoptic bronchoscope (53% vs 33%). In Canada and Denmark, similar surveys reported that, although a fiberoptic

bronchoscope was the standard selection for managing a difficult airway with pharyngeal tumor with stridor, a direct laryngoscope was still regarded as one of the choices worth trying [6,7]. The report from Denmark strongly recommended that awake-intubation was preferable for the safe management of a difficult airway [7]. In our patient, we could not use a laryngeal airway because of the huge mesopharyngeal tumor and the patient's age, and we believe our choice of airway management was one of the best.

Although there is no doubt that emergency tracheostomy is the most reliable way to manage an obstructed upper airway, some studies have reported serious complications of tracheostomy in children, even though not enough studies have yet been done on its advantages and disadvantages. Some authors have reported that the incidence of complications encountered during open tracheostomy in children is as high as 20% [8]. These complications include dystrophic calcification in the region of the tracheostome, causing tracheostenosis, some to an extent of near total occlusion, or substantial granulation tissue above the tracheostomy that necessitated recannulation of the tracheostomy tube. For these reasons, it is important to refer to the airway management algorithm to avoid unnecessary tracheostomies, and so-called "cannot ventilate, cannot intubate" situations.

Conclusions

We experienced a rare case of hemangioma occupying the oropharyngeal space in a child. Instead of building a tracheostome, we accomplished oro-tracheal intubation after undertaking thorough physical examination and radiographic evaluation prior to surgery. In the difficult airway, it is important to always refer to the airway management algorithm. Detailed preoperative evaluation can shed light on the most appropriate airway management for the patient.

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