

AIRWAY MANAGEMENT IN A CHILD WITH PENETRATING PHARYNGEAL WALL FOREIGN BODY INJURY: A CASE REPORT

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Penetrating foreign bodies of the oropharynx are encountered in children of all ages, although more frequently between the ages of 3 to 5 years. A thorough preanesthetic evaluation of these patients, including type and extent of injury, must be performed if time allows. As a result of the often emergent nature of these cases, poor patient cooper-

ation, and great potential for airway compromise, special considerations are given to management of the airway. The use of nontraditional equipment may greatly facilitate laryngoscopy and intubation.

Key words: Airway management, difficult intubation, penetrating oropharyngeal foreign body.

The true incidence of penetrating oropharyngeal foreign bodies in children is unknown because parents frequently remove the foreign body before arrival to the emergency room or choose to forego medical attention. Most of these injuries usually heal spontaneously without intervention. After the initial evaluation, parents are instructed to observe the child closely for any neurologic changes over a 24-hour period and return to the hospital if symptoms occur. Patients with a foreign body still in place will require foreign body removal and, if necessary, a wound exploration.

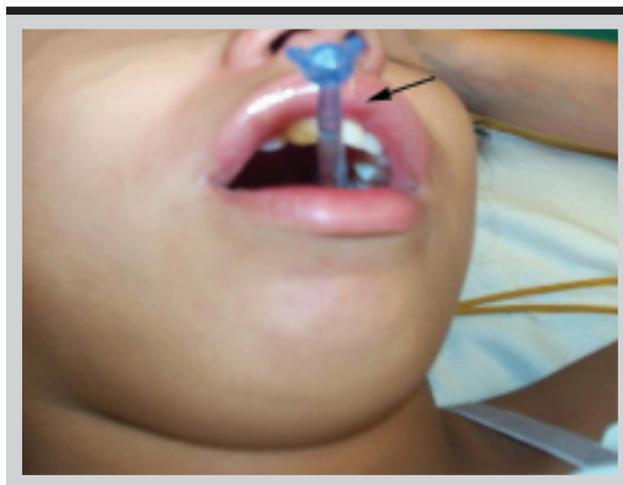
Although common in the entire pediatric population, children between the ages of 3 and 5 years represent the largest group among those with penetrating injuries to the oropharynx. The most frequent penetrating foreign bodies are long objects with a pointed tip such as metal sticks, plastic toys, forks, and ballpoint pens. Common areas of injury are superior to the tonsil and the posterior pharyngeal wall. These injuries are usually simple puncture wounds that often heal without surgical intervention; however, damage to the internal carotid artery (ICA) may cause bleeding and neurologic damage. Vomiting, irritability, and drowsiness may occur immediately after the injury or up to 24 hours following trauma to the ICA. Consequential upper airway obstruction also may develop. Radiographic evidence of retropharyngeal free air or abscess requires hospital admission and observation.

We present a case of airway management in a patient with a penetrating pharyngeal wall foreign body.

Case report

A 12-year-old, 93-lb (42 kg), 62-inch (157 cm) female

Figure 1. Pen protruding from the mouth



presented to the emergency room with a ballpoint pen lodged in the posterior pharyngeal wall. The shaft of the pen was protruding from her mouth (Figure 1). The incident occurred 1 hour before admission when the patient was struck in the face while chewing a pen. The patient's medical history was significant for mild asthma, and she had no surgical history. The patient had eaten a full meal at school 15 minutes before the incident.

On physical examination, vital signs were stable, and she was awake and alert. The patient was accompanied by her mother and appeared to be in no acute distress, breathing comfortably while sitting on the stretcher but becoming very anxious during the airway examination. The patient was drooling and had difficulty opening her mouth because of pain (according to her mother, she was able to fully open her mouth before this incident). The airway examination

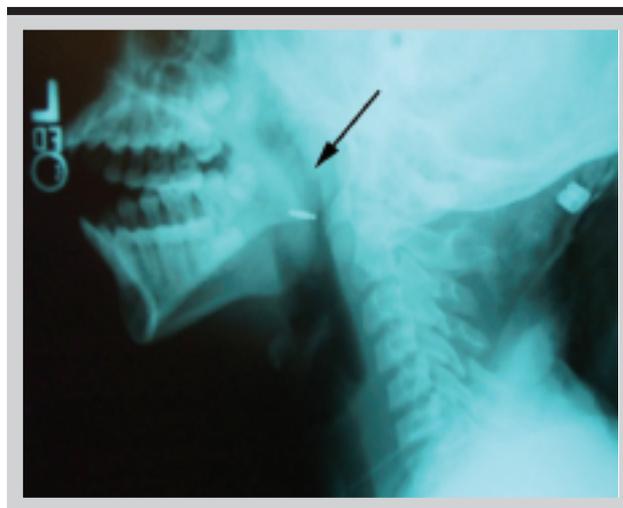
revealed that she had full extension of her neck and had a 3-finger width thyromental distance. Her mouth opening was limited because of pain, but with the aid of a tongue blade, visualization of the uvula, tonsillar pillars, and soft palate was possible. A plastic ballpoint pen was protruding approximately 3 inches from the mouth, teeth were intact, and there was no significant bleeding in the oral cavity.

A lateral neck radiograph revealed the metal tip of the pen penetrating the soft palate, which was lodged into the nasopharynx. The contours of the nasopharynx and hypopharynx were smooth and the epiglottic folds were normal. The retropharyngeal soft tissues were normal in thickness, the tip of the pen did not reach the retropharyngeal tissue plane, and there was no evidence of free air (Figure 2).

After an otolaryngologist was consulted, an 18-gauge intravenous catheter was placed in the right hand and a complete blood count and type and cross specimens were sent followed by intravenous Ringer's lactate infusion. Cephazolin was administered intravenously in a 50-mg/kg dosage. Per the otolaryngologist's instructions, the patient was brought to the operating room (OR) for foreign body removal and possible wound exploration under general anesthesia. Although removal of the pen while the patient was awake or under sedation without securing the airway was considered, factors such as a full stomach, poor patient cooperation, the proximity of the pen to major vessels, and the potential for airway loss because of bleeding or vomiting called for the airway protection before the surgical procedure. Fiberoptic intubation was considered as a backup because the airway examination was not suggestive of the potential difficult intubation. General anesthesia with rapid sequence induction and intubation was planned; however, the pen protruding from the mouth made the face mask application with adequate fit impossible.

While the patient was on the OR table, oxygen was delivered through the mask of the anesthesia circuit held next to her face, .02 mg of atropine, 50 µg of fentanyl, and 2 mg of midazolam were administered intravenously. With the patient awake and more cooperative, the pen was cut at the level of the lip using a surgical rib cutter, which allowed application of the face mask and preoxygenation before the induction of anesthesia. With the otolaryngologist present, a rapid sequence induction with 100 mg of propofol and 80 mg of succinylcholine was performed. Aided by a Miller 2 laryngoscope blade, the trachea was intubated with a 6.0 cuffed, styletted endotracheal tube without difficulty (Figure 3). The remaining piece of

Figure 2. Lateral neck x-ray



the pen was removed by the otolaryngologist without complication, and a small puncture wound was closed with one surgical suture.

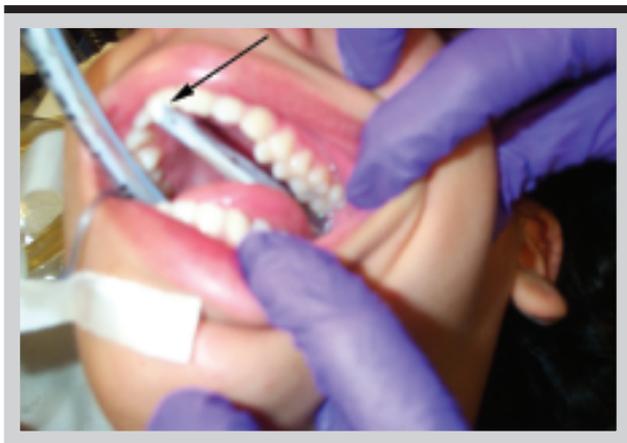
After emergence from anesthesia, the patient was extubated in the OR. The recovery period was uneventful. As instructed by the otolaryngologist, the patient was discharged to home later that evening on oral antibiotics and scheduled to follow up with the ear, nose and throat clinic on an outpatient basis.

Discussion

Although frequently uncomplicated, penetrating injuries to the oropharynx are not to be taken lightly. In 1936, Caldwell reported the case of a 16-year-old boy who sustained a penetrating oropharyngeal injury by falling onto a hedge with his mouth open.¹ He became drowsy and dysphasic within a few hours and hemiplegic 10 hours after the injury. He lapsed into a coma and died 6 days later. Since that time, there have been many reports of initially seemingly innocuous injuries to the oropharyngeal area causing subsequent serious neurologic events or death.

Children often place objects such as toothbrushes, toys, forks, sticks, pens, and pencils into their mouths, which may accidentally become lodged in the different parts of the oropharynx. The management of these patients depends on the size, characteristic, location of injury, and neurologic signs.² The most common areas of injury are superior to the tonsil and the posterior pharyngeal wall, with other common sites including the dorsum of the tongue and the palate. Lacerations of the tongue are usually minor and require no treatment, even wounds up to 2-cm heal without medical intervention. Palatal injuries occur less frequently; the junction between the hard and soft palate being the

Figure 3. Pen cut at the lip



most common location. These wounds can produce overhanging edges that require surgical closure. Bleeding may be brisk at first but is usually self-limiting. The lateral oropharynx is another common site of injury in children. The close proximity of the foreign body to the ICA presents a potential for ICA laceration or tear, which is the result of entrapment of the vessel between the foreign object and the vertebral body. Although these patients usually present with minimal bleeding at first, an intimal tear of the vessel may occur up to 48 hours after the injury.

Findings commonly associated with ICA trauma include hematoma in the lateral neck, ipsilateral Horner syndrome (miosis, ptosis, and facial anhidrosis), progressive limb paresis in an alert and oriented patient, a lucid interval with the development of a focal neurologic deficit, and transient ischemic attacks secondary to a thrombus formation. Contralateral hemiplegia, homonymous hemianopsia (loss of half of the field of view on the same side in both eyes), and possible aphasia can occur if the thrombus migrates to the middle cerebral artery.

A 5-year retrospective study done in 1997 at The Children's Medical Center of Dallas, Texas, identified 48 patients with documented injuries to the tonsil, lateral soft palate, or tonsillar pillars that posed significant risk for ICA injury.³ The patients' ages ranged from 2.4 months to 11.6 years with the average age of 42 months. A neurologic examination was documented as normal in 37 patients (77%). A computerized tomographic (CT) scan of the neck and the skull base was performed on 14 patients, which revealed 3 cases of ICA injury such as carotid spasm, hematoma, and carotid artery exposure with arterial compression. A normal CT scan allowed for same day discharge with instructions for monitoring neurologic changes. All 3 children with abnormal CT scans were further

evaluated with carotid angiography. Two patients whose angiograms demonstrated carotid intima disruption with no evidence of thrombus were discharged home on aspirin. One patient who had free air in the retropharyngeal space developed an abscess and required hospital admission for a 2-day course of intravenous antibiotics.

In the retrospective study from Children's National Medical Center, George Washington University, and Georgetown University Medical Center, Washington, DC, 6 out of 26 patients with oropharyngeal trauma required surgical intervention: 3 underwent retropharyngeal aspiration or incision and drainage procedures, 2 required neck exploration, and 1 required surgical extraction of the foreign body. Indications for hospital admissions were concerns about neurologic or vascular injury, radiographic evidence of free air or abscess, pneumomediastinum, and unreliable adult supervision at home.⁴

When presented with a case of oropharyngeal injury, it is important for the anesthesia provider to obtain a thorough history and physical examination with a detailed neurologic evaluation. The patients who require surgical intervention present several challenges. Frequently, these children have eaten a meal within 8 hours from the time of injury, which places them at risk for an aspiration during induction of anesthesia. Poor patient cooperation makes the examination or airway manipulation even more challenging. Mask ventilation, laryngoscopy, and endotracheal intubation could be impossible because of the protruding foreign body. Dislodgment of the object before intubation could cause bleeding and compromise of the airway.⁵ It is important to remember that most injuries are puncture wounds and that bleeding may not be present while the foreign body is tamponading the blood vessel. The potential for an ICA injury must always be considered. The patient should undergo a neck radiograph and possibly a CT scan to determine the position of the foreign object and major vessel involvement before transport to the OR. Radiographic evidence of free air in retropharyngeal space or mediastinum requires hospital admission and observation. Retropharyngeal abscess may require surgical drainage and antibiotic treatment.

Frequently, anesthesia practitioners will have to be creative and use tools and instruments that are not normally included in their armamentarium. In our case, we used an immediately available surgical instrument to cut the pen and facilitate both the mask application and endotracheal intubation without dislodgment of the foreign object.

Conclusion

Oropharyngeal trauma in children is usually benign and managed by observation and occasionally by antibiotics. However, some patients need to be brought to the OR for emergency foreign body removal and possible wound exploration. While evaluating the airway, the anesthesia provider must take into consideration poor patient cooperation, the risk of bleeding, aspiration, and potentially difficult mask ventilation or intubation. Occasional use of nontraditional equipment may greatly increase the safety of the airway management.

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