

Traumatic Hypopharyngeal Perforation from Football Helmet Chinstrap

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INTRODUCTION

Hypopharyngeal perforation is a rare but potentially serious injury typically resulting from instrumentation or external penetrating trauma.¹⁻³ Perforation following blunt trauma is even more rare.¹ Due to the nature of this injury and the serious complications that can arise, prompt and proper diagnosis is key for a good patient outcome and prognosis. This case report describes an unusual case of a hypopharyngeal perforation believed to have been caused by a dislodged chinstrap of a football helmet.

CASE REPORT

An 18-year-old male presented to a local emergency department following a high school football game. He complained of hoarseness and difficult, painful swallowing. During the game, he was running with the ball when he was hit in the facemask of his helmet twice during the same play. After the first hit, the chinstrap of his helmet became dislodged posteriorly and rotated under his chin. With the second hit to his facemask, he felt the chinstrap tighten, forcing him to swallow. He continued to play a majority of the game but began to notice anterior neck pain, shortness of breath, odynophagia, sore throat, and hoarseness.

On initial examination, the patient's voice was raspy and he complained of anterior neck pain with odynophagia. The decision was made to transfer the patient to the nearest Level I trauma center for further evaluation of suspected blunt neck trauma.

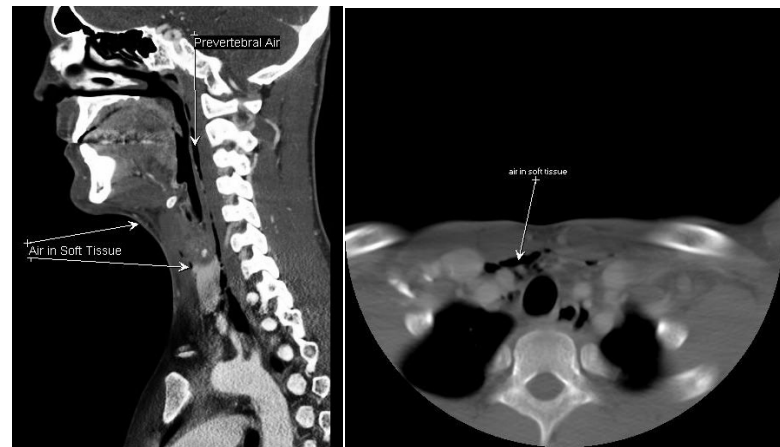
Upon arriving at the trauma center approximately one hour later, the physical exam revealed a small (1 cm) midline mandibular laceration, stable vital signs, and clear breath sounds bilaterally. Mild soft tissue swelling of the neck suggesting possible subcutaneous emphysema was found, however, no crepitus was noted. A chest radiograph was within normal limits. The patient's cervical spine was non-tender to palpation along the spinous processes with full range of motion.

Cervical radiographs revealed air in the prevertebral soft tissues, posterior to the hypopharynx (Figure 1). A computed tomography (CT) scan of the neck was performed, revealing an irregularity of the posterior hypopharyngeal wall and extensive air in the soft tissues of the neck extending from the nasopharynx to the mediastinum (Figures 2 and 3). An esophagram confirmed the diagnosis of a small posterior

hypopharyngeal perforation (Figure 4).



Figure 1. Lateral cervical radiograph displaying air in the prevertebral soft tissues, posterior to the hypopharynx.



Figures 2 and 3. CT scan exhibiting irregularity of the posterior hypopharyngeal wall and extensive air in the soft tissues of the neck extending from the nasopharynx to the mediastinum.



Figure 4. Esophagram confirming a hypopharyngeal perforation due to contrast leak into soft tissue.

The patient initially was admitted to the Intensive Care Unit for close observation. He was kept nil per os (NPO) and treated conservatively with cefotetan 1 gram every 12 hours and metronidazole 500 milligrams every 12 hours intravenously. Esophagrams were repeated every two days and showed gradual improvement with no extravasation noted by the sixth day of hospitalization. At that time, the patient was afebrile with a normal white blood cell count and differential. His initial symptoms of anterior neck pain, shortness of breath, and odynophagia were resolved. The patient was dismissed on a clear liquid diet with close outpatient follow-up. An esophagram three weeks after the initial injury confirmed a healed lesion.

DISCUSSION

Pharyngoesophageal injury leading to hypopharyngeal perforation is a rare clinical condition.⁴ The majority of hypopharyngeal perforations presented to trauma centers are after iatrogenic, penetrating, or blunt trauma to the neck.¹⁻⁶ Blunt trauma is responsible for less than 2% of hypopharyngeal perforations with most following a fall, blunt assault, motor vehicle or motorcycle collisions, or direct impact during sports activities.^{3,6-10}

Perforations are most likely to occur at the hypopharyngeal-esophageal junction. This area, known as Killian's dehiscence, lacks the longitudinal muscle fibers of the inferior pharyngeal constrictor and consists solely of mucosa and serosa.^{7,11-13} The most commonly postulated mechanism of perforation from blunt trauma is shearing force after cervical hyperextension with concurrent compression of the larynx against the vertebral bodies.^{7,14,15} Various other blunt trauma mechanisms have been thought to contribute to these injuries, such as barometric perforation (hyperextension of the neck with a closed airway combined with forced exhalation), forced compression of soft tissues against hypertrophic anterior cervical osteophytes, and displaced hyoid fracture resulting in pharyngeal perforation.^{7,14,15} Based on the physical and diagnostic findings, the likely mechanism of injury of this patient occurred as a result of compression of the larynx against the vertebral bodies by the chinstrap during the initial hit, followed by a shearing force during the second hit.

Aerodigestive tract injury (ATI) can cause serious morbidity and may result in increased mortality if not diagnosed and treated expeditiously.^{6,8,16} In a patient with a history of instrumentation or blunt trauma, common symptoms that should prompt suspicion of hypopharyngeal injury include subcutaneous emphysema, chest or neck pain, odynophagia, dysphagia, dysphonia, and hemoptysis.^{8,11} In addition, it has been suggested that "the presence of hoarseness or stridor is an important indicator of potential upper ATI when concomitant emphysema is present".⁸ Extent and location are critical in determining management of this injury; thus, appropriate use of diagnostic studies is crucial in the identifying hypopharyngeal perforations.¹¹

There is no consensus regarding the best diagnostic study for a suspected hypopharyngeal perforation, but some combination of plain radiographs, CT scans, fluoroscopy, and nasopharyngolaryngoscopy have been recommended in evaluating patients for this injury.^{11,17-19} Radiographs of the chest and lateral cervical spine are reasonable initial studies and may demonstrate cervical emphysema suggesting hypopharyngeal perforation. CT scans with water-soluble contrast can be

utilized to rule out other injuries and determine the precise location of a perforation.^{10,16,18-20} Fluoroscopic swallow studies are highly sensitive and can confirm a hypopharyngeal perforation.^{8,18,19} Ultimately, direct visualization through endoscopy is the diagnostic gold standard, however, this may not be necessary in all cases.²¹

The absence of management guidelines for a pharyngoesophageal injury, particularly for optimal operative management, probably results from the infrequent incidence of these injuries. Most recommendations are extrapolated from penetrating neck trauma experiences.¹⁶ Historically, surgical treatment has been the preferred management of hypopharyngeal perforation secondary to blunt trauma.^{19,21} Recently, a trend toward nonoperative treatment has been emerging which includes broad spectrum antibiotics, NPO status, parenteral nutrition, and follow-up imaging studies.^{3,18,22}

Criteria to select patients for nonoperative management are not well defined. Some have recommended this approach for perforations under 2 centimeters in length, presentation within 24 hours, no oral intake in the interval between injury and presentation to the hospital, and no signs of systemic infection or injury superior to the arytenoid cartilage.^{2,4,16} Overall, the management and treatment of hypopharyngeal perforation varies depending on the severity of the injury, as numerous factors influence treatment decisions: time of clinical presentation, physical signs and symptoms, degree of extravasation of contrast media, and the location and size of the perforation.^{1-3,6,10,15,18,19,22}

CONCLUSIONS

Hypopharyngeal perforation secondary to blunt trauma is uncommon. The unique mechanism of injury seen in this case demonstrated the need for heightened level of suspicion when assessing a patient with pertinent symptoms. Hypopharyngeal perforations are associated with high morbidity and even mortality if not recognized early and treated properly and promptly.

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