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Case Report

Diagnosis and management of laryngeal fracture: a case report

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ABSTRACT

Laryngeal fracture is a rare and potentially fatal traumatic injury. Because of the rarity of this type of injury, many laryngeal fractures are often undiagnosed or poorly managed, leading to significant problems with airway patency, voice production, and swallowing. We report a case of a 49 year old man admitted to the emergency room after a motor cycle accident with cervical trauma. The patient presented with hoarseness, anterior neck pain, cervical subcutaneous emphysema, and increasing respiratory distress that led to the tracheostomy of the patient. The computed tomography (CT) of the neck revealed a comminuted fracture of the thyroid cartilage, a hematoma of the left piriform sinus and cervical subcutaneous emphysema. The three-dimensional CT showed a double fracture of thyroid cartilage with displaced intermediate fragment. The patient underwent an open reduction and internal fixation of the thyroid cartilage with miniplates along with laryngeal stenting. He has no significant swallowing or breathing problem and reasonably good voice 6 months after surgery. We conclude that early diagnosis and appropriate therapy favorably alters the prognosis in terms of long-term voice and airway outcome.

Keywords: Laryngeal fracture, Diagnosis, Therapy

INTRODUCTION

Laryngeal fracture is a rare and potentially fatal traumatic injury. The reported incidence of this type of trauma is 1 in 30,000 admitted to severe trauma centers.[1] The rarity of this injury is thought to be related to the resilient cartilaginous laryngotracheal complex, its relative mobility in the neck, and its protected anatomic position between the mandible and the sternum.[2] Laryngeal fracture can result in great variability in clinical findings ranging from normal to severe airway collapse and death. Because of the uncommon nature of this injury, many laryngeal fractures are often undiagnosed or poorly managed, leading to significant problems with airway patency, voice production, and swallowing.[3] The purpose of this report, through the reported case, is to show that early diagnosis, expeditious evaluation, and appropriate therapy have a positive impact on the patient's condition later, especially as regards ease of breathing and voice quality.

CASE REPORT

A 49 year old man, with no significant medical history, was admitted in the emergency department after a motorcycle accident with cervical trauma. The patient was hemodynamically stable, conscious and presenting hoarseness, anterior neck pain, and increasing respiratory distress that led to the intubation of the patient, which has proven to be difficult, a tracheotomy was then performed. Physical examination revealed a cervical subcutaneous emphysema, edema, and tenderness in the cervical area, and other facial abrasions. The computed tomography of the neck revealed a comminuted fracture of the thyroid cartilage with two fracture lines (Figure 1), a hematoma of the piriform sinus (Figure 2) and cervical subcutaneous

emphysema (Figure 3). The three-dimensional CT showed a double fracture of thyroid cartilage with displaced intermediate fragment (Figure 4). Based on CT findings, the laryngeal injury was graded as Grade IV (Table 1). The patient was taken to the operating room and underwent an open reduction and internal fixation of the thyroid cartilage with miniplates. The patency of the laryngeal lumen was maintained with an endotracheal tube, which was removed done week later. The patient was temporarily admitted to the intensive care unit and fed through a nasogastric tube. Flexible endoscopy performed 2 weeks after the event showed reduced left vocal cord mobility and significant reduction of laryngeal sensibility and saliva aspiration. After 6 months, no significant swallowing or breathing problem was noted, the patient presented a persistent mild hoarseness of voice for which he was receiving speech therapy.

Figure 1: Axial section showing comminuted fracture of the thyroid cartilage with two fracture lines.

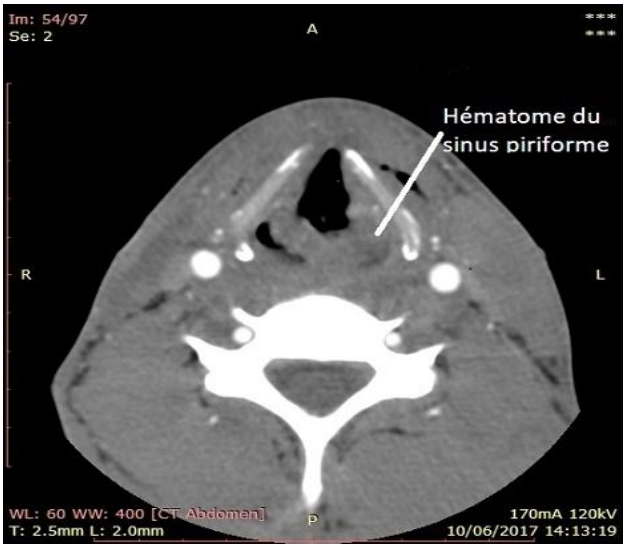

Figure 2: Axial section showing a hematoma of the piriform sinus.

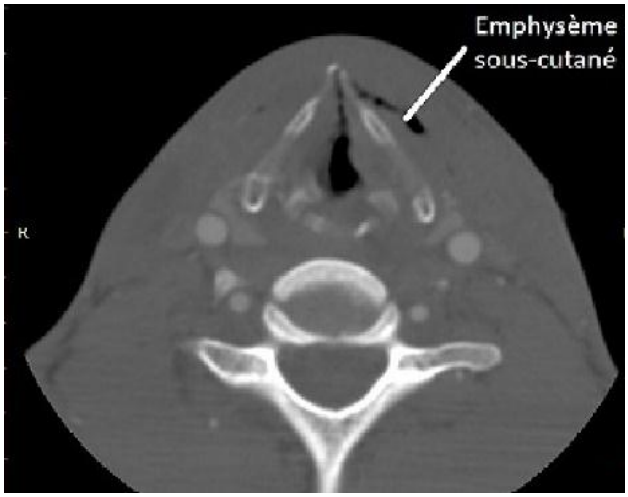

Figure 3: Axial section showing subcutaneous emphysema.

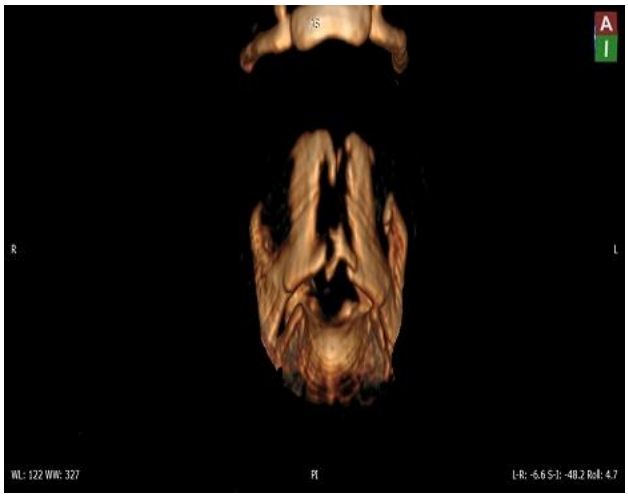

Figure 4: Tree-dimentionnal CT rising double fracture of thyroid cartilage with Intermediate displaced fragment.

Table 1: Schaefer Fuhrman's classification.

Severity of laryngeal injury (Schaefer Fuhrman's classification)	
Group	**Injury**
I	Minor endolaryngeal hematoma without detectable fracture
II	Edema, hematoma, minor mucosal disruption without exposed cartilage, and nondisplaced fractures
III	Massive edema, mucosal disruption, exposed cartilage, vocal fold immobility, and displaced fracture
IV	Group with disruption of anterior larynx, unstable fractures, two or more fracture lines, or massive trauma to laryngeal mucosa
V	Complete laryngotracheal separation

DISCUSSION

Laryngeal fracture is a rare injury, due to the high mobility of the larynx and the protection it receives from the surrounding bony structures of the sternum, mandible, and cervical spine.[4] Laryngeal trauma can be life threatening if not early identified and managed; the mortality rate has been reported to be from 17.9 to 40% with many patients dying before reaching the emergency room because of severe airway's injury or multiple organ's injury.[1] Blunt external trauma to the neck has been reported to be a more common cause of laryngeal fracture, which results from motor vehicle accidents, sports-related trauma, assault, and strangulation.[5] The major cause of laryngeal fracture is a direct anterior impact on the larynx in a motor vehicle accident such our case. Penetrating trauma is the second leading cause, often due to gunshot or stab wounds to the neck.[1]

Features of laryngeal trauma include loss of normal anatomic landmarks, tenderness, crepitus, soft tissue emphysema, dysphonia, aphonia, laryngeal obstruction, dyspnea, stridor, hoarseness, neck pain, hemoptysis, dysphagia, and odynophagia.[6] In our case, the patient presented some of the classical symptoms which didn't correlate well with injury's grade. Many authors reported that in case of blunt laryngeal trauma, the diagnosis of an injured airway may be missed initially as symptoms on admission do not always correlate with the degree of internal injury.[2] A missed significant laryngeal injury could ultimately have serious life-threatening consequences, such as airway obstruction and death. About 37% of the patients in reported series had delayed diagnosis hence the need for a high level of suspicion of any anterior cervical trauma.[7] A CT scan of the neck is considered the gold standard for diagnosing and grading such injuries for management planning.[8] Because of the importance of identifying and fully understanding the types of laryngeal trauma as a precondition for establishing successful diagnostic procedures and therapy, several authors have proposed categories of laryngeal trauma.[4] Like other recent publications, we used the classification of Schaefer-Fuhrman (Table 1), the laryngeal injury was graded as Grade IV.

Airway's management is the main priority in patients with laryngeal trauma. Both endotracheal intubation and tracheotomy have been recommended as means of maintaining airway patency.[1] The ultimate goal is to safely and atraumatically establish a secure airway. Orotracheal intubation in the setting of laryngeal trauma can be extremely difficult because of suboptimal conditions, poor visualization, and distorted anatomic relationships. Attempting orotracheal intubation in patients with laryngeal injuries carries with it associated risks such as creating false passages, causing further trauma to an injured larynx, disrupting damaged mucosa, and potentially compromising the stability of the patient.[10] However, if there is any question as to whether intubation will be difficult or unsafe and the patient's condition permits, we prefer to perform a tracheotomy under controlled conditions with local anesthesia. In a recent study, Mendelsohn et al analyzed 564 cases of laryngeal trauma and recommended tracheostomy within 24 hours to secure the airway because early tracheostomy decreases the length of stay in both the ICU and hospital.[7]

After safeguarding the airway, the anatomy of the larynx must be restored to improve the long-term voice outcomes in these patients. Management depends on the type and severity of injury.[1] Minor endolaryngeal lacerations and abrasions may be managed conservatively, whereas major endolaryngeal soft tissue injury is managed either through thyrotomy or endoscopically. Laryngeal skeletal fractures require internal fixation. Nondisplaced fractures can be managed nonoperatively or better with internal fixation, but displaced fractures, as our case should always undergo ORIF with sutures or plates.[2] In the past, the timing of surgical exploration was a topic of debate. Over the past 2 decades, numerous reports have demonstrated that early treatment within 48 hours resulted in a higher recovery rate than that of the delayed treatment.[1]

Endolaryngeal stenting is reserved for comminuted fractures and where the anterior commissure is significantly disrupted. Stenting is employed to provide stability to the mucosa and cartilage of the larynx during the healing process in an effort to prevent mucosal webbing and stenosis.[2] The majority of surgeons would agree that stenting is necessary and beneficial in cases of severe laryngeal trauma. Leopold reported poor clinical outcomes in 17% of airways and 24% of voices in patients receiving stents.[4] In this case we used an endotracheal tube for only small time.

CONCLUSION

This case highlights the importance of providing a high level of suspicion for laryngeal fracture in the blunt trauma patients. Early diagnosis and appropriate therapy favorably alters the prognosis in terms of long-term voice and airway's outcome.

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