

## Spontaneous Thyroid Cartilage Fracture: A Case Report

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### Abstract

Spontaneous thyroid cartilage fractures are extremely rare and occur without apparent external trauma. The exact causes and mechanisms remain not fully understood. Clinicians should maintain a high level of suspicion when evaluating patients with unexplained acute neck pain, voice changes, swallowing difficulties, or respiratory distress to consider the possibility of this entity. The role of radiology is the key to establish this diagnosis, evaluate the extent of this injury and guide formulating a patient-specific management plan. Computed tomography (CT) of the neck is the main evaluation tool when the suspicion for this injury is high. In this case we demonstrate the role and superiority of thin axial CT images of the neck (0.63 mm) in establishing diagnosis of this entity. Comprehensive care with clinical expertise of emergency physicians, otolaryngologists, and radiologists, is paramount in identifying these fractures, assessing associated injuries, and guiding optimal patient care.

Keywords: *Thyroid; Cartilage; Fracture; Neck pain; CT*

### 1. Introduction

Spontaneous thyroid cartilage fractures are extremely rare and occur without any apparent external trauma. We were able to find 7 cases reported in the literature, all of them happened after sneezing [1]. No clear etiology or mechanism of injury has been identified. Patients present with unexplained acute neck pain, voice changes, swallowing difficulties, or respiratory distress. This case represents the role of CT in establishing diagnosis and guiding the management in these cases. Securing the

airway is the priority, then comes symptom relief, and prevention of complications. Mild cases can be managed conservatively with pain control, voice rest, and monitoring. While more severe cases are treated surgically.

## 2. Case Report

A 36-year-old male with a past medical history of GERD and long-term history of tobacco and drug use presented to the emergency department with an acute onset of throat pain and dyspnea following a forceful coughing fit. The patient described dysphagia, odynophagia and globus sensation. Physical examination revealed stridor, hoarseness of voice, dry mucous membranes, and a non-pulsatile, tender midline neck mass. These findings were concerning potential airway compromise, so patient was given epinephrin and steroids, then admitted to the intensive care unit.

An outside hospital CT scan of the neck showed right pyriform sinus fullness with a small amount of fluid along the right lateral border of the thyroid cartilage. However, the fractures were not clearly visualized on the exam.

Otolaryngology flexible laryngoscopy exam demonstrated bilateral true vocal cords edema and evidence of hemorrhage and bruising of the bilateral false vocal cords. Full mobility of the bilateral true vocal cords with incomplete glottic closure due to edema was also seen. The hypopharynx presented a blackened right pyriform sinus with edema that extended to the post cricoid space and the left pyriform sinus. In-house CT angiogram of the neck was then recommended.

The CTA of the neck provided thin axial images in 0.63 mm thickness for interpretation, compared to 2 mm - 2.5 mm provided by the outside exam. A non-displaced fracture of the left thyroid cartilage lamina (FIG. 1) and a displaced fracture of the inferior right thyroid lamina were identified (FIG. 2).

Obliteration of the right pyriform sinus, thickening of the true vocal cords, and edema of the false cords were seen (FIG. 3), which correlated with the findings of edema and hematoma seen on laryngoscopy. After establishing the diagnosis, the patient was managed medically with pain control and steroids. No surgery was determined at this time. The patient was discharged upon improvement and advised to follow up with otolaryngology service.

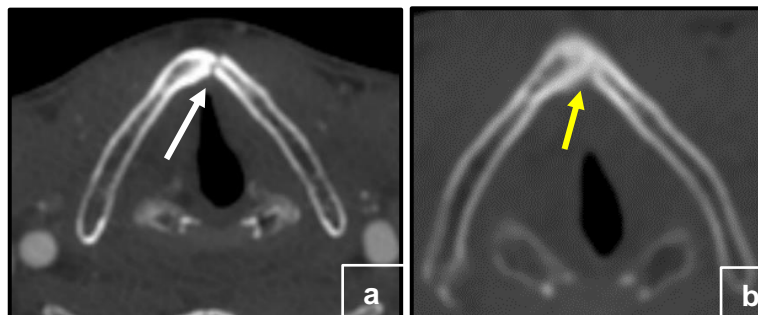


FIG. 1. (a) Axial 0.63 CT contrast enhanced image at the level of the thyroid cartilage demonstrate fracture of the left thyroid cartilage lamina (white arrow). (b) Axial 2.50 mm CT contrast enhanced images demonstrate *suboptimal visualization* of the left thyroid cartilage lamina fracture (yellow arrow).

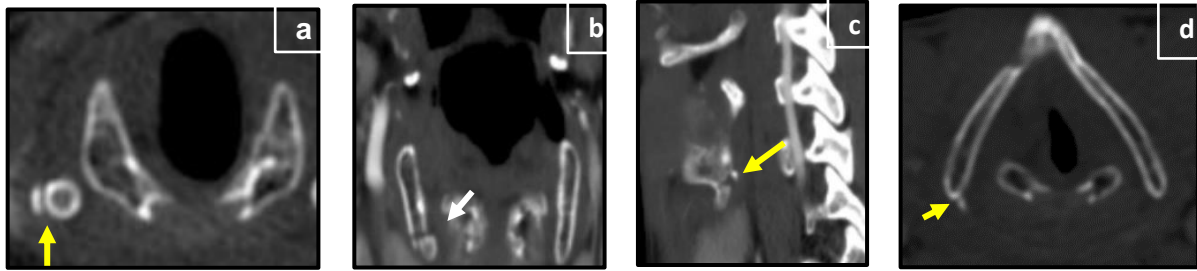


FIG. 2. (a) Axial 0.63 mm, (b) coronal and (c) sagittal CT contrast enhanced images at the level of the thyroid cartilage show displaced fracture of the inferior aspect of right thyroid lamina (yellow arrow). (d) Axial 2.5 mm CT image exhibits *suboptimal visualization* of the of the inferior aspect of right thyroid lamina fracture.

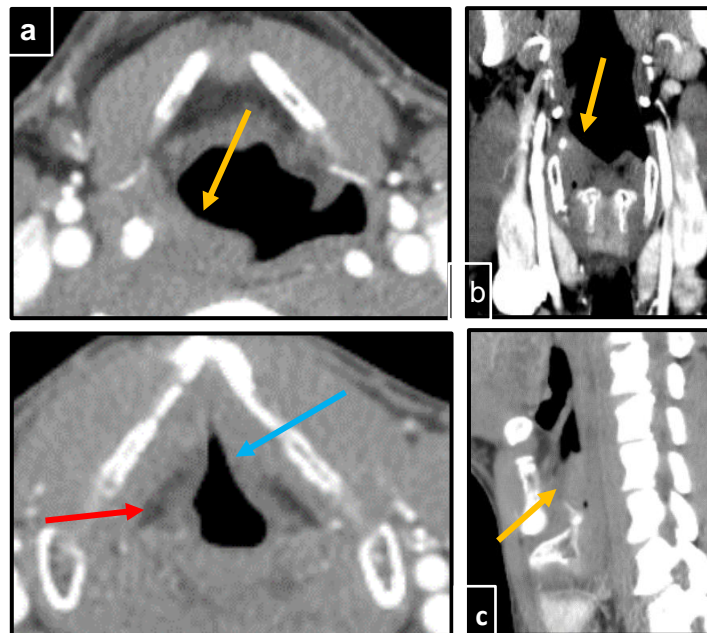


FIG. 3. (a) Axial, (b) coronal and (c) sagittal CT contrast enhanced images in soft tissue window represent asymmetric obliteration of the right pyriform sinus (orange arrow). (d) Axial CT contrast enhanced image in soft tissue window exhibit thickening of the true vocal cords (blue arrow), and edema of the false cords (red arrow).

### 3. Discussion

Spontaneous thyroid cartilage fractures, also referred to as non-traumatic thyroid cartilage fractures, are exceedingly rare and occur without any known external force or injury [2,4]. The thyroid cartilage is a sturdy structure that protects the larynx and plays a crucial role in maintaining the stability of the airway. Fractures of the thyroid cartilage are typically associated with trauma, such as motor vehicle accidents, assaults, or sports injuries [5,6]. However, spontaneous fractures occur in the absence of any apparent trauma, making them an unusual occurrence [3].

The underlying mechanism remains unclear due to the scarcity of reported cases [7]. One theory suggests that chronic inflammation of the laryngeal tissues, possibly due to conditions such as laryngitis or laryngeal reflux, may weaken the thyroid

cartilage over time, making it more susceptible to fracture. Other potential contributing factors include underlying metabolic bone diseases, such as osteoporosis or osteomalacia, abnormal ossification processes or anatomical variations in the thyroid cartilage [6].

Establishing the diagnosis can be challenging due to rarity and the absence of a clear traumatic history. Patients may present with acute or persistent neck pain, difficulty swallowing, changes in voice quality, or respiratory distress [2,6]. Clinical examination may reveal tenderness over the laryngeal area, localized swelling, or abnormal mobility of the larynx. Direct visualization with endoscopy can be performed to evaluate airway patency and to rule out other possibilities for the same clinical picture, for example: Laryngitis, vocal cord polyps, or paralysis. In the case of thyroid cartilage rupture, the exam may reveal edema over larynx and subglottic region, vocal cord hematoma and/or obliteration of the pyriform sinus. The true vocal cord movement is usually normal [2,4,5]. Imaging studies, such as radiographs (X-rays), computed tomography (CT), or magnetic resonance imaging (MRI), may be utilized to visualize the fracture line or assess any associated soft tissue injuries [3].

Radiographs can provide an initial assessment of the thyroid cartilage, although they may have limited sensitivity in detecting subtle fractures [3]. Fracture lines may appear as discontinuities or irregularities in the contour of the thyroid cartilage. However, in non-displaced or minimally displaced fractures, the radiographs may be inconclusive [3,5].

CT is the modality of choice as it can clearly demonstrate the fracture lines, displacement, and associated injuries [3,4]. Thin axial cuts, 0.63 mm or at least 1.25 mm, provide higher sensitivity for subtle fractures. Three-dimensional reconstructions from CT scans can help visualize the fracture pattern and assist in surgical planning. CT can also help identify concurrent injuries to the surrounding structures, such as the hyoid bone, laryngeal soft tissues, or cervical spine [3].

MRI may be utilized to assess damage to laryngeal structures, including vocal cords, and aid in assessing the overall integrity of the larynx [8].

Radiological and clinical findings need to be interpreted in conjunction [4,6]. It is important to evaluate the extent of the injury, particularly to assess for any signs of airway compromise, including narrowing or distortion of the airway, as this can influence management decisions [5].

The management primarily focuses on preservation of airway function, symptom relief, and prevention of complications. Conservative measures include pain management, voice rest, and close monitoring for any signs of airway compromise [5,7]. In more severe cases or when airway compromise is suspected, surgical intervention may be necessary to stabilize the fracture or address any concurrent injuries. Surgery may involve the use of fixation techniques or reconstructive procedures to restore the integrity of the laryngeal framework [5]. Long-term follow-up is crucial to monitor for potential complications, such as delayed healing, vocal cord dysfunction, or the development of voice disorders.

#### 4. Conclusion

Spontaneous thyroid cartilage fractures are rare and occur without any apparent external trauma. The exact mechanism remains not fully understood. Clinicians should maintain a high level of suspicion for it when evaluating patients with unexplained acute neck pain, voice changes, swallowing difficulties, or respiratory distress. The role of radiology is critical in establishing the diagnosis and evaluating the extent of this injury. Computed tomography (CT), of the neck with thin axial cuts of 0.63 mm, or at least 1.25 mm, is what we recommend for best evaluation.

#### 5. Statements and Declarations

The authors have no relevant financial or non-financial interests to disclose.

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