

Cricoid and Thyroid Cartilage Fracture, Cricothyroid Joint Dislocation, Pseudofracture Appearance of the Hyoid Bone: CT, MRI and Laryngoscopic Findings

Krikoid ve Tiroid Kartilaj Fraktürü, Krikotiroid Eklem Dislokasyonu ve Hiyoid Kemikte Yalancı Kırık Görünümü: BT, MRG ve Laringoskopi Bulguları

Yeliz Pekçevik¹, İbrahim Çukurova², Cem Ülker²

¹Clinic of Radiology, İzmir Tepecik Training and Research Hospital, İzmir, Turkey

²Clinic of Otolaryngology, İzmir Tepecik Training and Research Hospital, İzmir, Turkey

Abstract

We report a case of cricoid and thyroid cartilage fracture and cricothyroid joint dislocation after blunt neck trauma. Direct fibreoptic laryngoscopic, computed tomography (CT) and magnetic resonance imaging (MRI) findings were discussed. Pseudofracture appearance of the hyoid bone were reviewed. (*JAEM 2013; 12: 170-3*)

Key words: Cartilage, computed tomography, endoscopy, fracture, magnetic resonance imaging

Özet

Künt travma sonrası krikoid ve tiroid kartilaj fraktürü ve krikotiroid eklem dislokasyonu olan bir olgunun direkt fiberoptik laringoskopik, bilgisayarlı tomografi (BT), manyetik rezonans görüntüleme (MRG) bulgularını sunduk. Hiyoid kemiğin yalancı kırık görünümü gözden geçirildi. (*JAEM 2013; 12: 170-3*)

Anahtar kelimeler: Kartilaj, bilgisayarlı tomografi, endoskopi, kırık, manyetik rezonans görüntüleme

Introduction

Laryngeal trauma is extremely rare and usually occurs as a result of blunt trauma. The most common cause of the blunt laryngeal trauma is a motor vehicle accident but it can also occur as a result of relatively minor insults to the anterior neck that cause posterior compression of the larynx against the spine.

Injury to the larynx may range from simple mucosal tears to laryngeal cartilage fracture and dislocation. It may be associated with hyoid fractures, epiglottic injury, cervical spine fractures and esophageal or vascular injuries. As it may lead to life-threatening airway obstruction, rapid and accurate diagnosis is essential for proper treatment.

We report computed tomography (CT), magnetic resonance imaging (MRI) and serial endoscopic findings of a patient with cricoid and thyroid cartilage fracture and cricothyroid joint dislocation after blunt neck trauma.

Case Report

A 84-year-old man, with blunt neck trauma after falling down, presented to the emergency department with dyspnea. He had stridor, dysphagia, dysphonia and neck ecchymosis. Laryngeal injury was suspected by the history and physical examination. After ruling out cervical trauma with radiography and clinical examination, direct fibreoptic laryngoscopy and contrast-enhanced CT was performed.

The direct fibreoptic laryngoscopic examination showed severe swelling and hemorrhage of the epiglottis, left aryepiglottic fold, left vocal cord and left lateral and posterior pharyngeal wall that nearly closed the rima glottis (Figure 1). Bilateral vocal cord movements were normal. Computed tomography with coronal and sagittal reformation revealed swelling in the mucosa (Figure 2a, b), multiple minimally displaced cricoid cartilage fractures, a nondisplaced linear thyroid cartilage fracture and cricothyroid joint dislocation (Figure 3a, b). There was an asymmetric linear line in the hyoid bone with synchron-



Correspondence to / Yazışma Adresi: Yeliz Pekçevik, Gaziler Cad. No: 468, Yenişehir 35110, İzmir, Turkey
Phone: +90 232 469 69 69 e-mail: yelizpekcevik@yahoo.com

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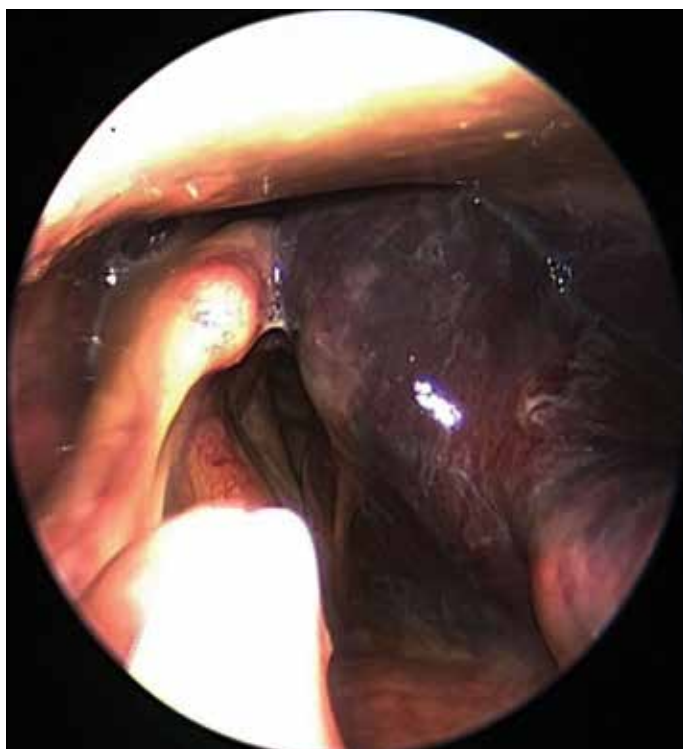


Figure 1. Direct laryngoscopy shows severe swelling and hemorrhage of left aryepiglottic fold, left lateral and posterior pharyngeal wall, epiglottis and left vocal cord that nearly closed the rima glottis

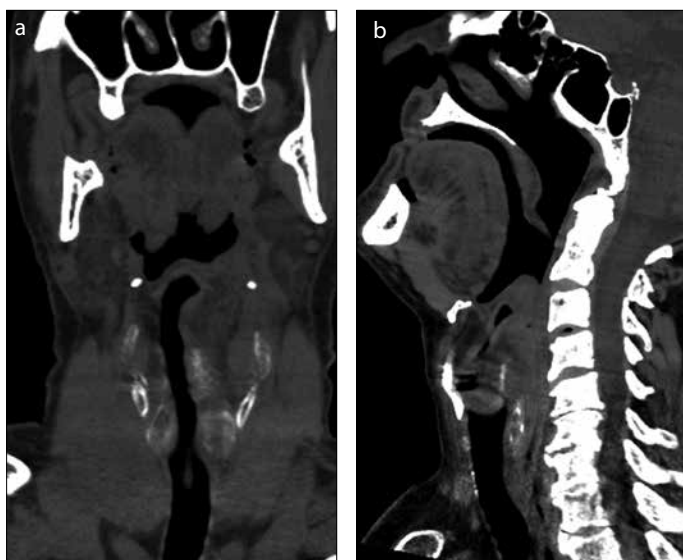


Figure 2. a) Coronal and b) sagittal CT reformation shows swelling and hematoma of laryngeal soft tissues that partially closed the left airway

drrosis of the hyoid bone, which was initially suspected as a hyoid bone fracture (Figure 3c). Magnetic resonance imaging was obtained for a potential vascular dissection but images were degraded because of motion artifacts. There was no vascular injury. On T1 and fat suppressed T2 weighted images, the edema and hemorrhage of the left vocal cord, aryepiglottic fold, lateral and posterior pharyngeal wall were well demonstrated. On T1 weighted images fracture of the cricoid and thyroid cartilage were evaluated (Figure 4a-c).

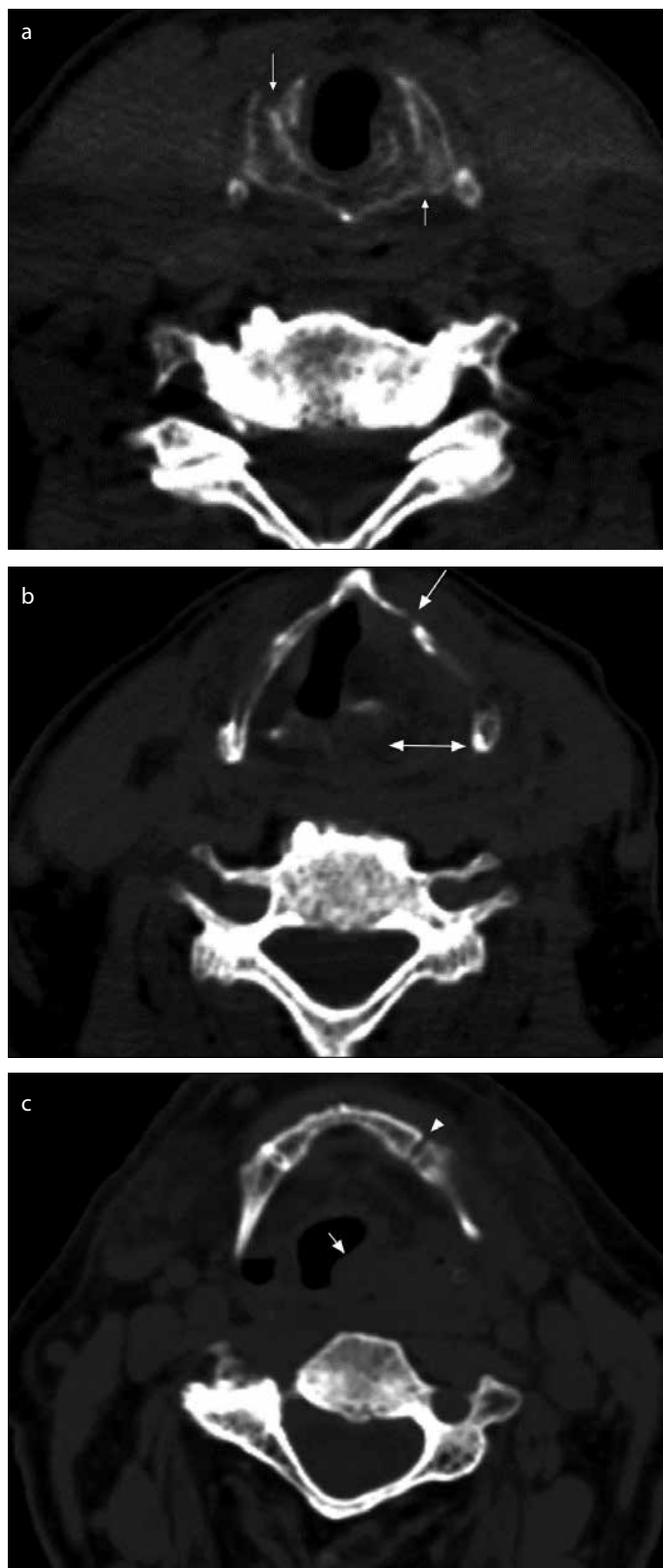


Figure 3. Axial non contrast CT examination shows; (a) multiple minimally displaced cricoid cartilage fracture (arrows), (b) a nondisplaced linear thyroid cartilage fracture (arrow) and cricothyroid joint dislocation (double ended arrow), (c) left aryepiglottic fold and left lateral and posterior pharyngeal wall hematoma (arrow), unilateral absence of bony fusion of the hyoid bone, that was initially suspected as hyoid bone fracture and was diagnosed as synchondrosis of the hyoid bone (arrowhead)

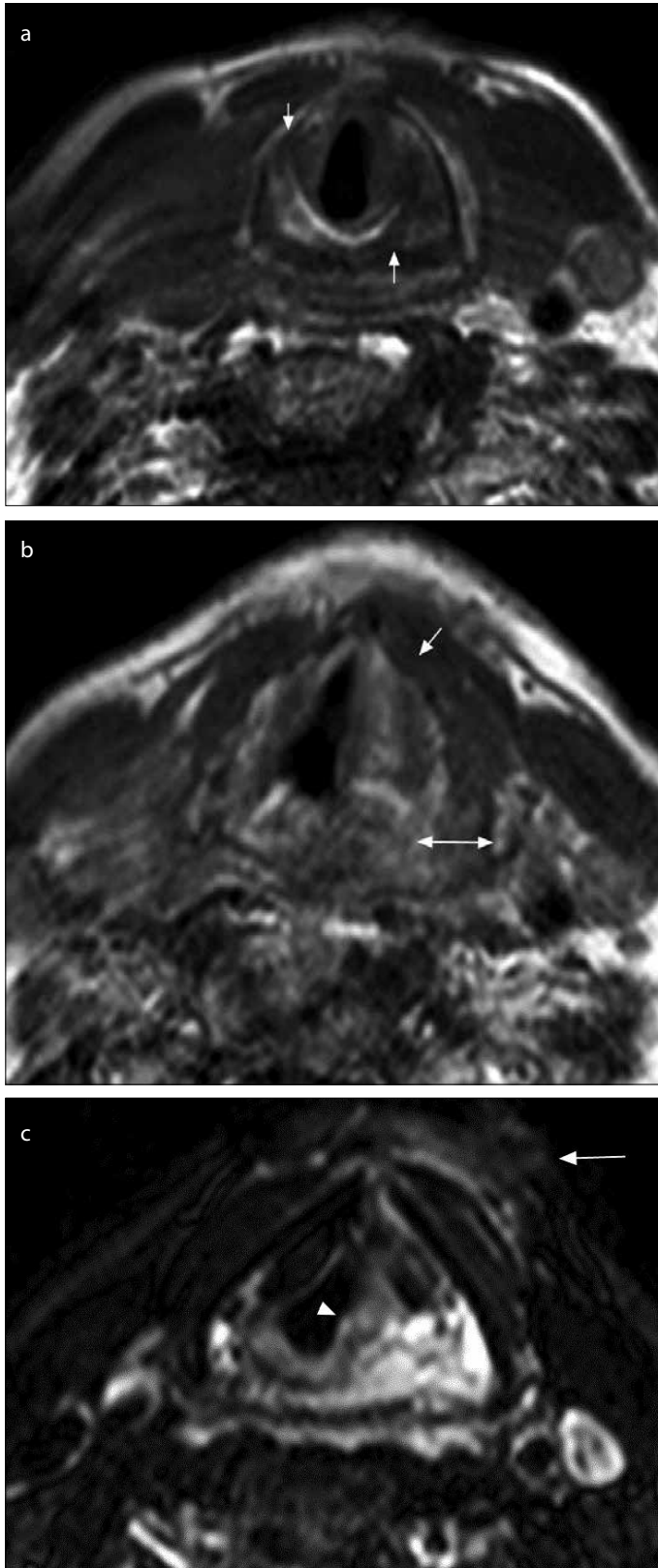


Figure 4. Axial T1 weighted images show (a) multiple minimally displaced cricoid cartilage fracture (arrows), (b) a non displaced linear thyroid cartilage fracture (arrow) and cricothyroid joint dislocation (double ended arrow) as well as soft tissue hematoma on the left. (c) On fat suppressed T2 weighted images, the edema and hemorrhage of the laryngeal mucosa and subcutaneous fat is evident

The patient was treated conservatively, including continuous monitoring of the clinical symptoms. Swelling and hemorrhage of the upper airway were followed by repeated direct fiberoptic laryngoscopy. The symptoms completely disappeared after one week. Laryngoscopic examination at the end of the second week showed regression of the swelling and hemorrhage. The patient was discharged after the last laryngoscopy without complication. Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Discussion

Laryngeal trauma is a rare condition because the larynx is protected by the mandible, sternum, cervical spine and sternocleidomastoid muscle. This protection is amplified in the pediatric population secondary to the high position of the larynx and its elastic nature. Laryngeal fractures are more common in older person because of calcification of the laryngeal cartilages.

Trauma to the larynx usually occurs as a result of a blunt trauma. Motor vehicle accidents are the most common cause. Clothesline injury, manual strangulation, hanging, penetrating injury and iatrogenic injury from intubation may cause laryngeal trauma (1). Blunt injuries can also occur as a result of relatively minor insults to the anterior neck that cause posterior compression of the larynx against the spine, as with our patient (2).

Common signs of laryngeal trauma include stridor, dyspnea, cough, hemoptysis, dysphonia, dysphagia, subcutaneous emphysema, hematoma and neck ecchymosis. A high degree of suspicion is the most important factor for the early diagnosis of laryngeal trauma because severe internal injury may have minor symptoms (1-5).

Endoscopy is superior to CT in the estimation of mucosal or vocal cord changes. Any patient who has evidence of laryngeal trauma based on examination findings should undergo CT imaging of the larynx, if stable. Multidetector computed tomography, with coronal and sagittal reformatted images is extremely helpful for early diagnosis of the laryngeal cartilage fractures. We can also evaluate the cervical spine and vascular injuries.

Fractures appear as discontinuities of the cartilage, with or without displacement, on thin slice and contrast enhanced CT. Reviewing both bone and soft tissue windows is important because soft tissue windows are helpful for poorly ossified cartilage fractures (1).

Laryngeal cartilage has a typically three-layer appearance: high signal bone marrow being surrounded by low signal cortical rims on MRI. It should be performed in patients that have a suspected fracture that could not be seen by CT. Fracture of the non-calcified cartilage, seen in pediatric patients, and soft tissue trauma are better evaluated with MRI. However, it is slower than CT and therefore motion artifacts from breathing, carotid artery pulsation and swallowing may degrade images.

Laryngeal trauma is classified as a group 1 minor hematoma, no fracture; group 2 non displaced fracture; group 3 stable displaced fracture, group 4 unstable displaced fracture and group 5 laryngotracheal disinsertion (1, 3-5). According to this classification, Group 1 and 2 were treated with conservatively while others required tracheotomy and surgery (3, 4). With significant advances in direct fiberoptic laryngoscopy, accurate assessment of rima glottis and serial examinations can be done (2). Our patient had a displaced cricoid fracture on CT but direct fiberoptic laryngoscopy revealed mobile

vocal cords with adequate opening of the rima. He was treated conservatively with a successful outcome.

Laryngeal trauma is commonly associated with hyoid fractures. Fractures are usually located at the body of hyoid bone. The synchondrosis between the greater horn and the body of hyoid bone is seen as a vertical radiolucent line, which may be mistaken for a fracture. It is a normal feature in many hyoid bones, especially in the younger age group. In the older age group especially when there is a unilateral nonfusion, it can be misinterpreted as a fracture (6, 7).

Conclusion

Laryngeal trauma is a rare condition and a high degree of suspicion is the most important factor for diagnosis. After clinical examination, CT imaging should be obtained for evaluation of the cartilage fractures and dislocation. MR imaging is useful for demonstrating the non-ossified cartilage fracture, soft tissue edema and hemorrhage. Serial monitoring of the clinical symptoms and airway patency by direct fiberoptic laryngoscopic examination is the choice of treatment in stable patients. Laryngeal fractures are usually associated with hyoid fracture. The synchondrosis of the hyoid bone should not be misdiagnosed as a fracture.

Conflict of Interest

No conflict of interest was declared by the authors.

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Informed Consent: Written informed consent was obtained from patients who participated in this case.

Author Contributions

Concept - Y.P.; Design - Y.P., I.C.; Supervision - Y.P., I.C.; Funding - Y.P., C.U.; Materials - Y.P., C.U.; Data Collection and/or Processing - Y.P., C.U., I.C.;

Analysis and/or Interpretation - Y.P., I.C.; Literature Review - Y.P., I.C.; Writer - Y.P.; Critical Review - Y.P., I.C., C.U.

Çıkar Çatışması

Yazarlar herhangi bir çıkar çatışması bildirmemişlerdir.

Hakem değerlendirmesi: Dış bağımsız.

Hasta Onamı: Yazılı hasta onamı bu olguya katılan hastalardan alınmıştır.

Yazar Katkıları

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