

Common Findings in Blunt Thyroid Fracture

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ABSTRACT

Although blunt neck trauma is known to be rare, occurring in approximately 5% of all neck traumas, undiagnosed cases may have a devastating outcome. Physicians need to fully understand the mechanism of the injury and the external laryngeal trauma signs. A physician's precise diagnosis and proper management are necessary to avoid long-term complications or death. Although blunt laryngeal injuries are uncommon, prompt recognition of the subtle signs is crucial to avoid the catastrophic complications associated with such injuries. This case report aims to demonstrate the symptoms and signs of laryngeal injury in a young healthy male following a road traffic accident.

Key words: Airway compromise, blunt airway injury, laryngeal trauma

INTRODUCTION

Laryngeal trauma is a rarely encountered event. Due to its uncommonness, many cases may go undetected. The consequences of blunt laryngeal injury can be life-threatening, which makes early recognition and management vital.^[1-8]

CASE REPORT

A 21-year-old healthy male driver involved in a motor vehicle accident presented to the emergency room. He had been driving his vehicle at an estimated speed of 100 km/h when he collided with a stationary car. There is no evidence that the patient was under the influence of any substance. However, he was not wearing a seatbelt and his airbag did not deploy. This resulted in the direct impact of the patient into the steering wheel. After a transient loss of consciousness, the patient was aware of being rescued by the paramedics.

When the patient was brought to the Emergency Department of the Bahrain Defense Force Hospital, he was assessed using the Advance Trauma Life Support protocol. He was fully conscious and stable, with a Glasgow coma score of 15/15. However, the patient had a linear laceration of 5 cm on his forehead that was later sutured. He also presented with right periorbital swelling and bruising associated with right nasal bone bridge depression. Furthermore, the patient was noted to have an anterior midline transverse neck bruise in Zone 2 [Figure 1]. Other than that, the patient was completely stable with no symptoms of airway compromise and only had generalized body ache that was managed with mild analgesia.

Thirty minutes after the initial presentation, the patient's condition deteriorated, and he developed inspiratory stridor, inability to speak complete sentences and was gasping for air. His oxygen saturation dropped to 80% and the Glasgow coma score dropped to 7/15. At this

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point, the patient was immediately intubated and oxygen saturation picked up to 96%. Interestingly, the intubating physician found no obvious abnormality in the airway and faced no difficulty in intubation. The patient was transferred to the Intensive Care Unit (ICU), where he was kept for observation.

Computed tomography scan of the brain, chest, spine and abdomen showed no abnormalities, apart from a right stable undisplaced thyroid cartilage fracture with soft tissue edema in the hypopharynx, larynx and subglottic space [Figure 2a and b] plus right nasal bone fracture. Carotid Doppler was also performed and showed no vascular injuries. The patient was then examined by the ENT team; a flexible fiberoptic nasolaryngoscopy showed edematous swelling of the hypopharynx with the loss of anatomical landmarks. The patient was prescribed steroids and kept on anti-reflux measures. On the 3rd day in the ICU, computed tomography of the neck was repeated, which showed a regression of the swelling and that the thyroid cartilage fracture remained stable [Figure 2c].

Repeated fiberoptic scope examination showed normal airway anatomy. Consequently, the patient was extubated, transferred to the ward and was gradually given food. After 24 hours, the patient was discharged, and a few weeks later, was seen in the outpatient clinic, when flexible fiberoptic nasolaryngoscopy was again performed and its findings were normal.

DISCUSSION

Injuries to the upper airway are sporadic; moreover, laryngeal injuries are less frequently encountered. Over a period of 27 years, Schaefer reported an incidence of 1

blunt laryngeal injury in 30,000 emergency visits, while Jalisi and Zoccoli reported the occurrence of 12 cases in 10 years.^[1,2] The rarity of this trauma is due to the bony framework of the mandible, sternum and cervical spine which engulfs the larynx.

Laryngeal injuries can be classified as blunt or penetrating injuries. Blunt laryngeal injuries are more common and causes include strangulation, hanging, clothesline injury and, most commonly, road traffic accidents also known as padded dash syndrome.^[3] Padded dash syndrome is an injury that correlates with rapid acceleration or deceleration and a direct blow to the anterior region of neck on the steering wheel or dashboard caused by the driver being thrust forward with the neck in extension, thereby rendering the protective function of the jaw ineffective. The larynx cartilages can get crushed against cervical spine as soon as the front region of the neck strikes against the dashboard or steering wheel. The airway is protected from blunt injuries by both the thyroid and cricoid cartilages. However, when the anterior region of the larynx faces a force against it, often, the thyroid cartilage encounters the force first, and on impact, the thyroid cartilage bends against the neck region of the spine. Eventually, the thyroid cartilage reaches maximal flexibility, causing a fracture, often around the midline of the cartilage.^[4,9,10] This mechanism of injury is applicable

Table 1: Schaefer–Fuhrman classification for laryngeal injuries

Group	Injury
I	Minor endolaryngeal hematoma, edema or laceration without detectable fracture
II	Edema or hematoma, minor mucosal disruption without exposed cartilage and nondisplaced fractures noted on computed tomography scan
III	Massive edema, mucosal disruption, displaced fractures, exposed cartilage and/or cord immobility
IV	Group III + two or more fracture lines, skeletal instability or significant anterior commissure trauma
V	Complete laryngotracheal separation



Figure 1: External neck sign (anterior midline horizontal bruise)

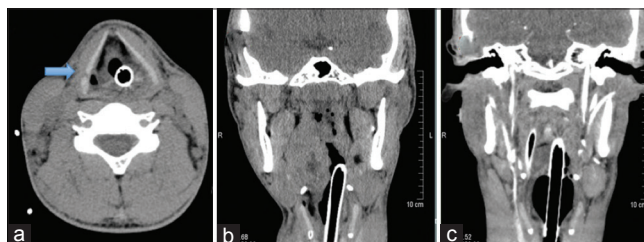


Figure 2: (a) A transverse view of a computed tomography scan laryngeal image showing minor right undisplaced thyroid fracture; (b) A coronal computed tomography scan image showing the swelling in the surrounding soft tissue; (c) A coronal view computed tomography scan neck image after management

Table 2: Schaefer's management of laryngeal trauma

Group	Symptoms	Signs	Management
I	Minor airway symptoms	Minor hematoma, no fracture	Observation, humidified O ₂
II	Airway compromise	Edema, mucosal disruption	Tracheostomy, direct laryngoscopy, esophagoscopy
III	Airway compromise	Massive edema, exposed cartilage, vocal cord immobility	Tracheostomy, exploration/repair
IV	Airway compromise	Massive edema, exposed cartilage	Tracheostomy, exploration/repair, stent required

in our case wherein the patient's neck collided with the steering wheel.

Numerous articles in literature have emphasized the importance of early recognition and proper management of laryngeal injury to avoid instant or future complications.^[1-8] The key to efficient care of such trauma is to have a high index of suspicion and comprehension of the mechanism of the injury. Hoarseness of voice is one of the most commonly encountered symptoms in blunt laryngeal injuries. Juutilainen *et al.* reported that hoarseness of voice was a presenting symptom in 28 of 33 cases of external laryngeal trauma he reviewed.^[3] Other symptoms include hemoptysis, dysphagia, neck pain and/or stridor. In this case, overlooking the anterior neck bruise prevented the physicians from suspecting laryngeal trauma. Subsequently, the patient developed inspiratory stridor, which alerted the treating physicians to the possibility of a laryngeal injury.

Once a laryngeal injury is suspected, a prompt management plan should be developed. Schaefer–Fuhrman classification is often used to draw a systemic graft of management [Table 1].^[5] According to the Schaefer classification, our patient was classified as Group II with a stable thyroid cartilage fracture that was identified in the computed tomography scan [Figure 2a]. Computed tomography scanner is considered the gold standard modality to confirm laryngeal injuries, given that the patient's condition permits it. It is mandatory that the thickness of slices does not exceed 1 mm, as the slice thickness determines the effectiveness of detecting fractures. Further, it is essential to evaluate soft tissue, which reveal subtle fracture lines in ossified cartilages, and bone windows, which provide enhanced assessment of submucosal tissues and nonossified cartilages.^[5]

Flexible fiberoptic nasolaryngoscopy is another examination modality that allows assessment of any mucosal injury, edema and vocal cord function. In this case, a flexible fiberoptic nasolaryngoscopy showed the extent of mucosal swelling that was compromising the airway. However, the scope was performed after the patient's airway was secured with an endotracheal tube. Once a laryngeal injury is suspected, securing the airway is of paramount importance.

Management of such cases may be either conservative or invasive, depending on the extent of injury. According to Schaefer's insinuated plan of management, Groups I and II can be managed conservatively, while Groups III and IV are managed surgically if the airway is secured in all groups [Table 2].^[6] Though endotracheal intubation was not included in the management recommended by Schaefer, we were fortunate that it was feasible in our patient. Endotracheal intubation in laryngeal injuries can be very difficult due to distorted anatomy and will need experienced hands to avoid additional laryngeal damage.^[5,7] In a recent analysis of 564 cases of laryngeal trauma by Mendelsohn *et al.*, a recommendation of early tracheostomy within 24 h was found to decrease the length of admission to the ICU and the ward.^[8]

Fortunately, the patient had a minor undisplaced thyroid cartilage fracture that did not need any surgical intervention. Therefore, the patient was managed conservatively with steroids and anti-reflux measures, which were taken to avoid further damage to the laryngeal mucosa.

CONCLUSION

While blunt laryngeal injuries are uncommon, prompt recognition of subtle signs is crucial to avoid the catastrophic complications associated with it.

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Conflicts of interest

There are no conflicts of interest.

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