Early Diagnosis of Pediatric Laryngotracheal Rupture Following Minor Blunt Trauma

Maria Ramos-Fernandez, Joakyna De Santiago, Javier Baez and Joanna Mercado

Department of Emergency Medicine, University of Puerto Rico, Medical Sciences Campus, San Juan, Puerto Rico, USA

Abstract

Laryngotracheal rupture is a rare but life-threatening condition that most commonly occurs after trauma to the chest or neck. Mechanism of injury involves large amounts of force. Therefore, injury is rare with low-impact trauma. It is important to keep in mind that physical exam and symptoms on presentation do not necessarily correlate with the severity of the injury.

Case Presentation: 14 year-old male who presented to the Emergency Department (ED) fast track area with neck discomfort after minor blunt trauma to the anterior aspect of neck, while running. Patient went home, developed throat pain, mild hemoptysis and hoarseness. Therefore, mother decided to bring him to the ED. On physical exam, patient was found with mild subcutaneous emphysema of the neck and upper chest. Neck for soft tissue and chest radiograph confirmed the clinical impression of suspected tracheal rupture in view of subcutaneous emphysema and pneumomediastinum. Patient was transferred for ENT evaluation where neck CT showed complete laryngotracheal rupture. Patient required surgical management for lesion repair.

Conclusion: Emergency Physicians should have a high level of suspicion in the presence of neck minor trauma where there may be a possibility of laryngotracheal injury. The patient’s outcome depends to a great degree on early diagnosis.

Background

Laryngotracheal injuries are rare and carry a high mortality rate [1-3]. Unrecognized tracheal injury has been reported to have up to 92% mortality [4]. Tracheal rupture commonly results from acceleration-deceleration injuries from motor vehicle accidents, blows to the neck or strangulation. They may also occur as a rare complication of endotracheal intubation [5]. Patient usually present with symptoms such as hoarseness, pain, dyspnea or stridor, cough and odynophagia. Possible physical exam findings may include tenderness to palpation of larynx or trachea, ecchymosis or hematoma of the neck. However, the most significant finding is the presence of subcutaneous emphysema of the neck that may extend into the chest area [6]. The diagnosis of isolated tracheal rupture is very important for treatment and prognosis [3,4]. Only an urgent surgical exploration can ensure a long-term good outcome [1,2]. We present the case of a pediatric patient with tracheal rupture who arrived with minimal symptoms and reported an atypical and unusual mechanism of injury.

Case Presentation

A 14 year-old male without past medical history arrived with his mother to the Emergency Department fast track area complaining of throat pain. He was ambulating unassisted, and stated anterior neck pain and mild hoarseness, after he received neck trauma with a rope while running. Upon evaluation patient had, stable vital signs and protecting his airway, he was placed on oxygen therapy and radiologic images were obtained. They revealed significant subcutaneous emphysema with pneumomediastinum (Figure 1). Patient was then transferred uneventfully to trauma center for ENT evaluation, where he was diagnosed with tracheoesophageal tear at level of C4-C5 (Figure 2).

Discussion

Tracheobronchial rupture is rare. It is commonly associated with penetrating neck and chest trauma. However, the literature describes, an increasing incidence among blunt trauma patients [7-10]. It is particularly seen in high energy mechanisms like for example motor vehicle collision. Only 265 cases are reported in the literature between 1873–1996. Of those cases, only 19% had tracheal injury alone and the rest had bronchial involvement [9]. The low incidence might be explained by the protection of trachea through its anatomical location behind mandible, sternum, and the first four ribs. Another reason could also be the structural cartilaginous support that makes the trachea flexible, elastic and mobile [11]. This flexibility is particularly more prominent on pediatric patients, making rupture less common [12,13].

Clinical manifestations of tracheal injury involve non-specific symptoms such as: dyspnea, cough, hemoptysis and cyanosis [8,14]. After literature review, the key clinical signs include subcutaneous emphysema, pneumomediastinum, pneumothorax, and respiratory

*Corresponding author: Maria Ramos-Fernandez, Department of Emergency Medicine, University of Puerto Rico, Medical Sciences Campus, San Juan, Puerto Rico, USA, E-mail: mariarramos@gmail.com

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However, patients had associated injuries in 50%-100% of the cases high energy trauma, (Martel), with an incidence between 1%-2% [7].

and esophagus. Similar injuries are described in literature related to the severe injury extension such as involvement of cervical trachea classified as rare because of the low energy mechanism, but also due to the severe injury extension such as involvement of cervical trachea and esophagus. Similar injuries are described in literature related to the severe injury extension such as involvement of cervical trachea and esophagus. Similar injuries are described in literature related to the severe injury extension such as involvement of cervical trachea and esophagus.

Low energy trauma to the neck. J Laryngol Otol 111: 1079-1081.

Corsten G, Berkowitz RG (2002) Membranous tracheal rupture in children following minor blunt trauma: diagnosis and management. Anaesth Intensive Care 30: 145-152.

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We found several case reports about tracheal lesions associated with minor traumatic mechanisms. Natarajan et al. presented the case of a 61y/o male with anterior tracheal rupture after a 6 feet fall [14]. Corsten and Berkowitz presented two pediatric patients of 9 months and 5 years, with tracheal rupture after falling from a bench and against a drawer respectively [12]. A more recent case from Fette [18] was an 8y/o boy with tracheal rupture after he hit the water surface with an over extended neck. All cases are similar in the less expected, low energy mechanism of injury. However, this case can be classified as rare because of the low energy mechanism, but also due to the severe injury extension such as involvement of cervical trachea and esophagus. Similar injuries are described in literature related to high energy trauma, (Martel), with an incidence between 1%-2% [7]. However, patients had associated injuries in 50%-100% of the cases reported. Therefore, this case is unique also in the isolated nature of the injury [7,9]. Mortality can range from 20%-50%, [6,15] of those patients that reach the hospital. This is often due to associated injuries. Morbidity can range from 10%-25% often due to failure of early recognition and the complications of airway obstruction, atelectasis, and stenosis [9,15]. Currently, there is still controversy about early vs. delayed repair and conservative vs surgical management among specialists, but they all agree in that early recognition is essential to improve morbidity and decrease mortality. When a patient comes to the emergency department, physicians should have a low threshold for extensive evaluation that include images on any patient presenting with neck trauma, even with trivial mechanism, and particularly in those presenting with subcutaneous emphysema, stridor, hoarsness with or without respiratory symptoms. As seen in this case, external injuries could be minimal or even absent on patient arrival, not correlating with the severity of damage [18]. Clinical suspicion is a key aspect for prompt diagnosis and subsequent management.

Conclusion

Laryngotracheal rupture following blunt neck trauma is rare and can be initially overlooked. However, timely recognition and treatment is important in order to decrease bad outcomes. Therefore, Emergency Medicine and Trauma Physicians should have a high index of suspicion for this type of lesion, regardless of the mechanism of trauma, and minor symptomatology. This would enable a prompt diagnosis, appropriate treatment by ENT subspecialist and decreased morbidity and mortality.

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