

Tracheobronchial Rupture due to Compression Under a Cannon Barrel

Savaş Topu Namlusu Altında Kalmaya Bağlı Trakeobronşial Rüptür

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ABSTRACT

Tracheobronchial ruptures following blunt thoracic trauma are rare in children. To our knowledge, there is no reported case of tracheobronchial rupture due to compression under the barrel of a cannon. The involvement of both the trachea and right main bronchus is highly unusual. The case of a 16-year-old boy with both distal tracheal and right main bronchial ruptures following blunt chest trauma is herein reported, in which we emphasize the need for a prompt diagnosis and appropriate management. (*Tur Toraks Der 2012; 13: 28-9*)

Key words: Tracheobronchial rupture, barrel of cannon, trauma

Received: 02.09.2009

Accepted: 07.10.2011

ÖZET

Çocuklarda künt göğüs travması sonrası trakeobronşial rüptürler nadirdir. Bildiğimiz kadar, literatürde savaş topu namlusu altında kalmaya bağlı trakeobronşial rüptür olgusu yoktur. Hem trakea hem sağ ana bronşu kapsayan rüptür oldukça nadir görülür. Bu çalışmada trakeobronşial rüptürlerde acil tanı ve uygun tedaviyi vurgulamak amaçlı, künt göğüs yaralanması sonrası yaygın cilt altı amfizem, bilateral pnömotoraks, pnömo-medyastinum, hem distal trakea hem sağ ana bronş rüptürü olan 16 yaşında erkek çocuğu olgusu sunuldu. (*Tur Toraks Der 2012; 13: 28-9*)

Anahtar sözcükler: Trakeobronşial rüptür, savaş topu, travma

Geliş Tarihi: 02.09.2009

Kabul Tarihi: 07.10.2011

INTRODUCTION

Traumatic injuries of the tracheobronchial system are rare, but a big challenge for the clinician in early diagnosis and optimal management for the prevention of high fatality and morbidity [1]. Early appropriate management can reduce the incidence of morbidity and death due to chronic bronchopleural fistula, empyema, and mediastinitis [2,3]. The case of a 16-year-old boy with both distal tracheal and right main bronchial ruptures following blunt chest trauma is herein reported, in which we emphasize the need for prompt diagnosis and appropriate management.

CASE

A 16-year-old boy was compressed under the barrel of a cannon measuring 30 cm in diameter and 2 m in length (Figure 1). When admitted to a local hospital, he had progressive respiratory distress and severe subcutaneous emphysema of the neck and thorax. Right pneumothorax and pneumomediastinum was noted on chest X-ray, and the patient was immediately transferred to our department for further management following the insertion of a right chest tube. He was semiconscious, dyspneic, and had gross subcutaneous emphysema extending from the neck to the anterior chest wall and persistent air leaks from a

chest tube on arrival. A chest X-ray showed bilateral partial expansion of the lungs and gross subcutaneous emphysema. A left thoracostomy tube was inserted immediately. The patient continued to have an air leak with bilateral pneumothorax. The patient was taken to theatre for emergency rigid bronchoscopy. Rigid bronchoscopy revealed a tear in the posterior membranous distal trachea (4 cm in length) and the posterior wall of the right main bronchus (2 cm in length).

The patient was immediately taken for a right posterolateral thoracotomy (through the fourth intercostal space). Selective intubation of the left main bronchus was performed. Tears of the membranous trachea and proximal right main bronchus were sutured (using interrupted 4-0 Vicryl, reinforced with a pleural flap). The patient recovered with normal lung expansion postoperatively. On the second postoperative day, he had atelectasis of the right lung that required bronchoscopy and suction. He was discharged on the seventh postoperative day. Six months later, he was asymptomatic and had normal chest x-ray findings.

DISCUSSION

Tracheobronchial ruptures are rare in children, the incidence being between 0.7% and 2.8% [4,5]. Eighty

This case was partly presented at the 5th Turkish Thoracic Surgery Congress, 14-17 May 2009, Kuşadası, Aydın.

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doi:10.5152/ttd.2012.06

percent of tracheobronchial rupture occurs within 2.5 cm of the carina, 15% involve the trachea, and 5% involve more distal airways [2,3]. The involvement of both the trachea and right main bronchus, as occurred in our case, is very rare. A linear tear of the posterior tracheal wall may be caused by sudden increases in intratracheal and intrabronchial pressures. This produces compression of the trachea between the sternum and vertebral column while the glottis is closed at the moment of impact in anticipation of the collision. When this intraluminal tension is greater than the elasticity of the tracheobronchial structures, rupture results [6]. In our case, we surmised that the compression of the barrel of the cannon, measuring 30 cm in diameter and 2 m in length, on the sternum resulted in an increase in the intratracheal and intrabronchial pressures and this caused the ruptures.

In the diagnostic pathways, the clinical examination is followed by radiologic imaging, computer tomography, and tracheo-bronchio-esophagoscopy. Chest radiographs are not diagnostic of tracheobronchial rupture but may give rise to sufficient suspicion, thus leading to a prompt diagnosis. The presence of pneumomediastinum, pneumothorax, or both may thus be suggested. The presence of bilateral pneumothoraces is more suggestive of tracheal lacerations and distal airway and/or parenchymal tears [2,3,7]. Computed tomography provides enhanced images of anatomical structures, in their retrospective study, Chen et al. [8] found only 85% sensitivity for detecting tracheal rupture in fourteen patients with such an injury. Since bronchoscopy remains the



Figure 1. The barrel of the cannon that fell on the 16-year-old boy

most reliable modality for defining the site, nature, and extent of tracheobronchial injury, it should be employed by experienced clinicians whenever such a diagnosis is suspected [6].

Early treatment minimizes the risk of infection and need for pulmonary resection. Optimal timing for surgery seems to be during the first 48 hours, when finding the ruptured segment is easy but becomes difficult in chronic cases [4,5]. Therefore, as in our case, emergency bronchoscopy is the most useful and accurate method in all cases with a suspicion of tracheobronchial injury. Surgery should be carried out as soon as a diagnosis is made and the patient's condition permits intervention. Primary repair is the gold standard for tracheobronchial injuries, and the key to successful treatment is airway management during surgery [2].

In conclusion, tracheal rupture should be suspected in cases with diffuse subcutaneous emphysema, pneumomediastinum, bilateral pneumothorax and active air leak from the chest tube. Early bronchoscopy and surgical intervention are paramount in minimizing morbidity and mortality in patients with traumatic tracheal injury.

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