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Visual Diagnosis in Emergency Medicine

MAINSTEM BRONCHUS TRANSECTION AFTER BLUNT CHEST TRAUMA

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INTRODUCTION

Mainstem bronchus transection is an uncommon injury after blunt chest trauma, but it is associated with high mortality. Early diagnosis of this injury may be difficult, but some radiographic signs can guide the emergency physician to identify this critical injury.

CASE REPORT

A 30-year-old man was brought to the Emergency Department 2 h after a motorcycle accident. He presented with chest pain and shortness of breath. He had diminished breath sounds in his right hemithorax and subcutaneous emphysema. He had low O₂ saturation despite 100% oxygen administration, severe respiratory distress, tachypnea and tachycardia, but no hypotension. An urgent right thoracostomy tube was placed with massive air drainage but minimal clinical improvement. The patient was still hypoxic and in persistent respiratory distress. A continuous massive air leak was found in the drainage system. A chest X-ray study was obtained, which confirmed successful tube placement but persistent right pneumothorax, and the “fallen lung sign” (Figure 1). The patient was then taken urgently to the Operating Room, where a right mainstem bronchus transection was confirmed, with no additional injuries found. A right pneumonectomy was performed, and the patient was transferred to the Intensive Care Unit. Unfortunately,

the patient died 3 days later, with respiratory insufficiency associated with the right pneumonectomy and pulmonary contusion of the left lung.

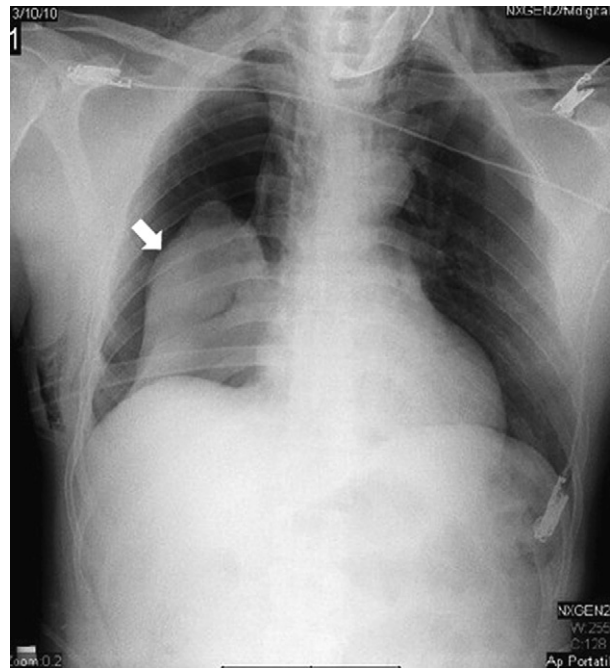


Figure 1. Fallen lung sign. Note the collapsed lung in a dependent position that appears to “fall away” from the mediastinum to the base of the thoracic cavity (white arrow).

DISCUSSION

The “fallen lung sign” refers to the collapsed lung in a dependent position, hanging on the hilum only by its vascular attachments (1). It is usually a result of a complete transection of the mainstem bronchus, and the lung appears to “fall” away from the mediastinum to the base of the thoracic cavity, in contrast to the usual pneumothorax finding of the lung collapsing towards the mediastinum (2). The sign was described by Oh et al. in 1969 indicating complete transection of mainstem bronchus, but was later found to be present in a computed tomography of a patient with partial bronchial rupture (1,3).

Complete transection of the mainstem bronchus is an uncommon complication after blunt chest trauma, being found in 1% of these patients. The usual mechanism in motor vehicle accidents is high-speed decelerating injury, and the tear is usually complete. The site of airway rupture primarily determines radiographic findings. If the rupture occurs within the pleural cavity, massive pneumothorax with continued air leak occurs. If the rupture occurs into the mediastinum and the parietal pleura is intact, then mediastinal air may be the only radiologic clue. Air may also dissect upward into the deep cervical tissues. The usual site of rupture is within 2.5 cm of the carina, and the right bronchus is injured more frequently than the left (4).

Most patients with tracheobronchial injuries after blunt chest trauma die at the scene or before reaching the hospital, as shown in a review of 1178 necropsy reports on persons dying after trauma in the years 1961–1966 (5–7). This study showed that 33 (2.8%) of these patients had tracheobronchial injuries, and 27 of

them (82%) died virtually instantly. Some authors have reported that the increased early mortality can be attributed to associated injuries rather than to the airway injury itself. A more recent review identifying all patients reported with blunt tracheobronchial injuries, reported a significant improvement in mortality, from 36% before 1950 to 9% since 1970 (8).

The “fallen lung sign,” although not common, is a very specific sign for mainstem bronchus transection, and thus very useful for the early diagnosis of this critical injury that requires urgent surgical management (1,9,10).

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