Transection of the right main bronchus
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Authors: Anne Paterson, Joe Hamill and Anamaria Gaca
Department of Radiology Royal Belfast Hospital for Sick Children 180 Falls Road Belfast BT12 6BE UK
*Division of Pediatric Radiology Department of Radiology Duke University Health System Durham, NC 27710 USA
Corresponding author: Dr Anne Paterson
Tel: +44 28 9063 2448 Fax: +44 28 9031 3798 Email: annie.paterson@belfasttrust.hscni.net

Patient: 11 years, male

Clinical History:
An 11-year-old boy suffered a crush injury to his chest. CXR demonstrated a right-sided pneumothorax, with the lung failing to re-inflate following insertion of an appropriately placed chest tube. CT demonstrated an avulsed right main bronchus, which was managed by primary repair.

Imaging Findings:
An 11-year-old boy was admitted via the emergency department, with a crush injury to his chest. He had fallen from a set of football goalposts he was swinging on, and they subsequently toppled over and landed on his chest. On admission, he complained of right-sided chest pain and shortness of breath. He was haemodynamically stable, but chest auscultation revealed absent breath sounds on the right side. A CXR showed a large right pneumothorax and fractures of the right clavicle and first rib. A chest tube was immediately inserted, but the right lung failed to re-inflate. Air continued to leak from the chest tube over the next few hours and the right lung remained collapsed. Injury to a major airway was clinically suspected and a CT scan was performed. The CT demonstrated complete transection of the right main bronchus at the level of the carina. At surgery, bronchoscopy confirmed the injury to the right main-stem bronchus. A thoracotomy was performed and the transected bronchus repaired. His post-operative recovery was uneventful.

Discussion:
Thoracic injury is a leading cause of death following trauma in children. However, tracheobronchial injury following blunt thoracic trauma is rare; it occurs most commonly as the result of motor vehicle collisions, falls or contact sports. Due to a child’s small body mass, the force applied in an impact results in a greater transmission of energy per unit body area. A child’s thorax is more pliable than that of an adult, and has less covering fat and connective tissue, meaning the underlying organs are in closer proximity to the transmitted energy that is applied. Internal thoracic and upper abdominal injuries frequently occur without overlying rib fractures, and their presence should alert the clinician to the possibility of the child having been subject to massive trauma. In such circumstances, careful clinical examination and imaging are required, to investigate the thoracic contents (remembering that trauma is no respecter of anatomic boundaries, and imaging of the head, spine and abdomen-pelvis may also be necessary). The signs of tracheobronchial injury are often rather non-specific, and therefore may be missed, leading...
to a delay in diagnosis. Indirect signs, which may be found clinically or noted on the chest radiograph include: pneumothoraces, a pneumomediastinum, subcutaneous emphysema and fractures involving the thoracic cage. More specifically, failure of the lung to re-inflate following correct placement of a chest tube and persistence of a pneumomediastinum, would suggest airway injury. The diagnosis can be confirmed with CT. Multi-detector row CT, with multi-planar reconstructions (and if necessary virtual bronchoscopy), will clearly show the injury; the defect most often being found within a few centimetres of the carina. The “fallen lung” sign describes the abnormal position of the (collapsed) involved lung, as it hangs from its vascular attachments at the hilum, and drops to the dependent portion of the chest cavity. Rarely observed, this appearance is seen following complete (rather than partial) bronchial transection. Management of tracheobronchial injuries is surgical with the success rate being influenced on the time from the accident to the time of diagnosis. Bronchoscopy is usually required to assess the full extent of the defect and can also aid selective endotracheal tube placement, allowing continued ventilation of the involved lung prior to definitive surgery.

**Differential Diagnosis List:** Transection of the right main bronchus

**Final Diagnosis:** Transection of the right main bronchus

**References:**


Description: Chest radiograph on admission. There is a large right-sided pneumothorax, a shallow left-sided pneumothorax and extensive subcutaneous emphysema. Both lungs are contused. The lateral aspect of the right clavicle is fractured, as is the right first rib. Origin:
Description: Chest radiograph following insertion of chest tube. The right lung has not re-inflated and the extent of subcutaneous emphysema has increased. Origin:
Description: Axial source image from CT study. The bilateral pneumothoraces, subcutaneous emphysema and lung contusions are well demonstrated. Air is seen tracking along the right lateral border of the trachea. Origin:
Description: Axial source image from CT study, showing transected right main bronchus, at the level of the tracheal bifurcation. A little air tracks anterior to the carina. The bilateral pneumothoraces and lung contusions are also seen. Origin:
Figure 5

**Description:** Coronal MPR image from CT study, demonstrating complete tear of right main bronchus. The chest tube is seen traversing the plural air collection. **Origin:**