



Case report

Pneumomediastinum and (bilateral) pneumothorax after high energy trauma: Indications for emergency bronchoscopy



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ABSTRACT

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High energy trauma may cause injury to tracheobronchial structures. This is sometimes difficult to diagnose immediately. Pneumomediastinum and (bilateral) pneumothorax seen on a CT-scan of the thorax may suggest possible damage to central airways. Emergency bronchoscopy should be performed to detect and locate a possible tracheobronchial injury.

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Introduction

We present two patients with tracheobronchial injury with subsequent pneumomediastinum combined with a bilateral pneumothorax. The indication and findings of emergency bronchoscopy is discussed.

Case reports

Patient 1: A 28-year-old man was admitted to the emergency department following high energy trauma: motor-scooter versus car. Because of respiratory insufficiency he was intubated at the scene of the accident. A chest X-ray showed a bilateral pneumothorax, which was treated by inserting a chest drain on both sides. He was haemodynamically stable and had normal neurological findings. A CT-scan of the thorax also showed a pneumomediastinum (Fig. 1).

Flexible bronchoscopy revealed a partial avulsion at the end of the left main bronchus blocking the distal airways and a linear mucosal tear in the pars membranacea of the left main bronchus (Fig. 2). A few glass pieces were removed from the trachea.

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Although rapid clinical recovery led to successful extubation, about 48 h later he became acutely dyspnoeic and adequate oxygenation and ventilation failed. This acute respiratory disturbance along with a complete white left lung on chest X-ray, forced a prompt transfer to the operation theatre. Here, a flexible bronchoscopy revealed a blood clot completely occluding the left main bronchus. A thoracotomy was performed during which a complete transection of the left main bronchus was encountered (Fig. 3). An end-to-end anastomosis of the left main bronchus was performed leading to full recovery. A control flexible bronchoscopy after three months showed a normal tracheobronchial structure.

Patient 2: A 13-year-old boy in a small boat was hit by a speedboat. He was submerged for about 20 s but remained conscious; however, he had to be intubated because of marked respiratory discomfort. On presentation in the emergency department, the patient was haemodynamically stable and neurological examination was normal, but it was difficult to adequately oxygenate and ventilate him, and even after insertion of two chest tubes for bilateral pneumothorax his respiratory condition did not improve. Persistent air leak from the chest tubes was noted. A CT-scan of the chest revealed a pneumomediastinum along with severe subcutaneous emphysema, a bilateral pneumothorax with marked mediastinal shift to the left, and multiple right-sided rib fractures (Fig. 4). Immediate flexible bronchoscopy using a paediatric bronchoscope through a small sized endotracheal tube,

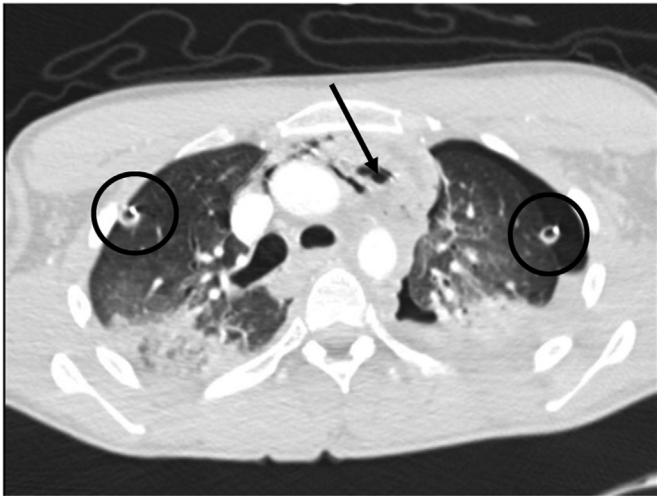


Fig. 1. CT-scan of the thorax showing a slice below the main carina with air in the mediastinum (arrow), along with two chest tubes (circles).

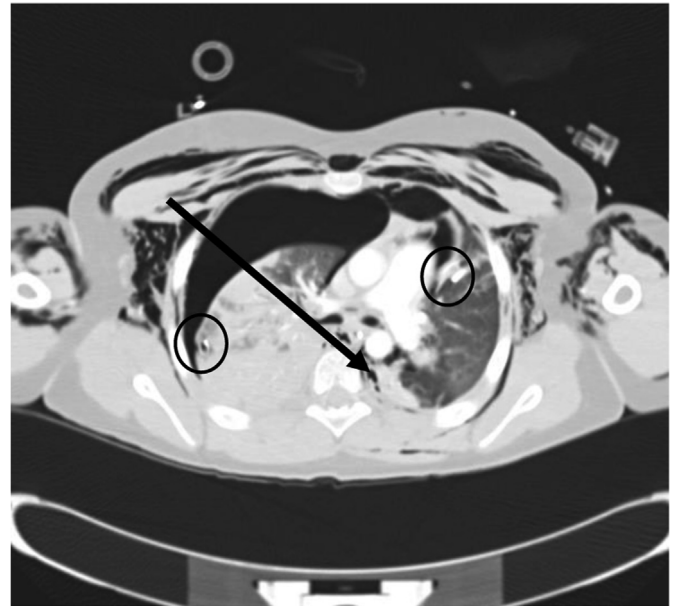


Fig. 4. CT-scan of the thorax showing a slice just below the main carina. Subcutaneous emphysema in both arms can be seen along with a pneumomediastinum (arrow) and a bilateral pneumothorax and two chest tubes (circles).

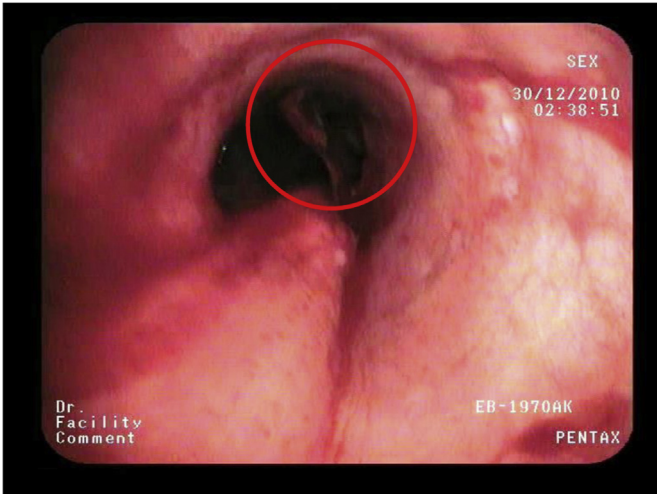


Fig. 2. A bronchoscopic view of the left main bronchus. An avulsion lesion is seen in the distal part of the left main bronchus (circle).

despite suboptimal inspection due to limited suction power of the bronchoscope in presence of abundant blood in the airways, showed a near-total laceration of the proximal part of the middle lobe bronchus in the vicinity of the carina (RC-2) at the lateral wall towards the lower lobe bronchus (Fig. 5). A right-sided posterolateral thoracotomy was performed and the middle- and lower lobes were resected as the location and the extension of the rupture into the lower lobe bronchus made primary repair impossible (Fig. 6).

Discussion

Tracheobronchial laceration is a rare complication of blunt thoracic trauma [1] and comprises only 2% of the major thoracic injuries. Tracheobronchial injuries can result from both penetrating

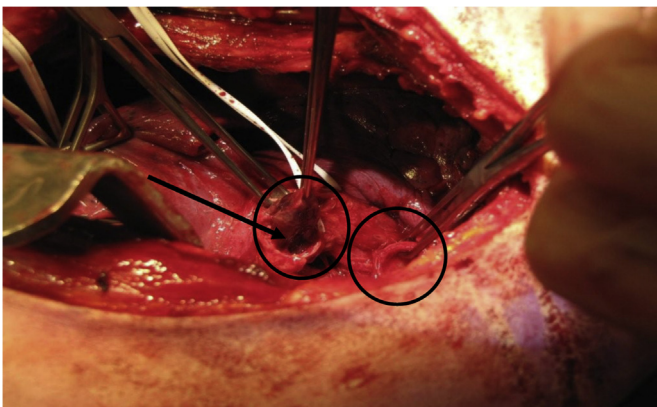


Fig. 3. Intraoperative view showing the distal end of the left main bronchus seen in the left circle, which is obliterated by a thrombus (arrow). The proximal part of the left main bronchus is seen in the right circle. The vessel loop encircles the left main pulmonary artery.

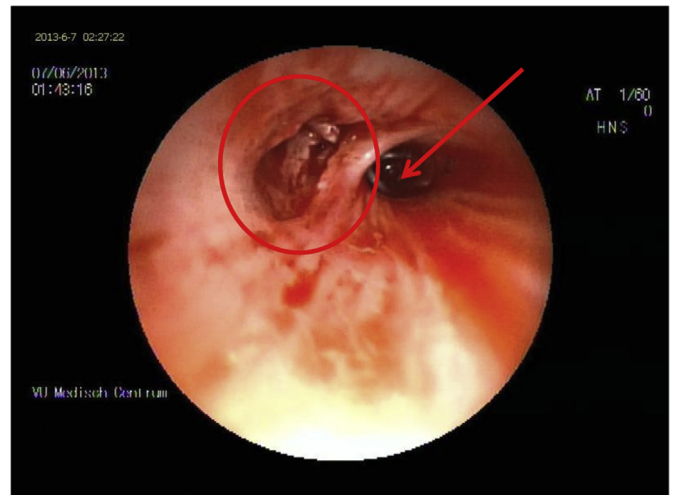


Fig. 5. A bronchoscopic view of the middle lobe and the right lower lobe orifice (arrow). A rupture is seen near the right second carina (circle).

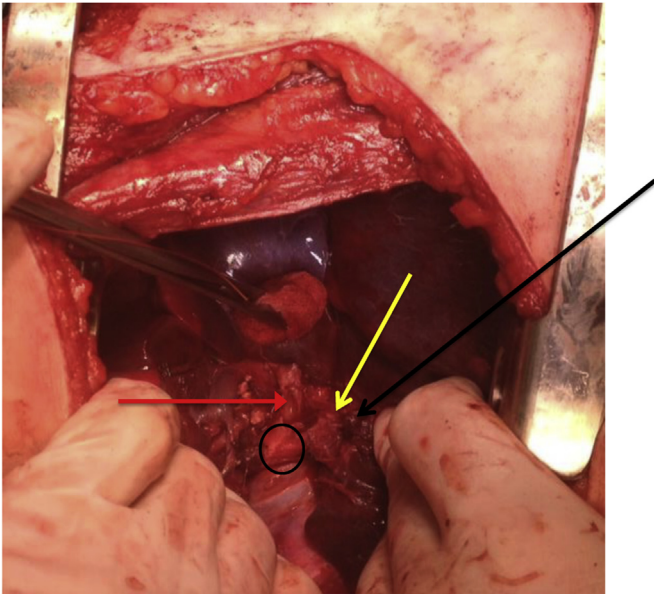


Fig. 6. Right sided thoracotomy with the patient positioned in the left lateral decubitus, with his head on the left side. A near-complete rupture of the bifurcation of the middle- and lower lobe bronchus (yellow arrow). The middle lobe bronchus is indicated with the red arrow and the lower lobe bronchus is indicated with the black arrow. Encircled is the intact intermediate bronchus.

and blunt trauma and the latter is usually the result of a high energy accident [3,4]. Previous studies report most patients with tracheobronchial injury to die at the scene of the accident, due to associated fatal injuries [2,3]. In patients who survive,

tracheobronchial lesions are not always diagnosed immediately [3,5], resulting in delay of proper treatment. This can eventually lead to stenosis, stricture, and scarring. Therefore, once pneumomediastinum and bilateral pneumothorax are diagnosed, especially when air leak persists, subcutaneous emphysema develops or worsens, signs of tension pneumothorax develop, or haemoptysis is seen, one must be aware of possible damage to central airways [6], and the patient should undergo an emergency flexible bronchoscopy for as thorough as possible inspection of the airways to detect and locate a possible tracheobronchial injury, determine its severity, remove foreign bodies, and ensure proper tracheal tube position when it is not yet confirmed by chest imaging. Extension of the lesion may occur in the waiting time to surgery. A chest CT-scan is not a reliable replacement of bronchoscopy in this setting. Emergency flexible bronchoscopy guides in this way the appropriate and life saving treatments and, as a result, might prevent the long-term sequelae.

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