Massive spontaneous haemothorax
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Section: Chest imaging
Area of Interest: Cardiovascular system Emergency Lung
Imaging Technique: CT
Case Type: Clinical Cases
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Patient: 61 years, male

Clinical History:

The patient presented with sudden onset of dyspnoea and right-sided chest pain, radiating to the back and right shoulder. The patient had undergone a right-sided lung biopsy with wedge resection 3 months earlier on the suspicion on interstitial lung disease (allergic alveolitis). Upon arrival in the emergency department the clinical condition rapidly deteriorated. The patient was intubated and CT was performed.

Imaging Findings:

Supine chest X-ray (Figure 1) was performed in the emergency department after the patient arrived. The image shows a large right-sided pleural collection with mediastinal displacement to the left. After worsening of the clinical condition contrast-enhanced arterial phase CT of the chest was performed (Figure 2). The CT was performed 45 minutes after the chest X-ray. The CT examination showed increasing fluid in the right pleural space with HU-values >30 in keeping with haematoma. As there was no contrast extravasation, the bleeding site could not be identified. A chest tube was inserted but the pleural collection increased as shown on a new chest X-ray 1 hour after the CT examination (Figure 3). The patient was subsequently operated with ligation of a bleeding intercostal artery. The stapler line from the prior resection was unremarkable. Postoperative chest X-ray showed complete regression of the haemothorax (Figure 4).

Discussion:

Background
A number of conditions can cause haemothorax with trauma being the leading cause [1,2]. In the setting of trauma rib fractures causing damage to the intercostal vessels are the most common cause of haemothorax. Iatrogenic haemothorax from thoracocentesis, thoracotomy, insertion of central venous lines, epidural anaesthesia, and pacemaker implantation have been described in the literature [2–4].
Spontaneous haemothorax (non-traumatic) on the other hand is very rare, especially in patients not receiving anticoagulant therapy. The common aetiologies are bleeding disorders, vascular malformations, rupture of thoracic aortic aneurysm, pleural endometriosis, costal exostosis, and pleural malignancy [1].
The present case is an example of spontaneous haemothorax. As surgery failed to show a relation to the prior lung resection, and it was verified that the bleeding site was an intercostal artery, the most likely cause was rupture of a small intercostal artery aneurysm.

Clinical and Imaging Perspective
Clinical presentation of haemothorax resembles other diseases that cause cardiovascular compromise. The patient will present with chest pain and dyspnoea. Clinical findings include low blood pressure and rapid heart rate. The primary imaging modality is conventional X-ray. Contrast-enhanced CT provides further information about the nature of the pleural fluid collection (reactive pleural collection vs. haemothorax). Viscous pleural fluids show HU-values up to 30, higher values indicate blood. Ultrasound may also be helpful for the detection of haemothorax (e.g., echogenic debris representing clots). Furthermore, CT may show the bleeding source as a site of contrast extravasation. However, in the present case it was not possible to identify the bleeding site. As the CT was only performed in an arterial phase, additional venous phase might have shown the source of bleeding.

Outcome
Arterial bleeding to the pleural space is a life-threatening condition leading to cardiovascular collapse if untreated. Chest tube insertion is the first choice of treatment to drain the accumulated blood and remove the mediastinal compression. However, thoracotomy is often needed subsequently to repair the site of bleeding. Endovascular treatment with coiling of intercostal arteries is also an option in some cases. Clinical outcome is good if proper treatment is performed. The patient had a full recovery.

Take Home Message/ Teaching Points
- Haemothorax is a rare but important cause of acute chest pain and cardiovascular collapse
- The condition can occur spontaneously

Patient consent:
Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Spontaneous haemothorax, Pneumothorax, Pneumonia, Pulmonary embolism, Acute myocardial infarction, Acute aortic syndrome

Final Diagnosis: Spontaneous haemothorax

References:
Figure 1

Description: Initial chest X-ray (45 minutes before CT). Origin: ©Department of Radiology, Herlev Hospital, Denmark 2019.
Figure 2

Description: CT examination. Hyperdense stapler line at the right lung represents sequelae after wedge resection. Origin: ©Department of Radiology, Herlev Hospital, Denmark 2019.
Figure 3

Description: Chest X-ray (1 hour after CT). Origin: ©Department of Radiology, Herlev Hospital, Denmark 2019.
Description: Postoperative chest X-ray. Origin: ©Department of Radiology, Herlev Hospital, Denmark 2019.