

Pneumopericardium in polytrauma with bilateral pneumothorax, lung contusion and laceration.

Published on 18.04.2009

DOI: 10.1594/EURORAD/CASE.7236

ISSN: 1563-4086

Section: Chest imaging

Case Type: Clinical Cases

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Patient: 35 years, male

Clinical History:

A 35 year old polytraumatised patient (cranial, thoracic and orthopaedic trauma) after a traffic accident was admitted for investigation. CT examination was performed and the findings are presented.

Imaging Findings:

A 35 year old patient was admitted to the Radiology Department after a traffic accident. Chest radiography demonstrated left pneumothorax and, after insertion of a chest drain, the patient was transferred to the CT unit for further investigation. CT scans of the neck and chest revealed bilateral pneumothoraces with contusions of the pulmonary parenchyma (fig 1), pneumomediastinum (fig 2) and pneumopericardium (fig 3) without pericardial or pleural effusion. Subcutaneous left-sided emphysema was also present (partially as a result of the insertion of the chest drain). Rib fractures as well as fractures of left scapula were identified (fig 4a,b). Multiple thin streaks of air extending to the superior mediastinum and neck were noticed (fig 5). The patient was admitted to the intensive care unit and a control CT scan after 2 days demonstrated complete resolution of the pneumopericardium and pneumothorax (fig 6). In addition, lung laceration with formation of pneumatocoles had occurred and a small pneumomediastinum was still evident (fig 7).

Discussion:

Pneumopericardium secondary to blunt chest trauma is generally due to 1 of 3 mechanisms: 1) penetration along pulmonary venous perivascular sheaths from ruptured alveoli to the pericardium, 2) pneumothorax with pleuropericardial tear, or 3) direct tracheobronchial– pericardial communication.

Pneumopericardium has been reported to result from blunt and penetrating chest trauma, as a complication of invasive procedures, from abnormal communications such as fistulas from the pericardium to the adjacent structures containing air from different causes, from barotrauma and from pericardial infections. There have been reported cases of pneumopericardium after proctocolectomy, after laparoscopy, as a complication of AIDS, and after administration of the Heimlich manoeuvre. Positive pressure ventilation with large tidal volumes or high end expiratory pressure may cause or worsen the condition, particularly in neonates or infants. Pneumopericardium is usually self-limited and resolves spontaneously, but possible complications, such as tension pneumopericardium leading to cardiac tamponade, can occur.

Clinical signs of pneumopericardium such as distant heart sounds, shifting precordial tympany, and a succussion splash with metallic tinkling and ECG findings such as low voltage, ST segment changes, and T wave inversion are

non-specific and unreliable.

Sufficient accumulation of pericardial gas may impair right ventricular filling, resulting in pericardial tamponade with increase and equalisation of intracardiac pressures, pulsus paradoxus, arterial hypotension, and cardiogenic shock. The diagnosis of pneumopericardium can be confirmed by conventional chest radiographs, computed tomography, or echocardiography.

Radiographic findings of pneumopericardium and pneumomediastinum can be similar in the lower mediastinum. In posteroanterior chest radiographs, a continuous thin radiolucent rim of air follows the cardiac silhouette and is outlined by a fine line representing the pericardial sac. At the base of the heart, the gas may outline the superior surface of the normally obscured parts of the diaphragm, which can be seen on the lateral radiograph as the continuous left hemidiaphragm sign and on a frontal radiograph as the continuous diaphragm sign. CT examination is the best imaging tool for demonstrating even small pneumopericardium, when radiographs can have a normal appearance of the lower mediastinum.

Pulmonary contusions are caused by hemorrhage and radiographically they are demonstrated as peripheral, nonsegmental and ill-defined parenchymal opacities that usually underlie the region of chest wall impact (90%) but may be contrecoup (10%). All pulmonary contusions are present on chest radiographs and CT scans within 24 hr and new or evolving opacities seen on radiographs after 24 and 72 hr suggest superimposed aspiration or infectious pneumonia on adult respiratory distress syndrome, respectively. Typically, the air-space consolidation from contusion clears during the 1st week after trauma. Pulmonary lacerations represent tears in the lung parenchyma and they usually occur after chest trauma. When the laceration is filled with blood, a hematoma forms but when it fills with air, a traumatic pneumatocele forms, as in our case. CT scan is more sensitive method comparing with plain radiography in the detection of contusions and lacerations in the trauma patient.

Differential Diagnosis List: Post-traumatic pneumopericardium with bilateral pneumothorax, lung contusion and laceration

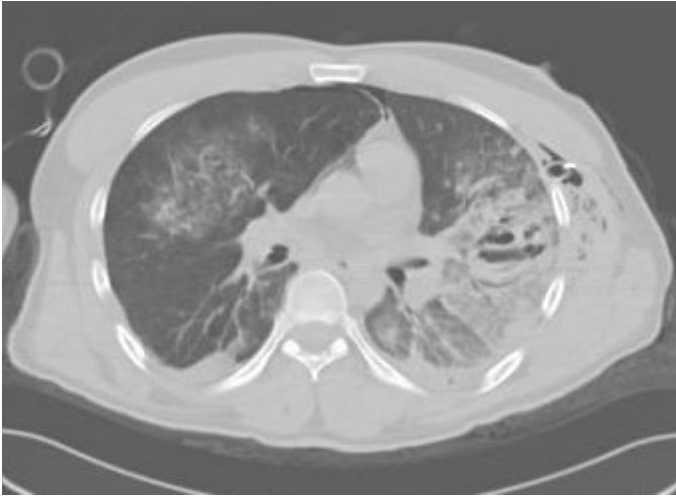
Final Diagnosis: Post-traumatic pneumopericardium with bilateral pneumothorax, lung contusion and laceration

References:

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Figure 1

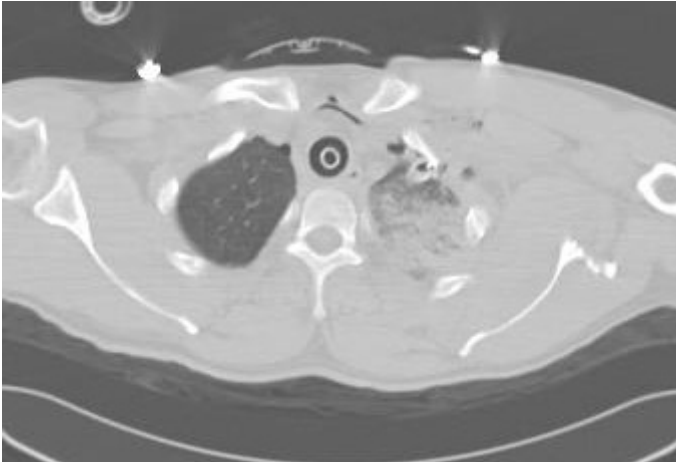
a



Description: CT image demonstrating bilateral pneumothorax and contusions of the pulmonary parenchyma **Origin:**

Figure 2

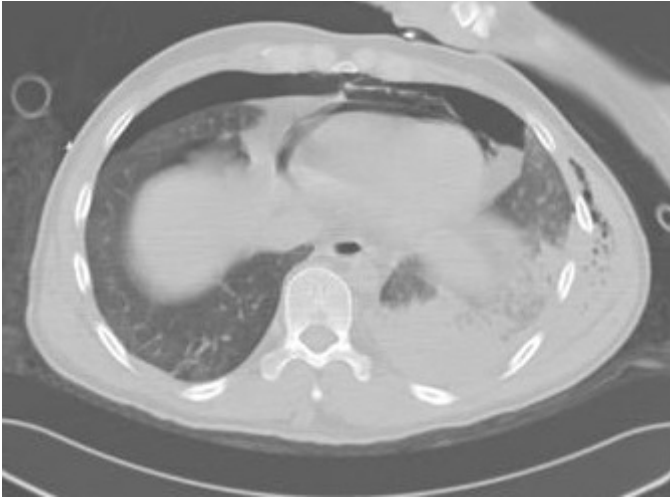
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Description: CT image showing pneumomediastinum **Origin:**

Figure 3

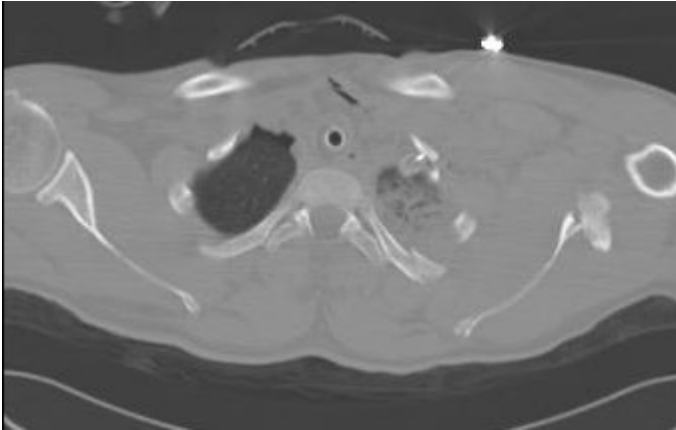
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Description: CT image demonstrating pneumopericardium **Origin:**

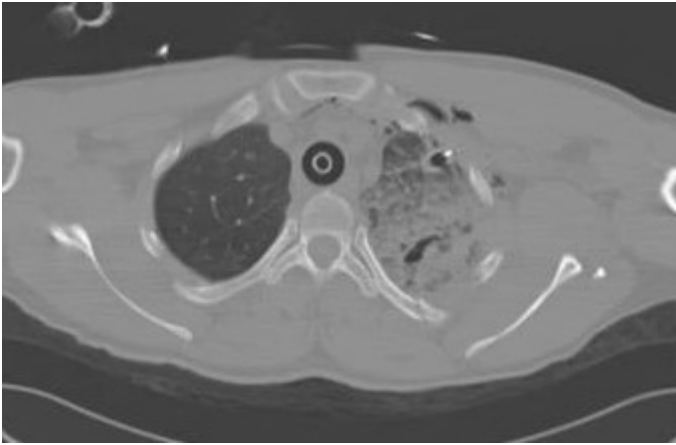
Figure 4

a



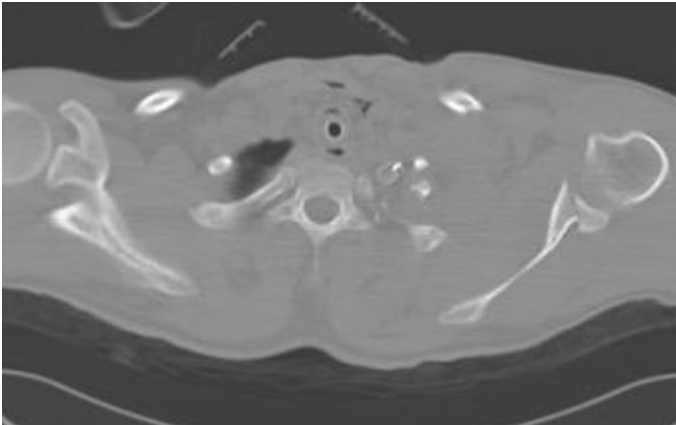
Description: CT image demonstrating rib fractures (a,b) as well as fractures of left scapula (a,c) **Origin:**

b



Description: CT image demonstrating rib fractures (a,b) as well as fractures of left scapula (a,c) **Origin:**

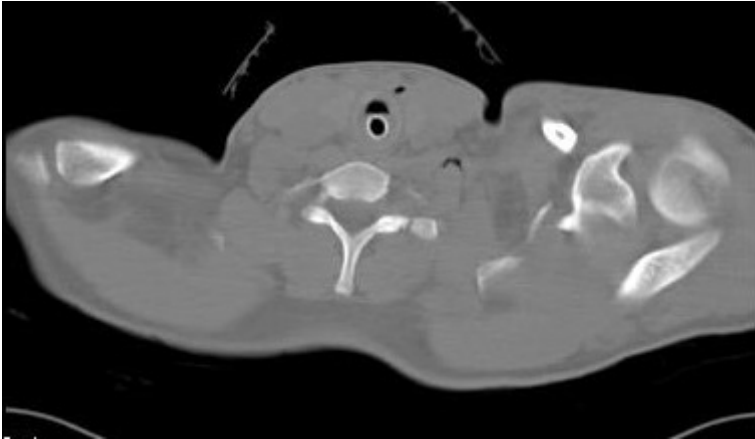
c



Description: CT image demonstrating rib fractures (a,b) as well as fractures of left scapula (a,c) **Origin:**

Figure 5

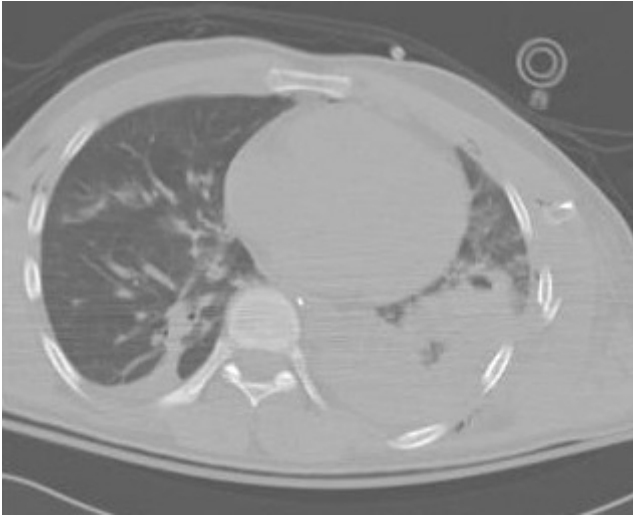
a



Description: CT image identifying thin streaks of air extending to the neck **Origin:**

Figure 6

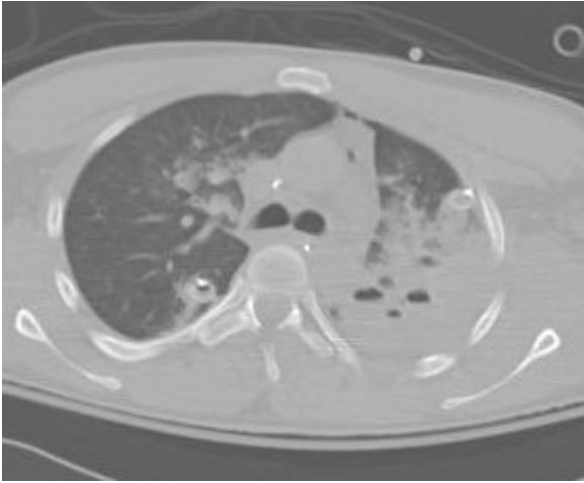
a



Description: Complete resolution of the pneumopericardium and pneumothorax - persistence of the pulmonary contusions **Origin:**

Figure 7

a



Description: On 2nd CT examination small pneumomediastinum is still evident. In addition, lung laceration with formation of pneumatoceles had occurred **Origin:**