

Fat embolism syndrome: a case report

Published on 22.01.2012

DOI: 10.1594/EURORAD/CASE.9538

ISSN: 1563-4086

Section: Chest imaging

Area of Interest: Bones Thorax Pulmonary vessels

Procedure: Surgery

Procedure: Diagnostic procedure

Procedure: Contrast agent-intravenous

Imaging Technique: Conventional radiography

Imaging Technique: CT

Imaging Technique: CT-Angiography

Special Focus: Embolism / Thrombosis Atelectasis

Case Type: Clinical Cases

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Patient: 18 years, female

Clinical History:

We present a case of an 18-year-old woman with tibial and peroneal fractures, who presented clinical symptoms of confusion, dyspnoea, hypoxaemia, haemoptysis and petechial rash 24 hours after orthopaedic surgery.

Imaging Findings:

Chest radiograph showed ill-defined bilateral opacities with symmetrical distribution predominating in the middle and lower fields of both lungs.

Contrast-enhanced chest CT showed ill-defined ground glass opacities associated with interlobular septal thickening with middle and lower lobe predominance. No filling defects were detected in the main lobar or segmental branches of the pulmonary arteries and no pleural effusions were present. Acute pulmonary embolism was therefore ruled out.

Discussion:

The concept of fat embolism syndrome (FES) refers to a clinical entity in which neurological, haematological, respiratory and skin symptoms are associated as a result of the release of fat droplets into the bloodstream [1]. Long bone fracture and orthopaedic surgery are often the main cause, although this syndrome may also develop in severe burns, acute pancreatitis, severe infections, acute decompression illness and sickle cell disease [2, 3, 4]. Fat embolism occurs very frequently (up to 90% in bone fractures and orthopedic prosthetic surgery), but only very few patients (~4%) will present with FES with classical symptoms [2, 3, 4].

The pathogenetic mechanism is unclear. There are many theories, but the most widely accepted are two: the mechanical theory which states that fat emboli are released from the intramedullary pressure increased (after trauma or orthopaedic manipulation) and the biochemical theory which postulates that fat embolism are a result of neutral lipids hydrolysis into free fatty acids by lipase activation during some stress situations. In any case, the harmful effect of fat embolism is not due to vascular occlusion, but instead the endothelial damage caused by these fatty acids [3, 4].

Clinical manifestations often appear after a latency period of 24-72 hours, which is the time it takes to develop vasculitis. The respiratory clinical symptoms are usually the first to appear and include dyspnoea, tachypnoea,

cyanosis and hypoxaemia. Neurological symptoms can present at the same time, ranging from headache, stupor, drowsiness, seizures or coma. Conjunctival petechiae can appear sometimes in the neck and trunk [1, 3, 4]. The chest radiograph may be normal initially, the most common radiological finding being bilateral ill-defined opacities with a pattern similar to pulmonary edema. These opacities on CT may have variable density, ranging from ground-glass to condensation, but usually tend to clear within 7-14 days. Interlobular septal thickening and centrilobular nodules may also be seen on CT. Sometimes fat embolism is seen as a filling defect in the pulmonary arteries. Pleural effusion is an uncommon finding in fat embolism. In severe cases adult respiratory distress can appear [1, 2, 5].

The diagnosis of FES requires a clinoradiological correlation [1]. The radiological signs are nonspecific and may occur in other diseases that affect patients with multiple trauma (pulmonary contusion, inhalation of toxic gases etc) [2, 5]. The latency period between the trigger and the onset of clinical and radiological signs is of great importance for the diagnosis [1].

Differential Diagnosis List: Fat embolism syndrom, Pulmonary contusion, Aspiration, Acute pulmonary embolism, Acute pulmonary edema

Final Diagnosis: Fat embolism syndrom

References:

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- Duis HJ (1997) The fat embolism syndrome. *Injury* 28:77-85 (PMID: [9205570](#))
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- Prologo JD, Dogra V, Farag R (2004) CT diagnosis of fat embolism. *American Journal of emergency medicine* 22:605-6 (PMID: [15666271](#))

Figure 1

a



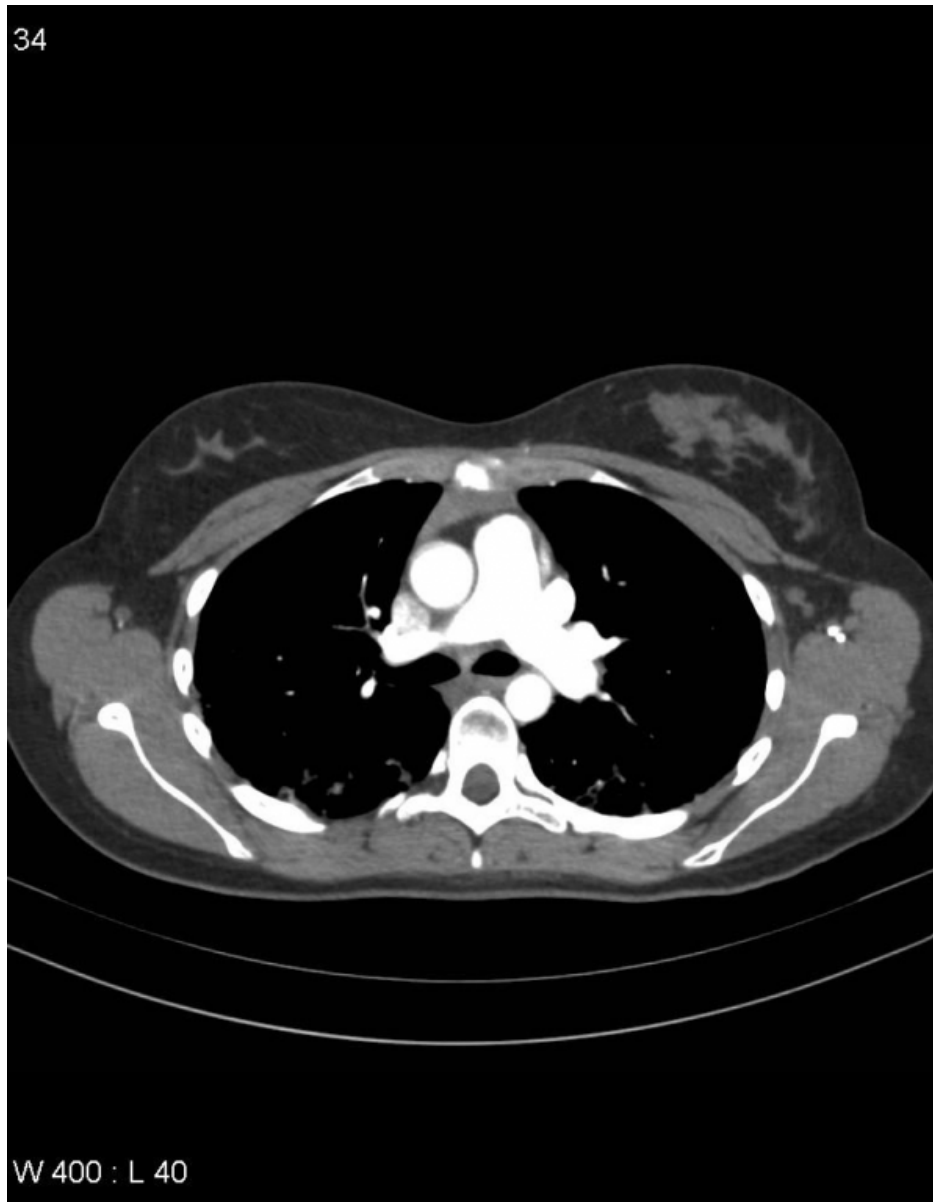
Description: The image shows tibial and peroneal fractures with displacement of bone fractures.

Origin: Hospital Reina Sofía, departament of Radiology, Cordoba, Spain

Figure 2

a

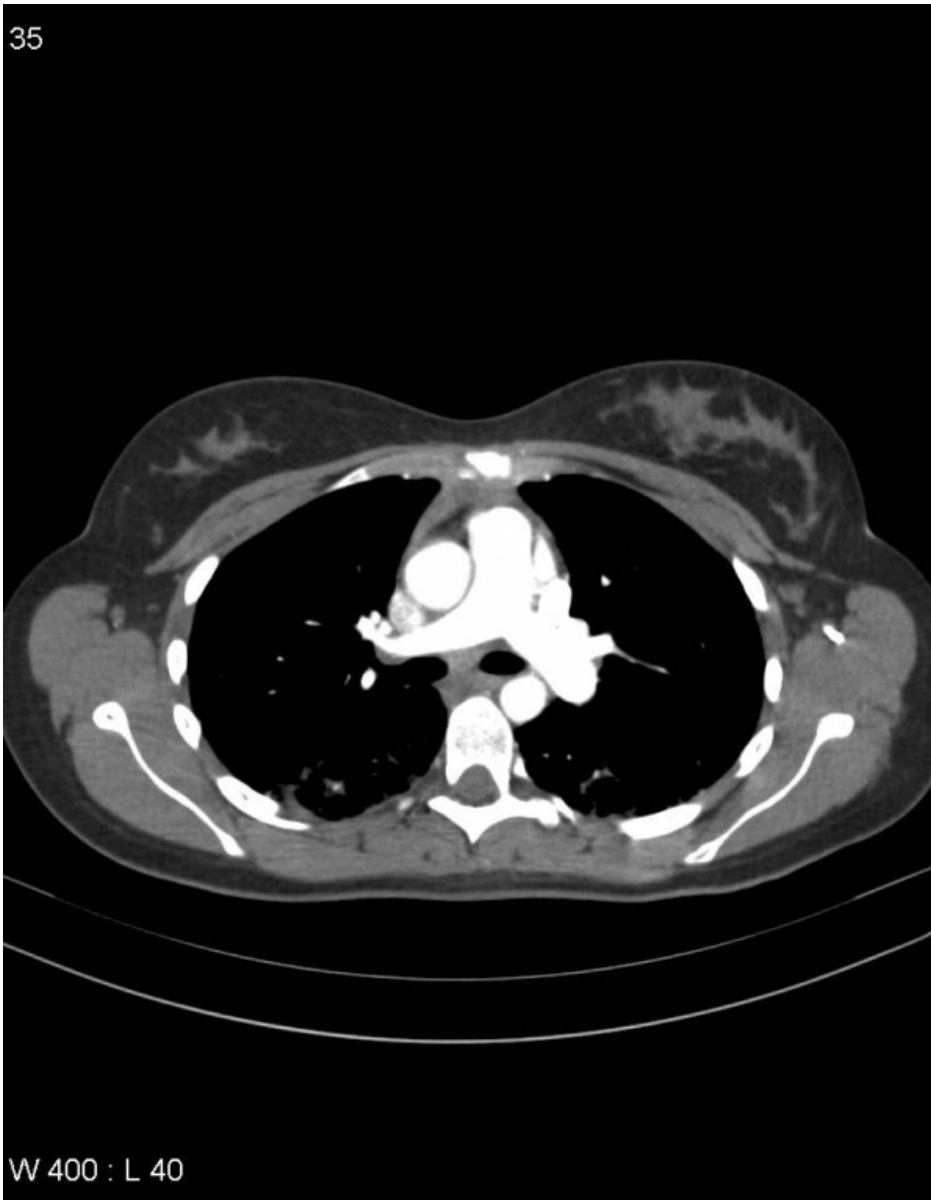
34



Description: No filling defects were detected in the main pulmonary arteries, lobar or segmental branches. No pleural effusions were seen. **Origin:** Hospital Reina Sofía, Departament of Radiology, Cordoba, Spain

b

35

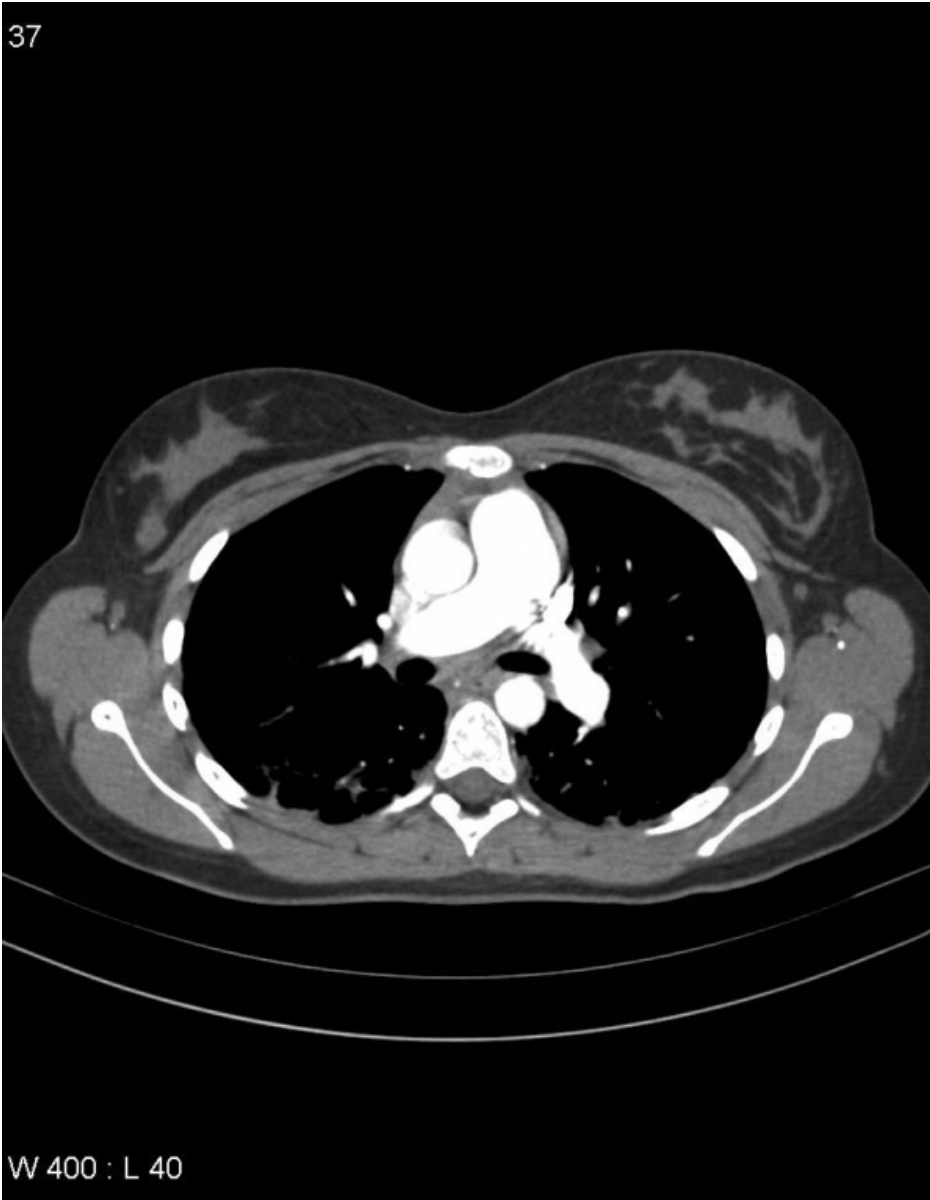


W 400 : L 40

Description: No filling defects were detected in the main pulmonary arteries, lobar or segmental branches. No pleural effusions were seen. **Origin:** Hospital Reina Sofía, Department of Radiology, Cordoba, Spain

c

37



W 400 : L 40

Description: No filling defects were detected in the main pulmonary arteries, lobar or segmental branches. No pleural effusions were seen. **Origin:** Hospital Reina Sofía, Departament of Radiology, Cordaba, Spain

Figure 3

a

281



Description: Note the ill-defined ground glass opacities associated with interlobular septal thickening, which predominate in middle and lower fields of both lungs. **Origin:** Hospital Reina Sofía, RAdiology Departamente, Cordoba, Spain

b

316



Description: Note the ill-defined ground glass opacities associated with interlobular septal thickening, which predominate in middle and lower fields of both lungs. **Origin:** Hospital Reina Sofía, RAdiology Departamente, Cordoba, Spain

c

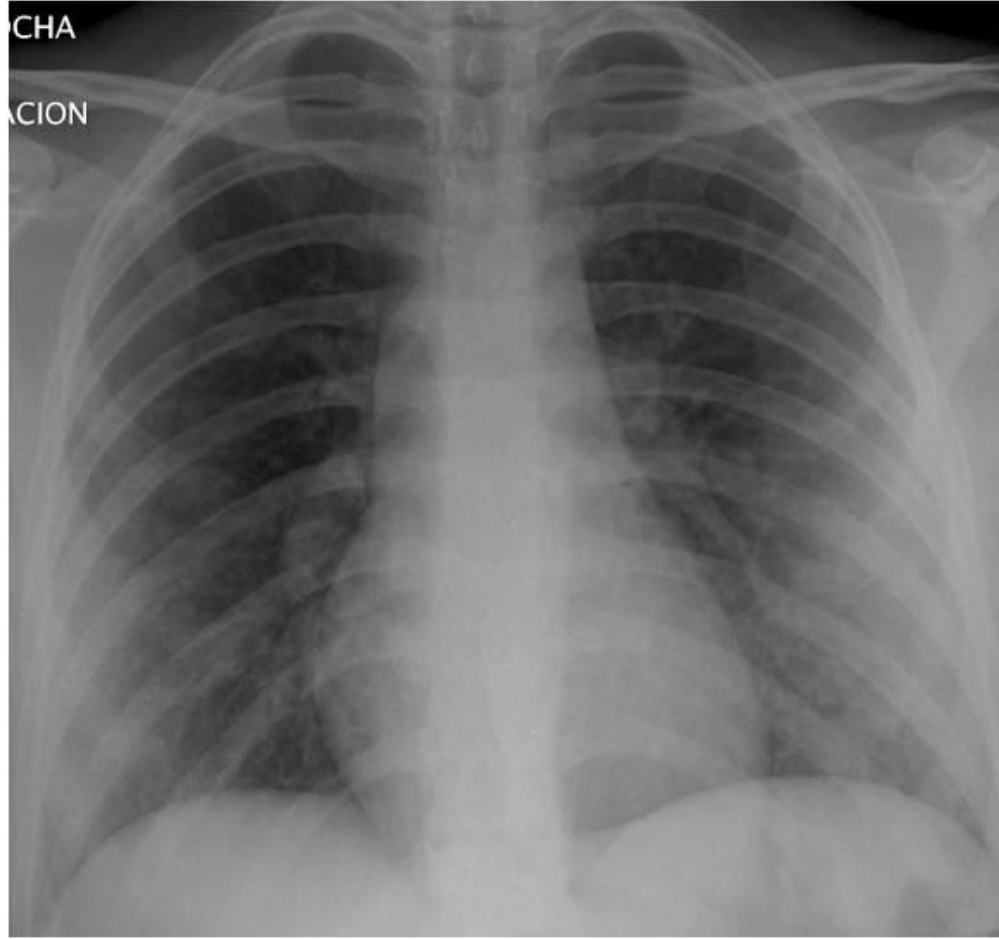
351



Description: Note the ill-defined ground glass opacities associated with interlobular septal thickening, which predominate in middle and lower fields of both lungs. **Origin:** Hospital Reina Sofía, RAdiology Departamente, Cordoba, Spain

Figure 4

a



Description: Ill-defined bilateral opacities with symmetrical distribution predominate in middle and lower fields of both lungs. **Origin:** Hospital Universitario Reina Sofía de Córdoba, Department of Radiology