

A case of lower extremity deep venous thrombosis with acute pulmonary embolism and resultant pulmonary infarction

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Section: Chest imaging

Area of Interest: Emergency Lung Vascular

Procedure: Complications

Procedure: Contrast agent-intravenous

Imaging Technique: Conventional radiography

Imaging Technique: CT

Special Focus: Acute Embolism / Thrombosis Case

Type: Clinical Cases

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Patient: 74 years, male

Clinical History:

A 74-year-old elderly male was brought to the emergency department with history of acute onset right-sided chest pain and mild fever. He had a history of on and off shortness of breath since last six months. No past medical history of diabetes or hypertension was noted.

Imaging Findings:

Since the patient presented with acute onset of right-sided chest pain, initial evaluation was carried out with a chest X-ray. Chest X-ray showed a thin-walled cavitary lesion in the right mid zone (Fig 1). Bilateral pleural effusion was noted. Based on the chest x-ray findings, patient was evaluated in the line of infective pathology and contrast CT chest was done (that is why we do not have the pulmonary angiography images in this case). To our surprise, contrast CT showed hypodense filling defect in the right descending pulmonary artery (Fig 4, Fig 5) and segmental arteries (Fig 6) suggestive of pulmonary thromboembolism. Cavitating, wedge-shaped peripheral based consolidation suggestive of pulmonary infarction was also noted (Fig 2, Fig 3). Doppler study of bilateral lower limbs revealed deep venous thrombosis of the left lower limb extending to the infra-renal inferior vena cava (Fig 7, 8, 9).

Discussion:

Background and clinical perspective: Pulmonary thrombo-embolism refers to the occlusion of the pulmonary arterial system by a thrombus or an embolus. It usually occurs following deep venous thrombosis of the lower limbs. A number of factors can lead to the increased risk of pulmonary thrombo-embolism such as prolonged immobilization, trauma, pregnancy, malignancy, hypercoagulable states (protein C and S deficiency) and oestrogen replacement therapy. Pulmonary infarction occurs only in a minority of patients with pulmonary embolism (10 to 15% of cases) [1].

Imaging Perspective: CT pulmonary angiography is the gold standard imaging modality for the evaluation of patients with pulmonary thromboembolism [2]. However, in cases of any suspected pulmonary pathologies, chest X-ray is usually the initial investigation carried out. Typical chest radiographic findings in cases of pulmonary thromboembolism with pulmonary infarction include enlarged central pulmonary artery with regional oligemia and wedge-shaped juxtapleural opacification (Hampton's Hump). CT angiography shows non enhancing hypodense filling defect within the pulmonary arteries (suggestive of pulmonary thromboembolism) with peripheral wedge-shaped pulmonary consolidations (suggestive of pulmonary infarction). Cavitation may be seen in septic embolism and in cases of infection of a bland infarct (cavitary pulmonary infarction) as in our case. In CT angiography, acute pulmonary embolism is noted as a hypodense filling defect surrounded by the contrast (Polo mint sign) and it makes an acute angle with the vessel wall [3]. Chronic pulmonary embolism, on the other hand, presents as asymmetric wall thickening of the vessel with the hypodensity making an obtuse angle with the vessel wall [4]. Nuclear study in the form of ventilation/perfusion scan can also be done in patients with suspected pulmonary embolism. Ventilation-perfusion study shows areas of ventilation-perfusion mismatches [5]. A study showing two or more unmatched segmental perfusion defects is considered to be a high probability study. Doppler study of lower limbs should be carried out in all patients with pulmonary embolism so as to rule out the deep venous thrombosis of the lower extremities as the potential cause of pulmonary thromboembolism.

Treatment and outcome: In all patients with pulmonary thromboembolism, with or without pulmonary infarction, the initial treatment is the cardiopulmonary support. In those patients with no risk of active bleeding, anticoagulation should be started. In cases of patients with massive emboli, thrombolysis can be undertaken. Pulmonary artery embolectomy with placement of vena cava filters can help in preventing further episodes of pulmonary thromboembolism.

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Deep venous thrombosis with acute pulmonary embolism and pulmonary infarction, Bronchogenic carcinoma, Pulmonary tuberculosis, Granulomatosis with polyangiitis

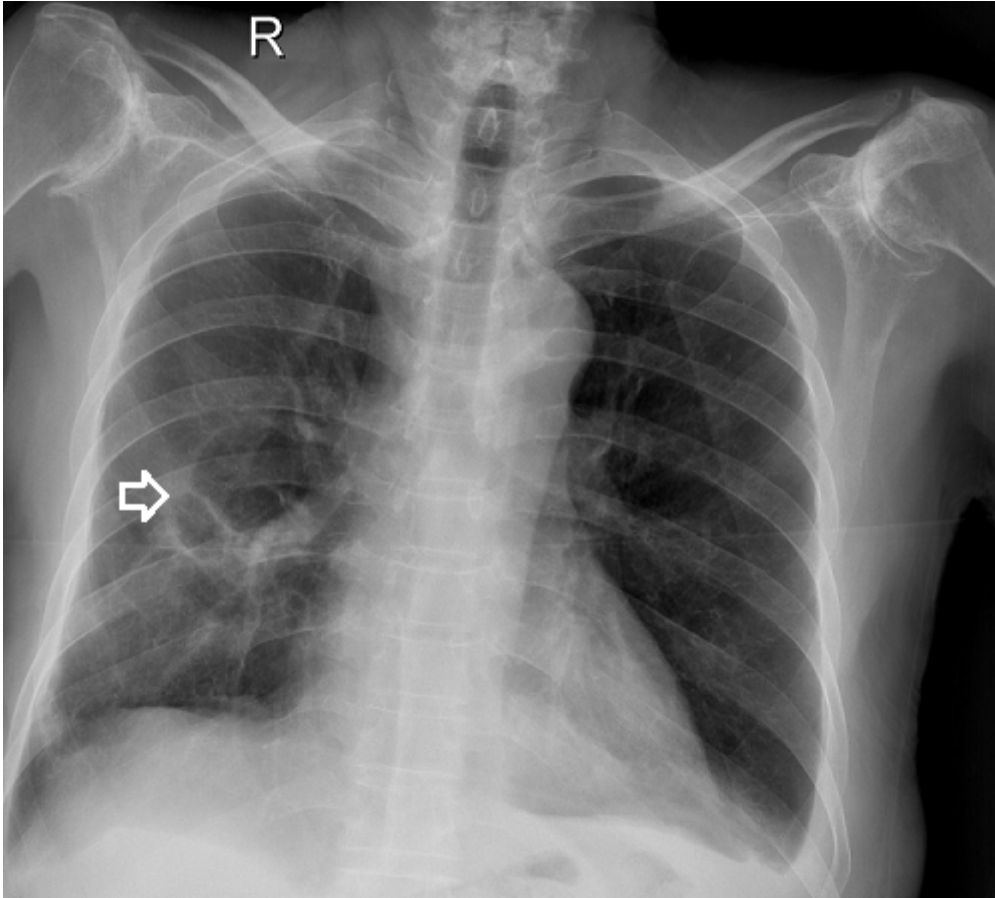
Final Diagnosis: Deep venous thrombosis with acute pulmonary embolism and pulmonary infarction

References:

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Figure 1

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Description: Chest X-ray PA view showing thin walled cavitary lesion in the right mid zone (white arrow) with adjacent airspace opacity. No air fluid level is seen. **Origin:** © Department of Radiodiagnosis and Imaging, Grande International Hospital, 2019.

Figure 2

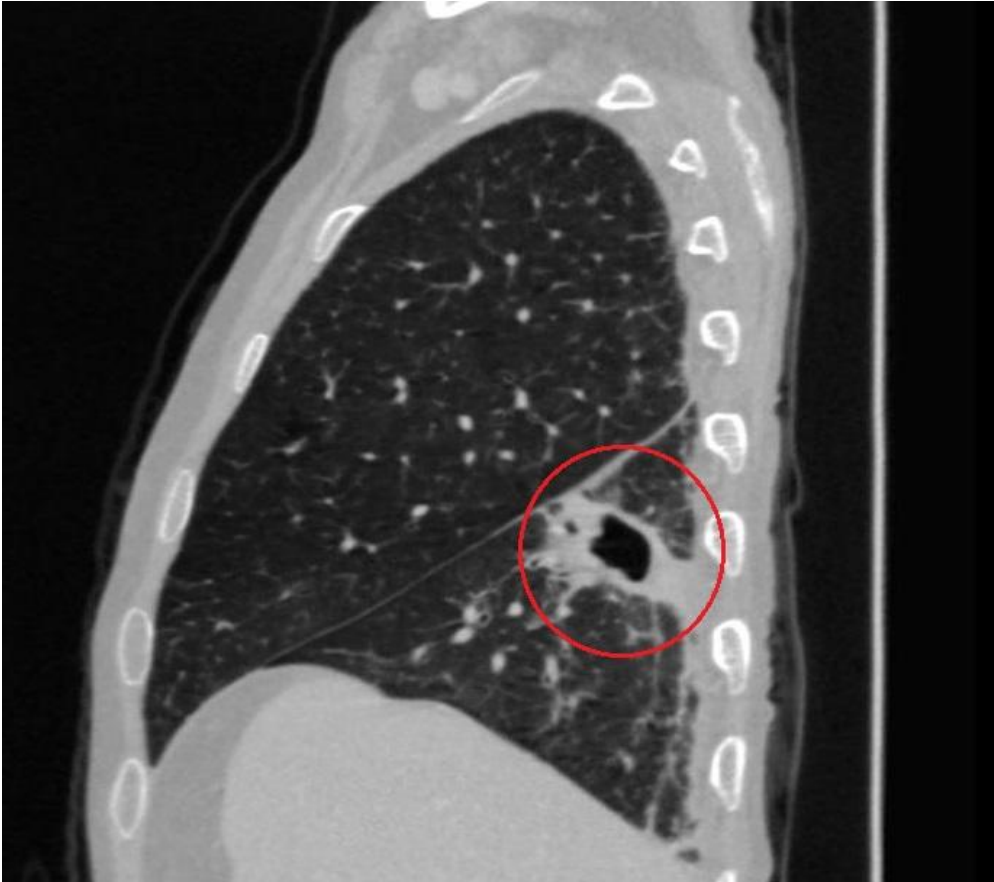
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Description: CT chest lung window axial view showing peripheral based wedge shaped consolidation with cavitary changes in superior segment of right lower lobe (yellow arrow). **Origin:** © Department of Radiodiagnosis and Imaging, Grande International Hospital, 2019.

Figure 3

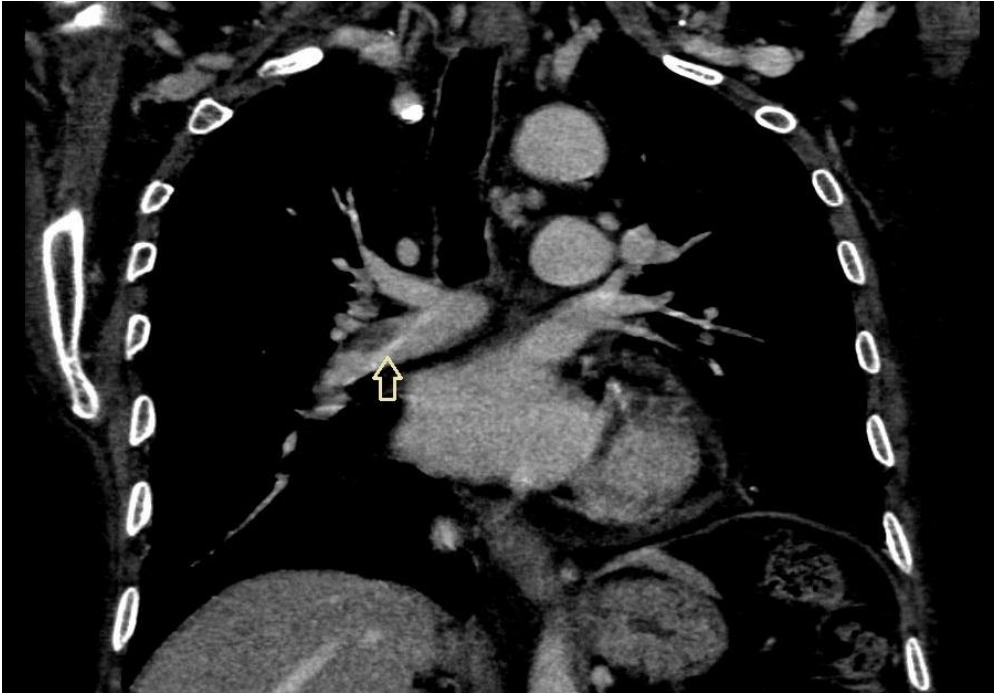
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Description: CT chest lung window sagittal view showing peripheral based wedge shaped consolidation in superior segment of right lower lobe with cavitary changes (red circle). **Origin:** © Department of Radiodiagnosis and Imaging, Grande International Hospital, 2019.

Figure 4

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Description: Contrast enhanced CT chest coronal view showing hypodense filling defect in the descending branch of right pulmonary artery (white arrow) suggestive of pulmonary thromboembolism.

Origin: © Department of Radiodiagnosis and Imaging, Grande International Hospital, 2019.

Figure 5

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Description: Contrast enhanced CT chest sagittal view showing hypodense filling defect in the right descending pulmonary artery (yellow arrow); the filling defect makes acute angle with the arterial wall suggestive of acute thrombo-embolism (red arrow). **Origin:** © Department of Radiodiagnosis and Imaging, Grande International Hospital, 2019.

Figure 6

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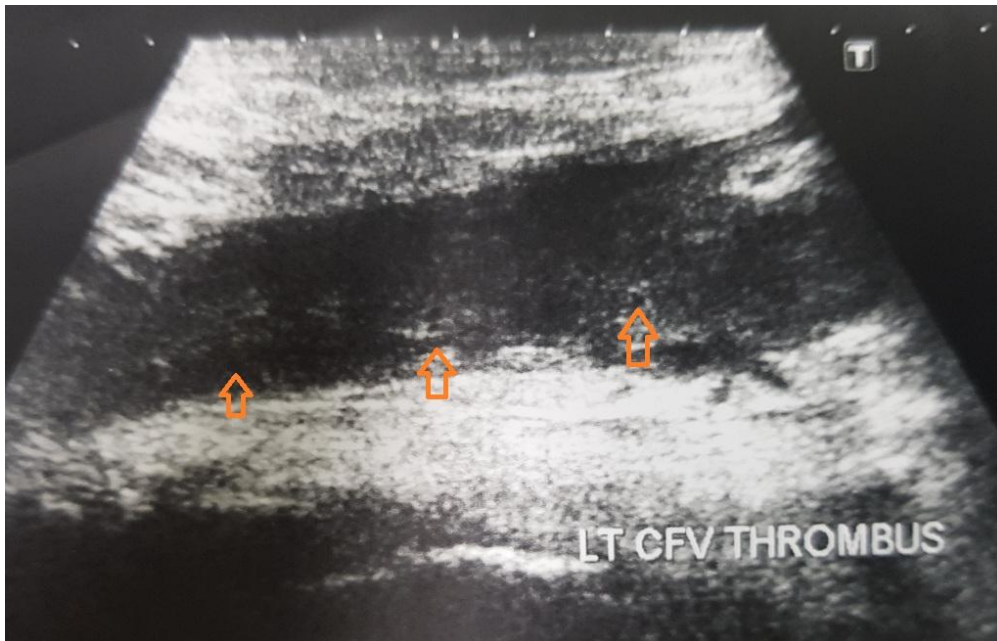


Description: Contrast enhanced CT chest axial view showing embolism in segmental branch of right descending pulmonary artery (yellow arrow). Adjacent pulmonary infarction is also noted (blue arrow).

Origin: © Department of Radiodiagnosis and Imaging, Grande International Hospital, 2019.

Figure 7

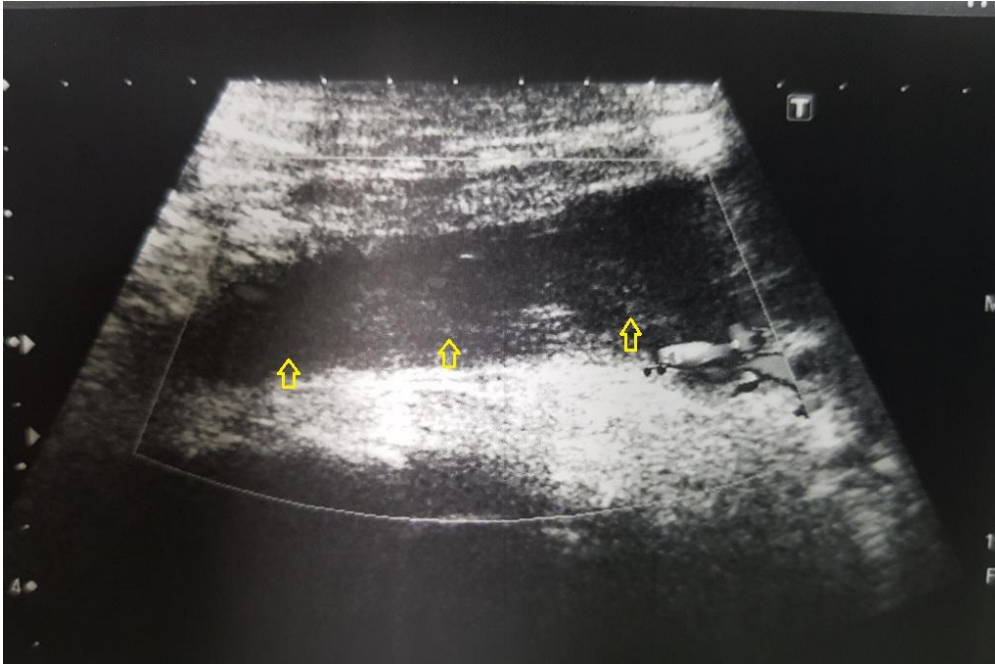
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Description: Ultrasonogram B-Mode image showing hypoechoic thrombus in left common femoral vein (red arrows). **Origin:** © Department of Radiodiagnosis and Imaging, Grande International Hospital, 2019.

Figure 8

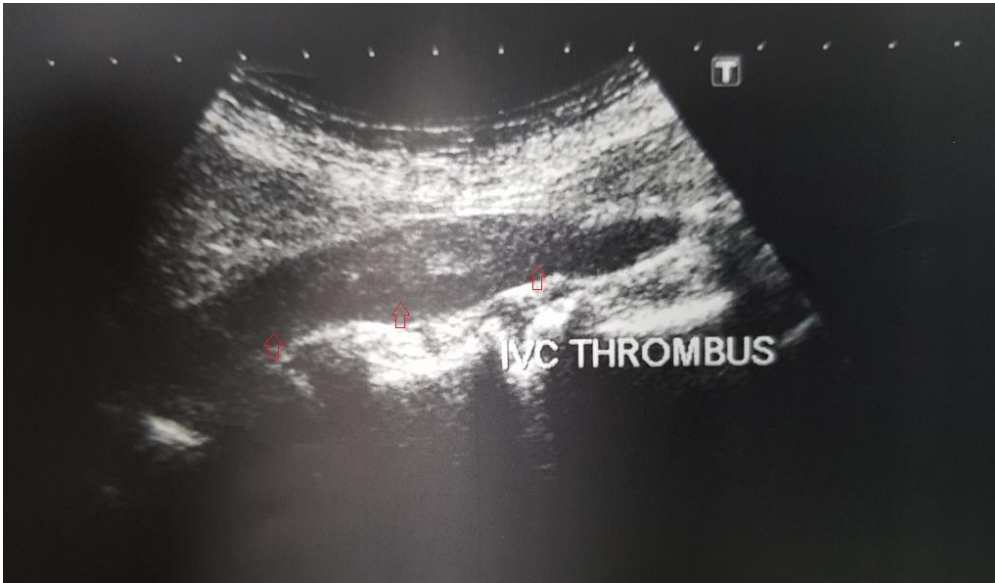
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Description: Ultrasonogram Colour Doppler Image showing no flow in the left common femoral vein (yellow arrows). **Origin:** © Department of Radiodiagnosis and Imaging, Grande International Hospital, 2019.

Figure 9

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Description: Ultrasonogram B-mode image showing hypoechoic content in the inferior vena cava suggestive of IVC thrombosis (red arrows). **Origin:** © Department of Radiodiagnosis and Imaging, Grande International Hospital, 2019.