

Ultrasound for identifying pleural effusion aetiology: have you checked the ribs?

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CASE REPORT

An 88-year-old male inpatient was referred to the Pleural Service with a large left-sided pleural effusion that developed over a 24-hour period. He had a background of ischaemic heart disease and type 2 diabetes mellitus. He had been admitted to hospital 6 weeks prior to this presentation with symptoms of congestive cardiac failure. During that admission, the patient fell onto his left side and a chest X-ray arranged then did not show rib fractures or pleural effusion. Two weeks later, he was readmitted with a presumed pneumonia. On admission, he had bilateral small simple pleural effusions on ultrasound (US) examination. Three days into this admission episode, the patient woke up with excruciating left-sided chest pain. An X-ray ([figure 1A](#)) did not show any obvious new abnormality. Within the ensuing day, the chest pain improved but the patient became hypoxic and breathless. A chest radiograph ([figure 1B](#)) showed a large left pleural effusion. US examination confirmed a large left pleural effusion, mildly echogenic with no septations. Additionally, a thrombus was noted to be adherent to the parietal pleura with parts of it floating in the pleural space (online supplementary video). Close US examination of the surrounding ribs suggested a rib fracture (online supplementary video) and this was confirmed with the high-frequency probe that revealed a 'step' abnormality surrounded by a hypoechoic structure—characteristic of a rib fracture and an adjacent

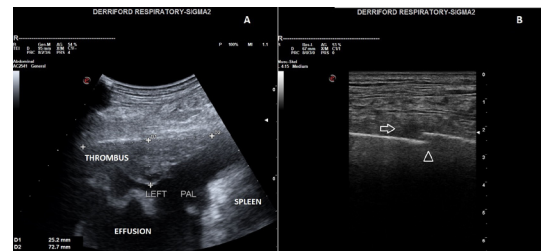


Figure 2 (A) Curvilinear (low frequency) probe examination revealing triangular echogenic structure adherent to the parietal pleura suggestive of an intrapleural thrombus. (B) Linear (high frequency) examination showing step abnormality (arrowhead) corresponding to a displaced rib fracture in addition to a haematoma (arrow).

periosteal haematoma ([figure 2B](#)). A chest drain was inserted and 1 L of deeply haemorrhagic fluid was rapidly drained. Over 36 hours, a total of 2.6 L was drained and repeat chest X-ray ([figure 1C](#)) and US confirmed acceptable fluid drainage with improvement in the patient's symptoms and withdrawal of supplemental oxygen and subsequently removal of the chest drain.

DISCUSSION

US examination has a central role in the evaluation of cases of pleural effusion. In addition to ensuring procedure safety by confirmation of the presence of pleural effusion, it aids in characterisation of the effusion in terms of septations and echogenicity which can suggest certain aetiologies (eg, haemothorax, empyema). The presented case demonstrates how US examination of the chest wall can delineate rib abnormalities.¹ The high-frequency (linear) probe is the recommended probe to examine the chest wall, but as demonstrated in the online supplementary video, the rib fracture was obvious during examination with the low-frequency (curvilinear) probe which is the probe typically used for thoracic US examination. In cases of blunt chest trauma, US has been shown to be superior to X-ray in identifying rib fractures as has been shown in this case.² This expedited the management of the case by providing information about the aetiology of the effusion which was confirmed by aspiration of blood-stained effusion obviating the need to carry out further investigations such as CT. The delayed presentation of the haemothorax after trauma could have been due to acute displacement of a previously fractured rib.

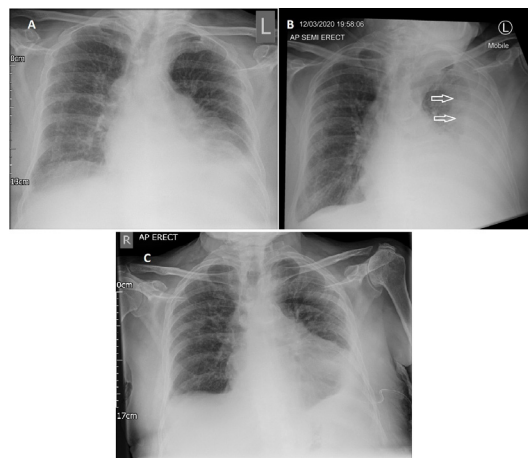


Figure 1 (A, B) Two chest X-rays 30 hours apart showing significant increase in the left pleural effusion but no obvious rib fractures. (C) Follow-up chest X-ray showing chest drain in situ and drainage of most of the left pleural effusion.



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A large pleural effusion is an unlikely cause for hypoxaemia on its own, but in this case it was compounded by baseline pneumonia.

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