

I M A G E S

Dynamic right diaphragmatic herniation revealed by point-of-care ultrasound in hepatic hydrothorax

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Case presentation

A 69-year-old male with a past medical history of alcohol use disorder and Child-Pugh C hepatic cirrhosis was brought to the emergency department after a ground-level fall and thoracic blunt trauma. CT scan demonstrated a large right pleural effusion with subtotal lung collapse and 7th and 8th right rib fractures, a thoracic wall hematoma, as well as large ascites. He developed a grade 1 porto-systemic encephalopathy and hepatorenal syndrome responsive to clinical management with loop and potassium-sparing diuretics in incremental doses. Despite clinical improvement, pleural effusion persisted, and ultrasound-guided diagnostic thoracentesis revealed transudative fluid, consistent with hepatic hydrothorax. Therapeutic thoracentesis removed 1300 cc of clear fluid, but reaccumulation was documented 4 days later on follow-up thoracic ultrasonography. Chest ultrasound performed during quiet breathing at the mid-axillary line, at the level of the diaphragm (corresponding to the right lung field 4) (1) revealed

inspiratory transient extrusion of abdominal viscera through the right hemidiaphragm, seen as mobile echogenic structures contouring the liver and entering the right lower thoracic cavity (Videoclip 1). Zoomed images of the mid-axillary line allow the identification of a discontinuity of the diaphragm close to the apposition zone. Subsequent CT scans did not reveal this finding. The patient was discharged and referred to pre-transplant assessment. We believe that this phenomenon resulted from the coexistence of a traumatic diaphragmatic defect, ascites and a respiration-dependent pressure gradient between the pleural and peritoneal cavities (2). This interaction likely enabled intermittent migration of bowel loops into the thoracic cavity. CT imaging did not identify this abnormality, for which two explanations may be proposed: transient pressure equalisation between the pleural and peritoneal cavities during inspiratory breath-hold, abolishing the respiratory pressure gradient; and the inherently static nature of CT imaging, which captures a single phase of the respiratory cycle, compared with the dynamic, real-time assessment provided by



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POCUS. While CT scan remains gold-standard for diaphragmatic hernia assessment, ultrasound has a contributing role in congenital (3) and acquired, traumatic diaphragm herniation. Supportive findings include non-visualization of the hemidiaphragm or of abdominal viscera (4), the direct visualization of disrupted diaphragm or of bowel loops above the diaphragm with active peristalsis (5). Specifically in patients with hepatic hydrothorax, Matono et al. (6) demonstrated the existence of a diaphragmatic defect using contrast-enhanced ultrasonography. Nevertheless, we are unaware of similar reports using dynamic POCUS. This case highlights the added diagnostic value of POCUS in detecting respiration-dependent diaphragmatic abnormalities.

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