

Differentiating pleural effusion from ascites on computed tomography

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A 65-year old male with no past medical history presented with abdominal pain and distension, intermittent low-grade fever and loss of appetite and weight over 2 months. General examination was unremarkable. Respiratory examination revealed tachypnoea, shift of apical impulse to the left with a paucity of movements along with a stony dull note, and absent breath sounds over the right lower hemithorax on inspection, percussion and auscultation, respectively. Abdominal examination revealed diffuse distension with no obvious palpable organomegaly, and fluid thrill was elicited. He was diagnosed with right pleural effusion and ascites. A chest radiograph confirmed the pleural effusion, and a computed tomography scan of the abdomen revealed ascites [Figure 1]. Apart from serum hypoalbuminemia, routine blood biochemistry and complete hemogram were normal. On diagnostic aspiration, examination of both pleural and ascitic fluid revealed straw-coloured fluid, which was confirmed to be exudative with raised adenosine deaminase level on biochemistry, and lymphocyte-predominant with no malignant cellularity on cytological examination. With a clinical diagnosis of disseminated tuberculosis, he was started on anti-tuberculosis treatment, following which he showed both clinical and radiological response.

Question: Identify the four radiological signs that differentiate ascites from pleural effusion on computed tomography?

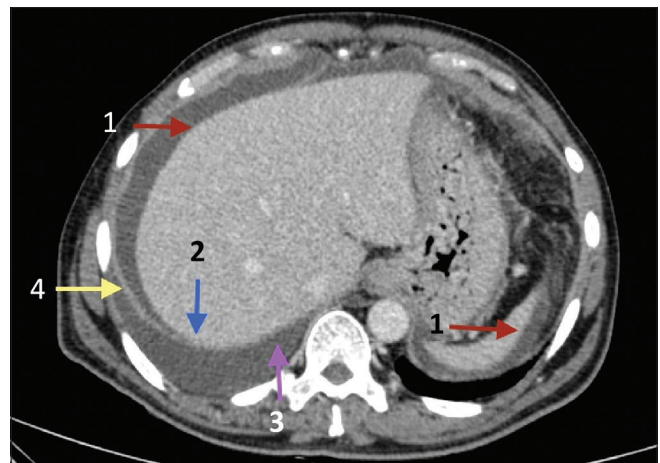


Figure 1: The computed tomography scan of the abdomen axial section at the level of crus of the right hemidiaphragm

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Answer: 1. Interface sign 2. Bare area sign 3. Displaced crus sign 4. Diaphragm sign.

DISCUSSION

To differentiate ascites from pleural effusion, a combination of four signs on computed tomography have been described: interface sign, bare area sign, displaced crus sign and the diaphragm sign.^[1] A fluid–solid interface appears sharp and well-delineated on computed tomography, hence the positive interface sign when a sharp interface or line of demarcation is seen between ascites and liver.^[2] The interface between pleural effusion and liver, however, appears fuzzy, in view of the interposed muscular diaphragm. Fluid collection in the abdomen cannot track behind the bare area of the liver as this area is devoid of peritoneal membrane and access is restricted by the coronary ligaments; if fluid is seen in this area, it is attributed to pleural effusion, and hence the bare area sign.^[3] A right pleural effusion raises the crus of the right hemidiaphragm laterally away from the vertebral body and posterior thoracic wall, leading to the positive displaced crus sign.^[4] The diaphragm appears as a high attenuation line dividing two areas of low attenuation, namely ascites and pleural effusion. Pleural effusion appears posterior to the diaphragm, whereas ascites appear anterior to the diaphragm. Interestingly, this sign has been described to be useful in differentiating a right pleural effusion from ascites only when both are present. The reason for this is that when only one fluid

collection is present (either ascites or pleural effusion), the clear demarcation of the high attenuating diaphragm line cannot be discerned easily. For the diaphragm to be identified easily, two areas of low attenuation (fluid) on either side are required.^[1] All the above signs singly cannot always exclusively differentiate between ascites and pleural effusion when both are present. Any one sign may be positive in a given patient. By applying a combination of all the four signs above, we can correctly differentiate between ascites and pleural effusion when both are present in a given patient.^[5]

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Conflicts of interest

There are no conflicts of interest.

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