Case Report

Hemothorax or not: Use of extrapleural fat sign

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Abstract

Extrapleural hematoma is a collection located between the chest wall and the parietal pleura and is usually associated with rib fractures. Computed tomography is an excellent modality to diagnose extrapleural hematoma and rib fractures as well as differentiate it from a pleural collection. Extrapleural hematoma needs to be differentiated from a hemothorax for appropriate management. We hereby report a case of a large extrapleural hematoma and associated pleural effusion following trauma being managed as a hemothorax based only on chest radiograph appearance.

Keywords: Extrapleural hematoma, hemothorax, pleural effusion

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INTRODUCTION

Blunt injury to the chest accounts for >15% of cases in patients with a history of blunt trauma.[1] Pneumothorax and hemothorax are the most common immediate complications associated with blunt chest trauma,[2] however, extrapleural hematoma can also occur and a patient may present immediately or rarely with delayed symptoms. Very rarely, an extrapleural hematoma can also occur spontaneously in cases of coagulopathy.

CASE REPORT

A 61-year-old male patient presented with gradually progressing complaints of breathlessness and right chest pain after a history of a fall 2 weeks ago. A chest radiograph performed elsewhere revealed blunting of the right costophrenic angle and opacification of the right hemithorax suspicious for a pleural effusion.

Ultrasound-guided aspiration revealed hemorrhagic fluid. Contrast-enhanced computed tomography (CT) study of the chest was performed in view of persistent symptoms. It revealed comminuted fractures of the right 9th–11th ribs [Figures 1 and 2] with mildly displaced fractures of the anterior ends of the right seventh and eighth ribs adjoining the costochondral junction. A small fractured fragment was seen projecting into the extrapleural space (EPS) along the tenth rib. A large associated mixed density mildly hyperdense extrapleural hematoma was noted displacing the extrapleural fat anteriorly and laterally with an associated pleural effusion as well [Figures 3 and 4]. No obvious active extravasation of the intravenous contrast was seen within the hematoma.

DISCUSSION

The EPS is an anatomic space which lies between the inner surface of the ribs and the parietal pleura and contains adipose tissue, blood vessels, endothoracic fascia, lymph nodes, and the intercostal muscle. The adipose tissue in the

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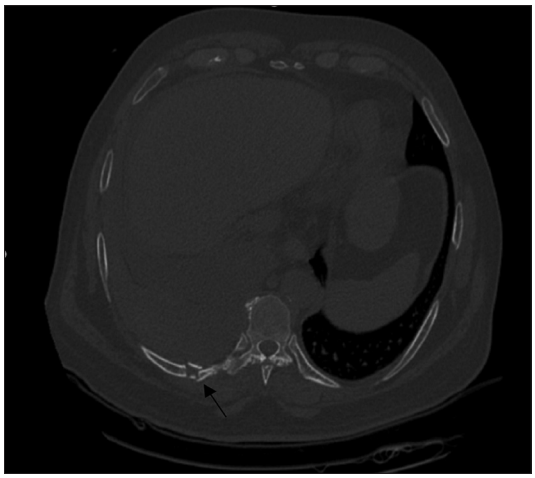

Figure 1: Axial computed tomography bone window image showing fracture of the right ninth rib (black arrow)

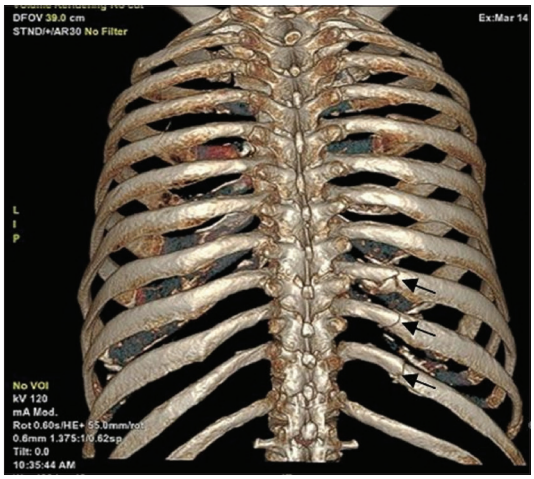

Figure 2: Volume rendered (VRT) image showing fractures of the right 9th–11th ribs (black arrow)

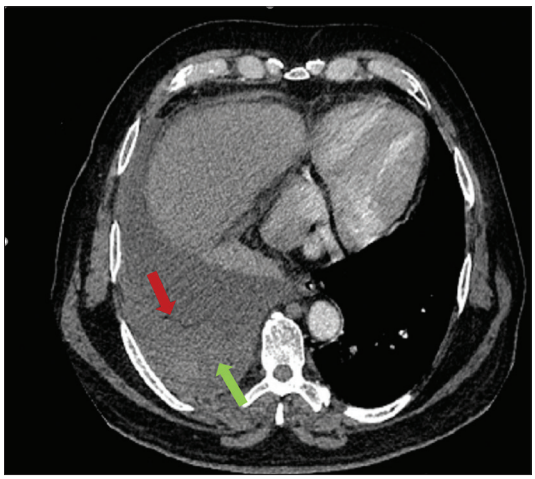

Figure 3: Axial computed tomography image showing an extrapleural hematoma (green arrow) displacing the extrapleural fat (red arrow) anteriorly

Figure 4: Sagittal computed tomography image showing an extrapleural hematoma (green arrow) displacing the extrapleural fat (red arrow) anteriorly

EPS is located immediately external to the parietal pleura and separates the pleura from the endothoracic fascia.[3]

Chest radiography may be useful for evaluating pleural or extrapleural abnormalities that are large enough to be detected, however, it may not provide the spatial resolution that is necessary to localize a lesion to the pleural or EPS.[3]

Ultrasound imaging is generally not used to differentiate a pleural from extrapleural pathology.

On CT scan, the anatomy of the EPS is complex mainly because of many tight structures packed in tight space. The layers of the EPS manifest as an intercostal stripe measuring 1–2 mm representing a combination of visceral pleura, parietal pleura, extrapleural adipose tissue, endothoracic fascia, and innermost intercostal muscle. The intercostal stripe is seen in the anterolateral and posterolateral aspects of the intercostal spaces and is not visible in the anterior parasternal and posterior paravertebral regions of the chest due to the absence of the intercostal muscle.[3]

An extrapleural hematoma results from the accumulation of blood in the EPS in cases of trauma leading to rupture of intercostal arteries or veins with an intact parietal pleura preventing the blood from draining into the pleural space.[4] Blunt chest trauma, especially when associated with rib fractures, can injure adjacent vessels and is the most common cause of an extrapleural hematoma.[5] Extrapleural hematoma may also occur in patients with thickening of parietal pleura or dense adhesions between the parietal pleura and the endothoracic fascia and is frequently misdiagnosed as a hemothorax.[6]

Injury to the diaphragm, lung contusion, and mediastinal structure injury should also be ruled out which cannot be

detected on conventional radiology. The patient's condition may further deteriorate in the event of an inappropriate intercostal chest tube insertion site.

Radiographically, extrapleural hematoma manifests as a localized pleural-based extrapulmonary mass with sharp inner margins and tapered obtuse edges, however, it is difficult to differentiate it from a loculated hemothorax.

CT is mainly used to further characterize abnormalities seen on the chest radiograph or ultrasonography and to determine precisely whether the abnormality is parenchymal, pleural, or extrapleural in origin. There is a low-attenuating extrapleural adipose tissue layer known as "extrapleural fat sign" which helps to establish the diagnosis of an extrapleural hematoma where it is displaced anteriorly and medially.[1,7,8] It is usually overlooked on CT scan, and a misdiagnosis of hemothorax is formed. A similar case of an overlooked extrapleural fat sign was published by Yong Seon Choi *et al*. in 2017 in which an extrapleural fat sign was overlooked and a diagnosis of hemothorax was given.

Treatment based only on radiographic and sonographic appearances may turn out to be false positive/negative, as in our case, where the patient was being treated as hemothorax. The differentiation between extrapleural and pleural spaces is important, to formulate the management protocol, whether to manage conservatively or intervene surgically.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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