

Extrapleural Fat Sign

Dharshan R. Vummidi, MRCP, FRCR, Jonathan H. Chung, MD, and Eric Stern, MD

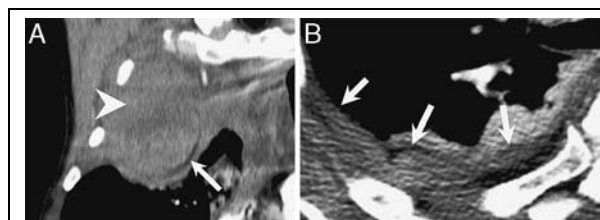


FIGURE 1. A, Coronal reformation from contrast-enhanced chest CT shows inward displacement of the extrapleural fat (arrow) by a large right extrapleural hematoma (arrowhead) from blunt trauma. B, Axial image from contrast-enhanced chest CT shows the extrapleural fat sign (arrows) adjacent to a non-convex extrapleural hematoma.

Extrapleural Fat Sign

Fat attenuation stripe displaced inward by an extrapleural collection or mass

Differential diagnosis

Extrapleural hematoma

Abscess

Neoplasm

Appearance: The extrapleural fat sign is the inward displacement of an extrapleural fat stripe by an extrapleural fluid collection or mass on CT.^{1,2}

Explanation: Extrapleural fat, endothoracic fascia, and the innermost layers of intercostal muscle are superficial to the parietal pleura. Extrapleural fat is usually seen as a 1 mm thick low attenuation line on chest CT and is almost imperceptible in normal individuals.² It may be thicker in obese patients.

Accumulation of blood in the extrapleural space results in an extrapleural hematoma (EPH), which displaces the overlying extrapleural fat centrally and is most commonly the result of injury to intercostal arteries or veins.³ EPH is an underreported complication of blunt chest trauma. Less common causes of EPH include aortic rupture, penetrating trauma, and iatrogenic injury.³⁻⁶

Discussion: A rapidly expanding biconvex extrapulmonary opacity on chest radiography or high attenuation extrapleural collection on CT should raise the suspicion of an EPH, particularly in the context of trauma. Frequently associated with rib fractures, intercostal vessel injury is considered the most common etiology of EPH (Fig. 1).³ Direct bleeding from rib fractures and paravertebral muscle trauma may also cause EPH.⁷ Other signs of trauma, such as pulmonary contusion or laceration, hemothorax, and pneumothorax, often coexist.

In a retrospective review of 13 cases of EPH by Chung et al, the majority of patients (11/13) had a traumatic etiology.⁷ Nine of the 11 trauma patients had rib fractures, 4 of whom required surgical intervention. The authors divided EPH into two groups: biconvex and nonconvex. Biconvex EPHs have a partial or complete biconvex margin, often forming an oval or round shape similar to the appearance of an intracranial epidural hematoma. Biconvex EPH tends to be larger than nonconvex EPH. The biconvex morphology suggests arterial bleeding and a higher likelihood of surgical intervention.⁷ Nonconvex EPH more often has lobulated margins that conform to the shape of the inner chest wall, likely results from low pressure venous bleeding, and usually does not require surgical management.⁷

The presence of the extrapleural fat sign should alert the radiologist to the extrapleural location of the fluid collection or mass in question. Extrapleural hematoma, the prototypical cause for an extrapleural collection, is frequently misdiagnosed as hemothorax and cannot be drained with pleural tube placement.⁷ Drainage of a large EPH most often requires surgery.

REFERENCES

1. Hammerman AM, Susman N, Strzembosz A, et al. The extrapleural fat sign: CT characteristics. *J Comput Assist Tomogr.* 1990;14:345-347.
2. Aquino SL, Chiles C, Oaks T. Displaced extrapleural fat as revealed by CT scanning: evidence of extrapleural hematoma. *AJR Am J Roentgenol.* 1997;169:687-689.
3. Rashid MA, Wikstrom T, Ortenwall P. Nomenclature, classification, and significance of traumatic extrapleural hematoma. *J Trauma.* 2000;49:286-290.
4. Igai H, Okumura N, Ohata K, et al. Rapidly expanding extrapleural hematoma. *Gen Thorac Cardiovasc Surg.* 2008;56:515-517.
5. Murley RS, Hurt RL. Extrapleural haematoma secondary to blunt chest trauma. *Eur J Cardiothorac Surg.* 1996;10:223.
6. Kay J, Goodman LR, Gurney J. Extrapleural hematoma: a recognizable complication of central venous pressure monitoring. *J Clin Monit.* 1987;3:64-66.
7. Chung JH, Carr RB, Stern EJ. Extrapleural hematomas: imaging appearance, classification, and clinical significance. *J Thorac Imaging.* 2011;26:218-223.