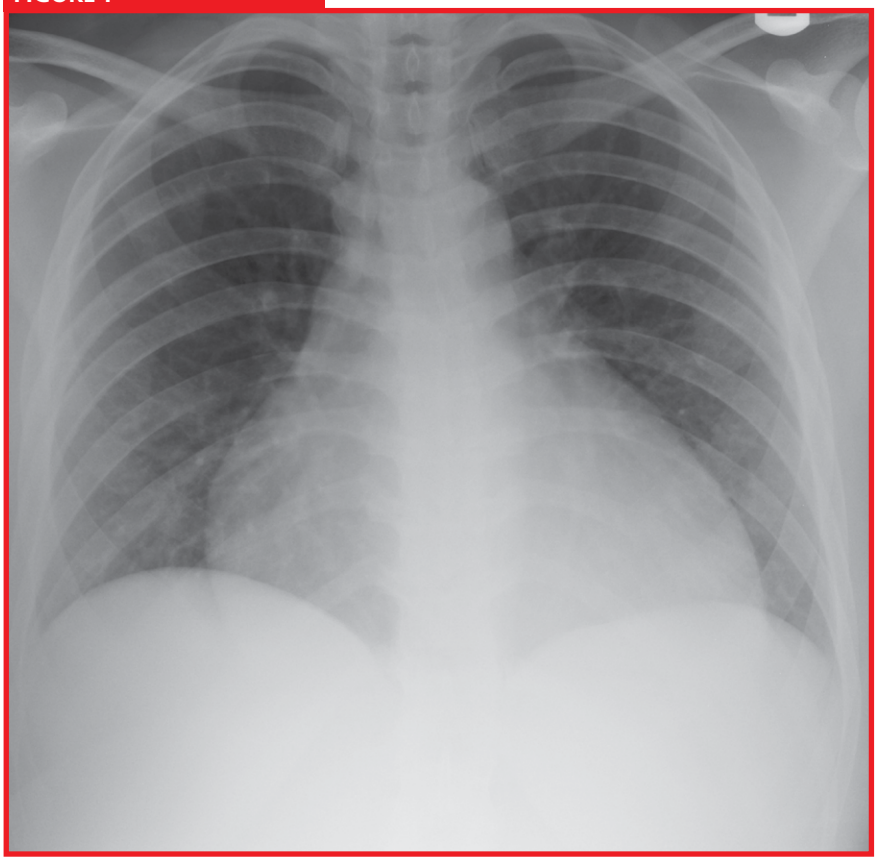
EMERGENCY IMAGING

Keith D. Hentel, MD

FIGURE 1



A 25-year-old woman presents to the ED with increasing shortness of breath. On exam, she has normal breath sounds but is tachycardic. A chest radiograph is obtained (Figure 1).

What is the finding, and what is the differential diagnosis? What other imaging studies should you obtain?

Dr. Hentel, editor of "Emergency Imaging," is an assistant professor of radiology at Weill Cornell Medical College in New York City. He is also chief of emergency/musculoskeletal imaging and the vice-chairman for clinical operation for the department of radiology at NewYork-Presbyterian Hospital/Weill Cornell Medical Center in New York City. He is a member of the EMERGENCY MEDICINE editorial board.

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FIGURE 2

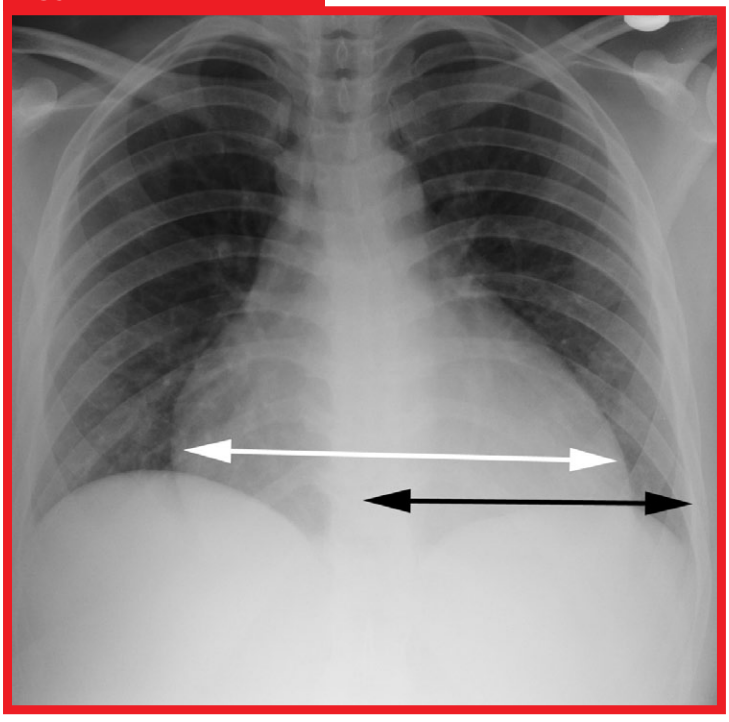
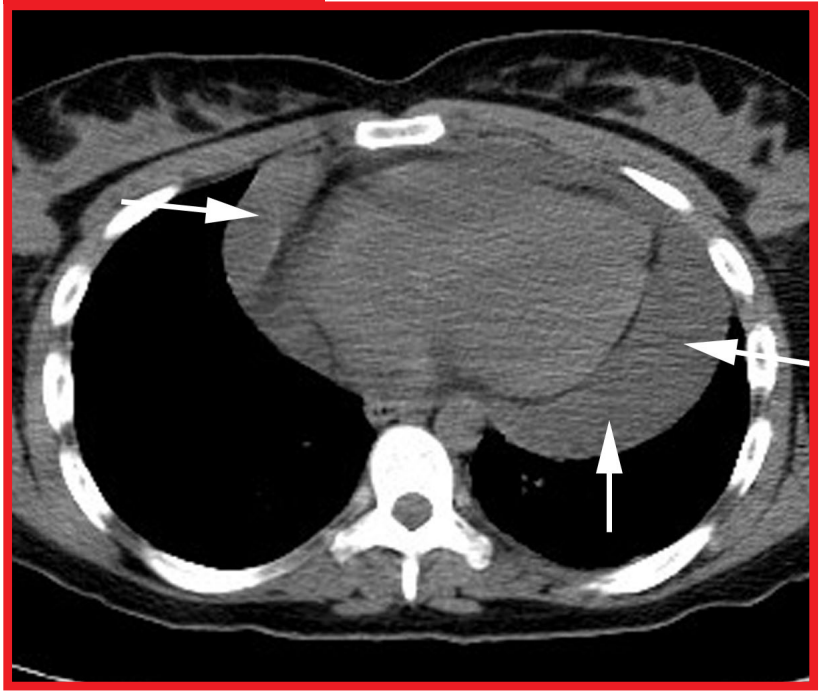


FIGURE 3



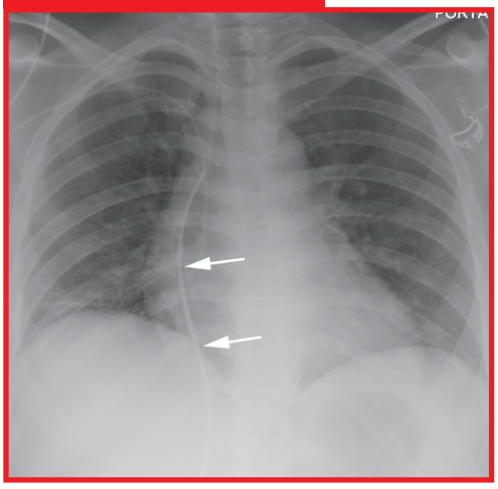
Answer

The frontal radiograph in this patient demonstrates enlargement of the cardiac silhouette. On a posteroanterior view of the chest (Figure 2), the size of the heart (white arrows) should be less than or equal to one-half the maximal thoracic diameter (black arrows). Enlargement of the cardiac silhouette is a nonspecific finding on plain radiography, as fluid, blood, and muscle all have the same radiographic density. Therefore, it is not possible to distinguish among fluid/blood in the pericardial space (pericardial effusion), muscular hypertrophy (cardiomyopathy), or dilatation of the cardiac chambers (heart failure). Echocardiography is the test of choice for identifying any of these entities; however, it is often not readily available in the ED.

CT is a modality that is widely available in the ED setting, and it may be used to detect and distinguish among the above entities. An advantage of CT is its utility in excluding additional etiologies for acute shortness of breath, such as radiographically occult pneumonia and pulmonary embolus. A disadvantage is the radiation dose. In an adult, a CT study of the chest to evaluate for pulmonary embolism may deliver an effective radiation dose of 3 to 5 mSv, or the equivalent of 1 to 2 years of background radiation. However, in many cases, including the case presented here, the risk of not making the diagnosis outweighs the risk associated with the radiation exposure.

An axial image from a CT examination of the chest (Figure 3)

FIGURE 4



shows that the enlargement of the cardiac silhouette is the result of a large pericardial effusion (white arrows). A pericardial effusion is the accumulation of an abnormal amount of fluid between the visceral and parietal layers of the pericardium. The differential diagnosis is broad, including entities such as pericarditis, trauma, volume overload, and neoplasm; pathology in other organ systems (liver, kidneys, pancreas, thyroid, thoracic duct) must also be ruled out.

Approximately one-third of patients with large pericardial effusions develop cardiac tamponade, regardless of etiology.[1] Observed more frequently with rapidly accumulating effusions, tamponade occurs when the pressure in the pericardial space compresses the heart, resulting in hemodynamic compromise. Clinical signs in patients with tamponade include tachycardia (although patients with thyroid disease and uremia may be bradycardic), hypotension, jugular venous distention, and poor peripheral perfusion. Once detected, tamponade should be rapidly treated to avoid shock and hemodynamic collapse.[2]

The pericardial effusion detected in this patient was drained via an emergently placed pericardial catheter (white arrows, Figure 4). Note that the size of the cardiac silhouette has returned to near normal following drainage of the pericardial fluid. **EM**

REFERENCES

1. Khandaker MH, Espinosa RE, Nishimura RA, et al. Pericardial disease: diagnosis and management. *Mayo Clin Proc*. 2010;85(6):572-593.
2. Restrepo CS, Lemos DF, Lemos JA, et al. Imaging findings in cardiac tamponade with emphasis on CT. *Radiographics*. 2007;27(6):1595-1610.