A 69-year-old woman presented to an outside hospital with chest pressure radiating to the back and dyspnea. Computed tomography (CT) of the chest with pulmonary embolism protocol for elevated D-dimer was negative (Figure 1). She had mild Troponin elevation that resolved along with the symptoms, and the patient underwent a stress test to rule out acute coronary syndrome. She developed dyspnea during the test, prompting a chest x-ray, which showed left-sided pleural effusion and mediastinal shift to the right that was not seen on the admission chest x-ray (Figure 2). A thoracentesis demonstrated hemorrhagic fluid. A CT of the chest without contrast showed an intimal flap in the aorta with a centrally displaced calcified atherosclerotic plaque characteristic of aortic dissection that could not be seen in the previous CT with pulmonary embolism protocol (Figure 3). After this, she was transferred to our hospital, where a transthoracic echocardiogram almost 6 hours later showed a type I aortic dissection with the intimal flap originating 1.5 cm proximal to the aortic valve and extending into left subclavian artery and descending aorta (Figures 4 and 5 and Movies I and II in the online-only Data Supplement). There was no involvement of the coronary cusps, and no regional wall motion abnormalities of the myocardium. A transesophageal echocardiogram showed the dissection in addition to mediastinal fluid surrounding the aortic arch, suggestive of rupture (Movie III in the online-only Data Supplement). CT angiography performed to evaluate the
extent of aortic involvement again demonstrated the echocardiographic findings and showed a severely compressed true lumen (4 mm at the thinnest) and the dissection flap extending up to the right renal artery (Figures 6–8 and Movie IV in the online-only Data Supplement). Surgery revealed a hemopericardium with an enlarged and tense thoracic aorta (Figure 9). She eventually succumbed to uncontrollable bleeding caused by aortic wall frailty during surgery.

In all likelihood, this unfortunate patient presented initially with an aortic dissection that could not be identified with the early imaging study. The fact that she had an elevated D-dimer is a concern because it is positive in both pulmonary embolism and aortic dissection. A D-dimer within normal limits has a very good negative predictive value for both. The difference in timing for acquisition of the contrast-enhanced images for Aortic Dissection and Pulmonary Embolism plays a significant role in distinguishing between the 2 disorders from the same study. Certain centers around the country are now implementing what is called a triple rule-out strategy for acute chest pain, wherein a CT with pulmonary embolism protocol, a CT with aortic dissection protocol, and CT coronary angiography are combined into 1 study to ascertain the origin of chest pain. Although this combined study might not be as highly sensitive and specific as the individual studies, it should be used when possible. Perhaps if patients with a similar presentation can have an extended imaging series during the evaluation of chest pain of uncertain origin, the imaging could lead to earlier diagnosis and implementation of appropriate treatment strategies.

Disclosures

None.

Figure 3. Computed tomography (CT) of the chest without contrast demonstrating an intimal flap marked by a displaced calcified atherosclerotic plaque (arrow) that was seen to be adherent to the vessel wall in the CT of the chest with pulmonary embolism (PE) protocol on admission (left).

Figure 4. Transthoracic echocardiogram. Evidence of the dissection flap extending into the subclavian artery is seen on this transthoracic echocardiographic image. The arrow points to the subclavian flap, and the asterisk shows the left common carotid artery.
Figure 5. Transthoracic echocardiogram demonstrating the completely collapsing true lumen during the systolic phase compared with the diastolic phase in the abdominal aorta. Arrows point to the true lumen in the diastolic and systolic phases.

Figure 6. Computed tomography angiogram of the ascending and descending thoracic aorta demonstrating the true and false lumen.

Figure 7. Computed tomography angiogram showing the false and true lumen, including the extension of the dissection into the left subclavian artery and down the descending aorta. The arrow points to the involvement of the subclavian artery, arch of the aorta, and abdominal aorta.
Figure 8. Three-dimensional reconstruction demonstrating the extensive nature of the dissection in the aorta. Arrows point to the involvement of the arch of aorta, subclavian artery, and abdominal aorta.

Figure 9. Intraoperative image of the false lumen filled with thrombus.
Radiating Chest Pain to the Back
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