Acute aortic dissection with highly compressed true lumen: unanticipated pitfall of point-of-care ultrasonography

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SUMMARY
A 46-year-old man presented with sudden onset of chest pain. He was in cardiogenic shock at arrival. Based on the results of ECG and echocardiogram, he was diagnosed with ST-segment elevation myocardial infarction. Point-of-care ultrasonography (POCUS) did not reveal acute aortic dissection (AAD). During an emergency coronary angiography, aortic dissection was detected and computed tomographic angiography (CTA) revealed Stanford type A AAD with a highly compressed true lumen. Because of this form of aortic dissection, the enlarged false lumen could be potentially misidentified as a normal aorta in POCUS. Although POCUS is useful when AAD is suspected, we should not overestimate its findings and lower the threshold for CTA.

BACKGROUND
Acute aortic dissection (AAD) is a fatal disease that presents in the emergency department (ED). However, the symptoms and severity of AAD at the time of presentation vary and are often difficult to diagnose. As AAD sometimes mimics myocardial infarction, emergency physicians (EPs) are faced with a difficult decision. Although point-of-care ultrasonography (POCUS) has proven to help distinguish between these two diseases,1 we experienced a case in which the form of the dissection made it difficult to diagnose using POCUS.

CASE PRESENTATION
A 46-year-old Japanese man suddenly developed severe chest pain. He had no significant medical or family history, and smoked one pack of cigarettes per day. The symptoms appeared while he was working in a restaurant. He arrived at the ED 30 min after onset.

The initial vital signs of the subject were as follows: blood pressure, 183/120 mm Hg; heart rate, 98 beats/min; respiratory rate, 26 breaths/min; oxygen saturation, 99% on 10 L of oxygen per minute. He was in a state of restlessness and had large amounts of cold sweat. On auscultation, no abnormal heart or breathing sounds were observed.

INVESTIGATIONS
The laboratory data showed a normal troponin I level of under 10 pg/mL (normal range: under 26.2 pg/mL) and elevated lactate level 32 mg/dL (normal range: 4.5–18.0 mg/dL). ECG showed ST elevation in the II, III, aVF, V1, V2 and V4R leads (figure 1). Thoracic echocardiography showed decreased contraction of the inferior left ventricular wall. Chest radiography revealed mediastinal widening (97 mm). Aortic dissection-oriented POCUS with left parasternal, apical, suprasternal, subcostal and abdominal views did not reveal an intimal flap, a thoracic aorta dilation, a massive pericardial effusion or an aortic valve regurgitation.
of Acute Aortic Dissection reported that the overall mortality rate of Stanford type A AAD is approximately 22%. This large multicenter database also revealed that the 25% of AAD are initially diagnosed by thoracic echocardiography. Occasionally, the dissection of the ascending aorta occludes the coronary artery and mimics an STEMI. Discriminating between an AAD and a primary STEMI is very important for decisions regarding treatment plans. Aortic dissection-oriented POCUS has been reported as a useful tool to help discriminate these conditions. Another report suggests that the dissection of the aortic arch could be diagnosed using the suprasternal view. Many parts of the thoracic aorta can be evaluated using POCUS.

Differential Diagnosis
He was diagnosed with ST-segment elevation myocardial infarction (STEMI). After the administration of aspirin and prasugrel, an emergency coronary angiography (CAG) was performed. During CAG, a dissection was detected in the ascending aorta. The right coronary artery was obstructed and drug-eluting coronary stents were placed (figure 3). After CAG and percutaneous coronary intervention, computed tomographic angiography (CTA) was performed. It revealed a Stanford type A AAD with a highly compressed true lumen (figures 4 and 5), large intestinal ischemia and left renal infarction. The DeBakey type I aortic dissection extended to the bilateral internal iliac arteries (figure 6).

Treatment
He underwent emergency thoracic aortic graft replacement and open stent grafting.

Outcome and Follow-Up
After an extensive bowel resection, he was discharged from the intensive care unit.

Discussion
AAD is a lethal condition in the ED. The International Registry of Acute Aortic Dissection reported that the overall mortality (AR; figure 2). The D-dimer levels were not determined during the ED stay.

Computed tomographic angiography showing aortic dissection in the aortic arch in coronal view (A) and sagittal view (B). Intimal flap is indicated by black arrow. FL, false lumen; TL, true lumen.

Computed tomographic angiography showing aortic dissection at the abdominal aorta below the renal artery branch points (A), and the external and internal iliac arteries (B). White arrows show highly compressed true lumen. FL, false lumen.
Learning points

► Point-of-care ultrasonography (POCUS) is a useful tool to discriminate acute aortic dissection (AAD) and other mimics.
► One of the pitfalls of POCUS is that AAD with a highly compressed true lumen and enlarged false lumen could be difficult to identify.
► We should not overestimate the POCUS findings and lower the threshold for computed tomographic angiography.

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