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CASE REPORT CARDIOLOGY

A patient presenting with acute heart failure: A dilemma of diagnosis

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ABSTRACT

Acute dyspnea is a major complaint of patients admitted to cardiology and emergency departments (ED). Acute dyspnea can be life-threatening, and is seen in cases of asthma, pulmonary embolism, acute heart failure and myocardial infarction. The present case is that of a 32-year-old man admitted to the ED with orthopnea position and agitation. Physical examination, electrocardiogram (ECG), transthoracic echocardiogram (TTE), contrast-enhanced computed tomography (CECT) of thorax and coronary angiography (CAG) helped to rule out chest disease pathologies such as pneuomo-thorax, pulmonary embolism and coronary artery disease, but were not enough to make an appropriate diagnosis in this case. Because of high pretest probability of aortic dissection, transesophageal echocardiography (TEE) was performed and a diagnosis of Stanford type A dissection closing left main coronary artery (LMCA) ostia from beat to beat was made.

Keywords: CT angiography; misdiagnosis; transesophageal echocardiography; type A aortic dissection.

Dyspnea, or breathing difficulty, is one of the cardinal symptoms of cardiac and pulmonary diseases [1]. Most ED dyspnea attack admissions are due to systolic or diastolic heart failure. The specific reason for the sudden onset of dyspnea must be determined and appropriate treatment according to the etiology started as soon as possible. Aortic dissection is rare, and presentation of aortic dissection with dyspnea is even more infrequent. Aortic dissection is a life-threatening cardiovascular disorder in which the inner layer of aorta has ruptured, and for which early diagnosis is crucial for definitive surgical management and patient survival. As the aorta is the main supplier of blood to organs and all of the body, a tear in the inner layer of the aorta causes false lumen to form, which could block the flow of blood through the true lumen and prevent distal organ perfusion. Primary symptom of dissection is an abrupt, tearing-like chest pain that radiates to thorax and abdomen. Dyspnea, pain in arms, weakness, and loss of consciousness are other symptoms. There are two classification systems for aortic dissection: Stanford type A refers to dissections occurring in the ascending aorta, while Stanford type B means dissections occurring in the descending aorta. The De Bakey classification uses De Bakey I

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for a dissection that starts from ascending aorta and includes the arc and descending aorta, De Bakey II is a dissection in the ascending aorta and the arc, and De Bakey III dissections involve the descending aorta. Computed tomographic (CT) angiography has very high sensitivity and specificity for diagnosing acute aortic dissection. Patients with vascular Ehlers-Danlos syndrome, Marfan syndrome, bicuspid aortic valve and Loeys-Dietz syndrome are known to have a greater risk of aortic dissection.

The present case is that of a 32-year-old man admitted to the hospital with pulmonary edema and aortic dissection.

CASE REPORT

A 32-year male patient presented to the ED with severe dyspnea and agitation at 2:00 a.m. The patient was placed in orthopnea position and oxygen was administered. Blood pressure was 165/50 mmHg, heart rate was 113 bpm, body temperature was 36.5 °C, 25 breaths of respiratory rate per minute and oxygen saturation with pulse oximetry was 78% with nasal cannula. Physical examination revealed rales as far as upper zones of both of lungs and at base of heart, and a diastolic grade 2/6 murmur of aortic regurgitation was heard. There was no pulse deficit of peripheral pulses. Medical history included hypertension treated with angiotensin receptor blocker (ARB) and smoking habit. No recorded pulmonary disease, coronary artery disease or valvular disease was present. Electrocardiography (ECG) showed sinus tachycardia with T-wave inversion in leads DI and VL. The working diagnosis was pulmonary edema, and use of bronchodilator inhaler was initiated, as well as intravenous nitrates and intravenous diuretic therapy. While taking arterial blood gas sample, patient's condition deteriorated and abdominal respiration pattern became obvious. Elective tracheal intubation of patient was performed, and patient was admitted to coronary intensive care unit (CICU) with pulmonary edema and possible acute valvular insufficiency. Transthoracic echocardiogram (TTE) showed mild to moderate aortic regurgitation with 3.3 cm of sinus of Valsalva. No sign of flap in ascending aorta was present. There was no pericardial effusion. Systolic function of ventricle was normal and left ventricular (LV) cavity widened to 5.1 cm at end-diastolic volume. Arterial blood gas before intubation showed hypoxia with 76% arterial oxygen saturation and hypocarbia with metabolic acidosis of 7.13 Ph. Contrast-enhanced computed tomography (CECT) of thorax was used to refine the diagnosis. As a team, the cardiologist, the cardiovascular surgeon, and the radiologist checked the computed tomography (CT) images. Sinus of Valsalva was 3.5 cm and no flap was found in ascending or descending aortas. Pulmonary embolism was also ruled out with CT scan. As lab test results showed coronary ischemia with positive troponin I levels (1.016 ng/dL), it was decided that a diagnostic coronary angiography (CAG) would be performed. In the catheterization laboratory, intubation of right coronary artery (RCA) and left main coronary artery (LMCA) was difficult, and the test required 1 hour to complete. Surprisingly, the CAG revealed normal coronary arteries. Pulmonary embolism and coronary artery disease as cause of acute dyspnea were ruled out, but the cause of dissection of aorta was still unclear because of possibility of a false negative CT scan. Transesophageal echocardiography (TEE) was selected as the next diagnostic tool due to high pretest probability of aortic dissection. TEE showed a Stanford type A dissection flap closing LMCA ostia from beat to beat and compromising the aortic valve with moderate aortic regurgitation. Determining the appropriate diagnosis for acute heart failure was very challenging, but at 6.00 a.m., surgery to correct a Stanford type A dissection localized in the valve and coronary ostia was performed. Upon further careful review of CT scan images, a very tiny flap was observed at the ostium of LMCA (Figure 1).

DISCUSSION

Acute aortic dissection is a life-threatening medical emergency that can quickly lead to death. Incidence is estimated to be 3 in a 1000 cases according to International Registry of Aortic Dissection (IRAD). If left untreated, 33% of individuals will die within 24 hours of presentation, and 50% die in

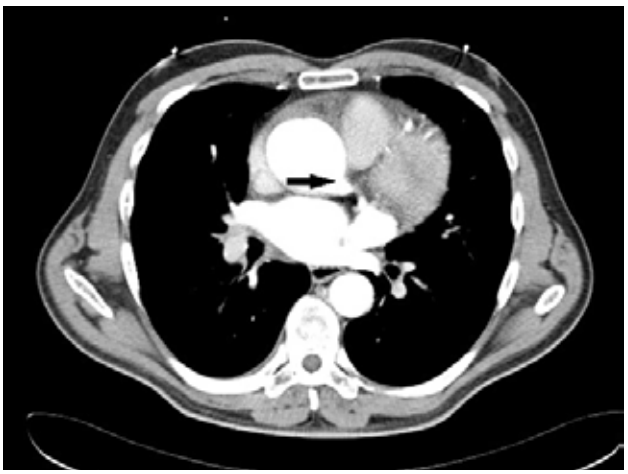

Figure 1. Transverse cut view of contrast enhenced enhanced computed tomography shows a tiny flap at the ostium of LMCA that was initially misdiagnosed.

the initial 48 hours [2]. Although diagnostic tests have improved, the condition remains undiagnosed in about half of patients because of variable symptoms and negative laboratory tests. After first admission tests of physical examination, vital signs, and electrocardiogram (ECG); the most frequently performed tests to diagnose aortic dissection are CT, TEE and magnetic resonance imaging (MRI). A recent meta-analysis by Shiga et al. [3] reviewed published studies of diagnosis of aortic dissection by TEE, helical CT and MRI showed that these tests have equal and reliable diagnostic value. TEE had 99% sensitivity and 95% specificity, helical CT had 100% sensitivity and 98% specificity, and MRI had 98% sensitivity and 98% specificity [4, 5].

In the present case, first admission physical examination and laboratory tests were supportive of aortic dissection. After a misdiagnosis was made by the radiologist, the cardiologist, and the surgeon based on CT of chest, CAG was performed to clarify coronary ischemia, which is contraindicated in aortic dissection. Correct diagnosis of aortic dissection was made with TEE, and the patient was taken to surgery. Further examination of CT scan images then revealed a tiny flap at the ostium of LMCA (Figure 1). Aortic dissection may occur in a small part of aorta and not be seen in CT scan or laboratory test results. If suspicion of aortic dissection is high, diagnosis can be made with TTE and TEE in intensive care units (ICUs).

Dyspnea is the major symptom of acute heart failure and an etiologic assessment must be made for every patient who presents with acute dyspnea. In the present case, aortic dissection compromised aortic valve and coronary ostium, increasing left ventricle end-diastolic pressure, which led to pulmonary edema and acute dyspnea. In episodes of acute dyspnea, aortic dissection must be kept in mind as a differential diagnosis. Though a diagnostic tool like CT scan may have 100% sensitivity and 98% specificity, it may also contribute to a misdiagnosed aortic dissection. If high pretest probability is present and CT scan does not support the diagnosis, TEE and MRI may be used next to determine the correct diagnosis.

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