Acute Stanford Type A Aortic Dissection Mimicking Acute Myocardial Infarction: A Hidden Catastrophe Which Should Prompt Greater Vigilance

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Stanford type A aortic dissection involving the coronary artery ostium and leading to a concomitant acute myocardial infarction (AMI) is an infrequent but life-threatening condition, necessitating a prompt diagnosis and appropriate treatment. Unfortunately, the diagnosis of this entity can be extremely challenging and misdiagnosis is sometimes unavoidable because it usually mimics a common AMI. Herein, we describe the case of a 56-year-old man who presented with severe retrosternal chest pain and dynamic ECG change which was initially misdiagnosed solely as an AMI. However, the patient was finally diagnosed to have a type A aortic dissection complicated by coronary artery involvement. Following emergent surgery treatment, the patient made a good recovery.

Key Words: Acute myocardial infarction • Aortic dissection • Coronary angiography

INTRODUCTION

Stanford type-A aortic dissection complicated with coronary artery obstruction is a rare but potentially fatal condition, necessitating prompt diagnosis and appropriate treatment.[1] However, type-A aortic dissection with coronary artery involvement usually share a similar clinical presentation with acute myocardial infarction (AMI), rendering the diagnosis of this entity extremely difficult and misdiagnosis is sometimes unavoidable.[2] In this article, we describe a case of a 56-year-old man who presented with severe retrosternal chest pain and dynamic electrocardiogram (ECG) change which was initially misdiagnosed as an acute inferior myocardial infarction. However, diagnosis of type A aortic dissection was strongly suspected when aorta root dilation and eccentric aortic regurgitation were detected on aortogram. Subsequent thoracic computed tomography fully confirmed the presence of type-A aortic dissection. Emergency surgery was successfully performed and the patient made a good recovery.

CASE REPORT

A 56-year-old man was admitted to the emergency department of our institution complaining of sudden onset of severe retrosternal chest pain for 1 hour. His past medical history was unremarkable except for long-standing, uncontrolled hypertension. At admission, physical examination revealed blood pressure of 170/100 mmHg without significant blood pressure differences in both arms; pulse rate of 98 bpm and equal bilateral radial pulses. No distinct murmur was heard on cardiac auscultation. The initial ECG showed atrial fibrillation with no signs of myocardial ischemia (Figure 1A). A bed-

Received: June 27, 2013 Accepted: December 20, 2013
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side chest X-ray examination did not show widening of the mediastinum. Shortly after admission, the patient's clinical condition deteriorated rapidly with signs and symptoms of cardiogenic shock. During clinical evaluation, the patient soon developed cardiac arrest and was successfully resuscitated after defibrillation. A second ECG obtained 10 min later demonstrated a marked ST-segment elevation in leads II, III and aVF with reciprocal ST-segment depression in leads I, aVL, suggesting an inferior wall acute myocardial infarction (AMI) (Figure 1B). Based on the clinical presentation and ECG findings, a diagnosis of acute inferior ST segement elevatio myocardial infarction (STEMI) complicated by cardiogenic shock was made. Thus, anti-aggregation therapy, including 300 mg aspirin and 300 mg clopidogrel, was promptly administered. After obtaining written informed consent, the patient was immediately referred to the catheterization lab for primary percutaneous coronary intervention (PCI) due to ongoing myocardial ischemia and hemodynamic instability. Emergent coronary angiography revealed normal left coronary arteries and a discrete, eccentric stenosis at the proximal portion of the right coronary artery (RCA) (Figure 2A), with contrast dye stasis beyond this portion after the angiography. This suggested a flow-limiting lesion in the proximal-RCA (Figure 2B). Intriguingly, during the peak of contrast injection, the vessel lumen was distended while collapsed at the end of the injection in the proximal segment of the artery, suggesting that the luminal narrowing may be secondary to an extrinsic compression on the vessel wall. An aortogram was performed, which revealed a significantly dilated aortic root associated with moderate eccentric aortic regurgitation (Figure 2C). These findings were compatible with an underlying type-A aortic dissection. Urgent thoracic computed tomography (CT) scan was performed and fully confirmed the diagnosis of a type-A aortic dissection with the involvement of the RCA ostium (Figure 2D). The patient was referred

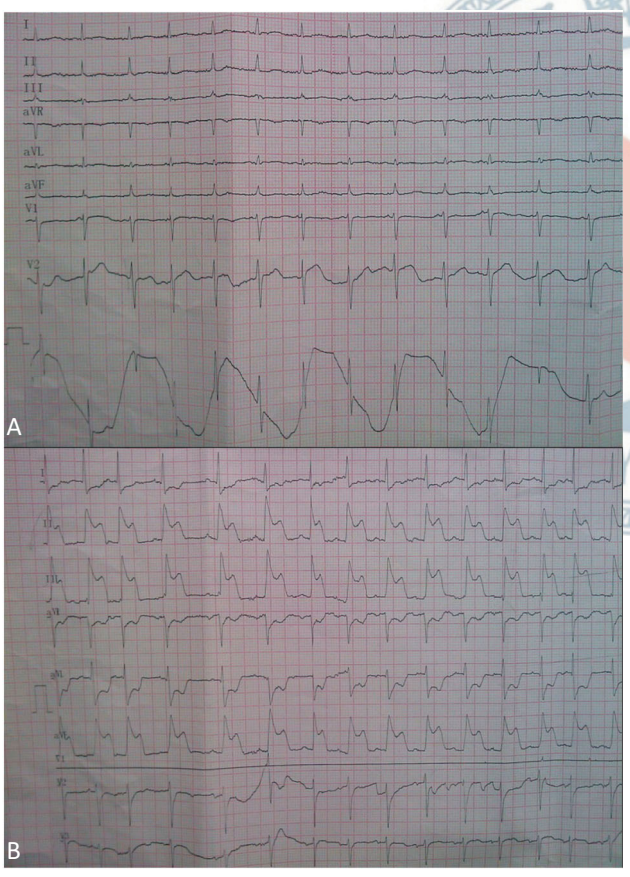

Figure 1. *(A) The ECG at admission showed atrial fibrillation with no signs of myocardial ischemia. (B) A second ECG obtained 10 min later showed a marked ST-segment elevation in leads II, III and aVF and reciprocal ST depression in leads I, aVL, suggesting an inferior wall acute myocardial infarction. ECG, electrocardiogram.*

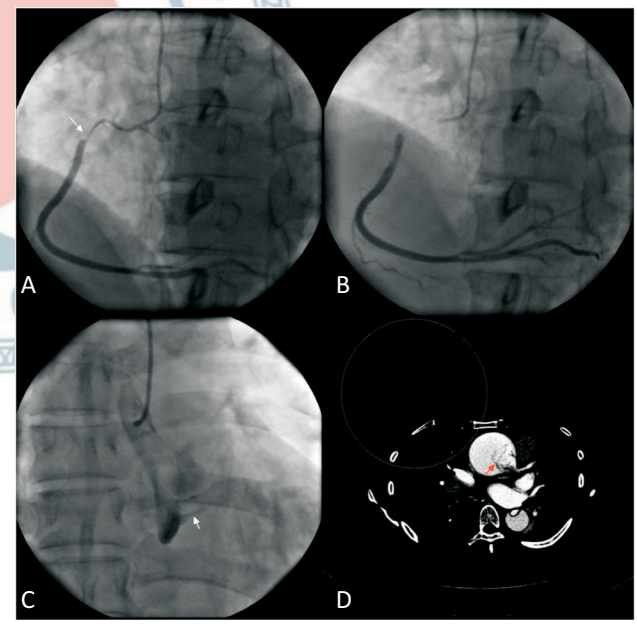

Figure 2. *(A) The right coronary angiogram revealed a discrete, eccentric stenosis at the proximal portion, with a TIMI 2 flow distally. (B) Contrast dye stasis beyond the proximal-RCA after angiography represents flow limitation caused by the proximal lesion. (C) Aortogram demonstrated a significantly dilated aortic root associated with moderate eccentric aortic regurgitation. (D) Thoracic computed tomography scan confirmed the diagnosis of type A aortic dissection involving the RCA ostium. RCA, right coronary artery.*

for cardiothoracic surgery immediately and subsequently made a good recovery following aortic root replacement and coronary artery bypass grafting. At 12 months of follow-up, the patient was doing well.

DISCUSSION

Acute aortic dissection is a dynamic process with a broad spectrum of clinical presentation. More than one-third of patients with aortic dissection demonstrate symptoms secondary to organ system involvement. For instance, symptoms may mimic other more common disorders such as acute coronary syndrome or stroke, and classic physical findings are often absent or may be suggestive of a diverse range of other conditions.[3,4]

AMI occurs in 1-2% of patients with type A aortic dissection, because of extrinsic compression of the coronary ostium by an expanding false lumen or occlusion with an intimal flap. The right coronary artery is more commonly involved than the left, manifesting as an acute inferior myocardial infarction.[5] Differential diagnosis between such a critical situation and common AMI must be made promptly, as these two entities differ substantially in terms of management. Unfortunately, AMI caused by atherosclerotic thrombosis and that due to complicated aortic dissection share similar clinical and ECG manifestations, rendering initial differentiation in the emergency department extremely difficult and misdiagnosis has frequently occurred.[6-8] Because aortic dissection has a prognosis highly dependent on time course, loss of time due to misdiagnosis leads to an increase in mortality. Moreover, such a misdiagnosis could lead to inappropriate thrombolysis with catastrophic consequences. Maintaining a high level of suspicion is essential to avoid a potential catastrophe.[2,4] Von Kodolitsch et al.[9] devised a clinical prediction model for the initial prediction of aortic dissection based on history, physical findings, and chest radiography findings. The independent predictors of aortic dissection are identified as follows: chest pain of sudden onset, especially with a tearing or ripping character; pulse or BP discrepancy in the two upper extremities or between upper and lower extremities; and mediastinal or aortic widening on chest X-ray. The assessment of these three variables permitted the identification of 96% of acute aortic dissection cases. It is worth noting that in addition to these variables, the murmur of aortic regurgitation identified on physical examination could serve as an important clue for considering type A aortic dissection as a differential diagnosis in patients presenting with acute chest pain, as at least half of the patients with type A dissection have a degree of aortic regurgitation present on admission.[1,8]

In the present case, the diagnosis of aortic dissection was not apparent and overlooked in the initial assessment, as the patient was diagnosed solely as an AMI based on the clinical manifestation and electrocardiographic findings. The critical unstable clinical condition in this patient prompted us to perform a primary cardiac catheterization rather than thrombolysis. Eventually, the cardiac catheterization procedure in this patient was the right choice, as it provided three crucial clues for the correct diagnosis of aortic dissection complicated by RCA occlusion: 1) the presence of extrinsic compression on the coronary artery ostium on coronary angiogram, 2) aorta root dilation, and 3) eccentric aortic regurgitation on aortogram. Na SH et al.[10] proposed that the detection of extrinsic compression on the coronary artery ostium on coronary angiogram should raise the possibility of the presence of aortic dissection, and intracoronary ultrasound image could provide detailed information for prompt diagnosis. Additionally, the detection of aortic regurgitation via transthoracic echocardiogram, especially when the valve cusps appear to be normal, should also raise the possibility of the presence of dissection. In a retrospective study conducted by Luo et al.,[1] half of the patients with AMI caused by aortic dissection had aortic regurgitation diagnosed with transesophageal echocardiography (TEE), which was neglected at the time of diagnosis.

Once the diagnosis of aortic dissection is suspected, appropriate imaging studies should be performed without further delay. Contrast-enhanced CT scanning, magnetic resonance imaging, and TEE are all highly accurate techniques that are useful for the diagnosis of aortic dissection. The choice of the initial imaging modality depends chiefly on the availability of these modalities, with CT and TEE being the most commonly performed initial studies.[3,4] Although primary coronary intervention with stenting of the comprised coronary artery to restore the coronary perfusion in the context of type A

aortic dissection is still a controversial technique,[1,7] recent reports have demonstrated that stenting of the collapsed coronary artery can be lifesaving and can serve as an optional bridge approach to earn time for hemodynamic unstable patients before definitive surgery.[10,11]

CONCLUSIONS

Diagnosing acute type A aortic dissection with the uncommon involvement of the coronary artery is challenging because it can resemble AMI. Keeping a high clinical index of suspicion and meticulous clinical evaluation is crucial in establishing the diagnosis of this devastating condition. Clinicians should bear in mind that aortic dissection is always a differential diagnosis for acute chest pain, even in the absence of classic physical findings, and in the presence of typical ECG changes for AMI.

CONFLICT OF INTEREST

None declared.

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