CASE REPORT

Suspected ST segment elevation myocardial infarction referred for primary angioplasty: a masquerader

Abhivrat Yennu Nandan,¹ Abhinav Singh,² Navin Mukundu Nagesh,¹ Manish M Gandhi¹

¹Cardiology Department, Royal Devon & Exeter NHS Foundation Trust, Exeter, EX2 5DW, UK
²King's College NHS Foundation Trust, Princess Royal University Hospital, Orpington, UK

Correspondence to
 Dr Manish M Gandhi,
 manish.gandhi@nhs.net

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SUMMARY

A 50-year-old man collapsed at the roadside with retrosternal pain, shortness of breath and generalised weakness. An ECG in the emergency department was reported as demonstrating ST segment elevation of up to 1.5 mm in leads V1 to V3, leading to a diagnosis of an acute ST-elevation myocardial infarction. He was immediately transferred to the cardiac catheterisation laboratory. Introduction of a coronary catheter produced signs that raised suspicion of aortic dissection. An aortogram revealed a grossly dilated aortic root of 7.3 cm with a type A ascending aortic dissection. The patient was urgently transferred to the cardiothoracic surgical centre and underwent emergency aortic root and ascending aorta replacement. Following a 20-day hospital admission, and postoperative atrial fibrillation, the patient made a steady and full recovery.

indicates ST elevation, the cardiologist commences angiography.³

Aortic dissection could thus be initially overlooked and can be potentially fatal. The annual incidence of aortic dissection is three per 100 000 people making it the most common aortic emergency. Aortic dissection is due to an intimal tear in either the ascending aorta and aortic arch (type A), or distal to the origin of the left subclavian artery in the descending aorta (type B). Diagnosis involves a carefully taken history and examination, followed by a contrast CT in suspected cases.⁴ This case underlines the importance of rapidly identifying specific indicators of possible aortic dissection in patients with chest pain who are transferred for primary angioplasty.

BACKGROUND

Patients presenting with severe chest pain in the community are assessed by paramedics, and the pathway for primary angioplasty is triggered when an acute myocardial infarction is suspected. The patient is transferred directly to the cardiac catheterisation laboratory, and the first medical contact is usually with a cardiologist as the angiogram procedure is commenced.

We present a patient initially suspected to have an acute myocardial infarction who was transferred to the cardiac catheterisation laboratory, and subsequently found to have an acute aortic dissection during the angiography procedure. Following an aortogram, the patient was urgently referred for emergency cardiothoracic surgery. This case highlights the pitfalls in making an accurate diagnosis in the current era of primary angioplasty with limited medical assessment prior to rapid treatment.¹

Aortic dissection presents with severe chest pain which can be difficult to distinguish from acute myocardial infarction when the patient is assessed in the community by paramedics, particularly when the ECG has suspicious ST elevation. In accordance with current guidelines recommending primary angioplasty within 90 min of presentation, patients with suspected myocardial infarction are rapidly transferred directly to the cardiac catheterisation laboratory to minimise delay.² In most cardiac centres, as the patient reaches hospital, to avoid delay, a detailed history, examination or echocardiography, are usually not undertaken; when the ECG

CASE PRESENTATION

A 50-year-old man collapsed at the roadside with retrosternal pain, shortness of breath and generalised weakness. He appeared pale and clammy and was confused. Systolic blood pressure was 90 mm Hg in the right arm. He was a smoker and had a history of hypertension.

The ECG ([figure 1](#)) on arrival to the emergency department was reported as demonstrating ST segment elevation of up to 1.5 mm in leads V1 to V3, leading to a diagnosis of an acute ST-elevation myocardial infarction. The patient was loaded with oral antiplatelet therapy and immediately transferred to the cardiac catheterisation laboratory for primary angioplasty.

On arrival to the cardiac catheterisation laboratory he appeared distressed with severe chest pain requiring additional opiates.

INVESTIGATIONS

Rapid right femoral arterial access was obtained. On introduction of a Judkins left coronary catheter, large amplitude oscillations of its tip were noted in the ascending aorta prior to selective coronary engagement, leading to suspicion of aortic regurgitation.

An aortogram ([figure 2](#), [video 1](#)) was performed. This revealed a grossly dilated aortic root of 7.3 cm with a type A ascending aortic dissection. An echocardiogram ([figure 3](#)) confirmed a dissection flap with one cusp of the aortic valve dynamically prolapsing into the left ventricular outflow tract, associated with severe aortic regurgitation.

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Figure 1 Admission ECG suggesting an anteroseptal ST-elevation myocardial infarction. ST segment elevation of up to 1.5 mm in leads V1 to V3 is highlighted (yellow), with ST segment depression in V5 to V6.

DIFFERENTIAL DIAGNOSIS

In patients with chest pain and ST elevation, there is a wide differential in addition to ST-elevation myocardial infarction including pericarditis, myocarditis and takotsubo cardiomyopathy; ST depression in V5–V6 make these unlikely. In this patient, on initial presentation, severe chest pain with anteroseptal ST segment elevation on the ECG seemed consistent with an acute myocardial infarction. In retrospect, the ST elevation in this patient was likely to be associated with left ventricular hypertrophy and suboptimal blood pressure control in a young patient with hypertension, leading to aortic dissection.

TREATMENT

Following the aortogram, the patient was urgently transferred to the cardiothoracic surgical centre and underwent emergency aortic root and ascending aorta replacement with a mechanical valve and conduit.

Intraoperatively, the aortogram and echocardiographic findings were confirmed, and additionally, a tense haemopericardium had developed during transfer.

Within 24 hours of surgery, a re sternotomy was required for excessive mediastinal haemorrhage likely, in part, to be associated with administration of dual antiplatelet therapy at initial presentation.

Figure 2 Aortogram showing a dilated aortic root of 7.3 cm (black arrows) and dissection flap (red arrow) suggesting a type A aortic dissection.

Video 1 Aortogram showing a dilated aortic root of 7.3 cm with a type A aortic dissection flap in the ascending aorta, and aortic regurgitation.

OUTCOME AND FOLLOW-UP

Following a 20-day hospital admission, and postoperative atrial fibrillation, the patient made a steady and full recovery. He was anticoagulated, with a recommendation to titrate antihypertensive medication to maintain blood pressure at 120/70. He returned to his usual independent lifestyle including cycling, and his blood pressure therapy was monitored during outpatient follow-up.

DISCUSSION

Although there is an overlap in the symptoms of aortic dissection and myocardial infarction, a detailed history of chest pain allows better discrimination between the two. Aortic dissection classically presents with sudden onset severe pain which is tearing or ripping in character that radiates to the back. The abrupt onset of pain is characteristic in the majority of patients with aortic

Figure 3 Echocardiogram demonstrating a dilated aortic root with prolapse of a cusp and dissection flap into the left ventricular outflow tract. AO, aorta; LA, left atrium; LV, left ventricle.

dissection and can be established from the initial history.⁵ A 12-lead ECG is important in differentiating an acute myocardial infarction, but clinicians should be mindful that ST elevation can be misleading, particularly in the presence of left ventricular hypertrophy.⁶ In this case, if echocardiography had been performed prior to cardiac catheterisation, the correct diagnosis would have been apparent at the outset, and antiplatelet therapy and cardiac catheterisation avoided.

Late diagnosis of aortic dissection increases the likelihood of adverse outcomes. The early (<24 hour) mortality rate can be as high as 50% in circumstances where diagnosis is missed or delayed.⁷ Early diagnosis and treatment improve survival and reduce complications which include aortic rupture, cardiac tamponade, stroke and sudden death. Cardiac catheterisation has the potential to further complicate matters by extending the dissection flap within the aorta, or into the coronary arteries.

When the history raises suspicion, blood pressure can be measured rapidly in the cardiac catheterisation laboratory in each arm, to assess for a difference between the two sides which would suggest dissection. Tachycardia and hypotension can be infarct related; however, hypotension or shock can be present in patients with acute type A dissection associated with cardiac tamponade or aortic rupture. Therefore, sudden pain accompanied by differential arm blood pressure, a low diastolic blood pressure, and/or auscultation of a diastolic murmur of aortic regurgitation should alert the clinician to the possibility of an aortic dissection. A neurological deficit, tall stature or other signs of a connective tissue disease would further heighten the suspicion.⁴

Aortic dissection mimicking inferior ST-elevation myocardial infarction has been previously described, with misdiagnosis due to time pressures.^{8,9} Anterior ST-elevation myocardial infarction is rare but can occur due to compression of coronary ostia by haematoma, or occlusion by extension of the dissection flap.¹⁰

In the era of direct transfer of a patient with chest pain from the community to the cardiac catheterisation laboratory, a few moments spent by the cardiologist in taking a careful history, followed by appropriate examination of the blood pressure and auscultation, could readily discriminate infarction from dissection. A hand-held transthoracic echocardiogram can be readily performed in the cardiac catheterisation laboratory to assess for a dilated aortic root, intimal flap, aortic regurgitation or pericardial effusion.¹¹ Emergency physicians should have a heightened awareness of aortic dissection as a differential diagnosis, and a low threshold for a more detailed history and examination particularly when the chest pain is abrupt in onset.

Patient's perspective

The whole episode was painful and distressing. I do not have many memories from it other than intense pain and nausea. The process of going into hospital for an angiogram and then being transferred to another hospital was very stressful. Finding out that I had needed major surgery was terrifying, having to go back in again for a complication made it even worse. However, the rehabilitation team were excellent. I gained confidence and began to feel better quickly.

Learning points

- ▶ Emergency physicians should maintain a high index of suspicion for aortic dissection as a differential diagnosis in ST-elevation myocardial infarction when the onset of chest pain is sudden.
- ▶ ST elevation can be associated with left ventricular hypertrophy, or with aortic dissection extending into the coronary artery.
- ▶ A history of hypertension, a differential arm blood pressure or a low diastolic blood pressure should prompt careful auscultation for a diastolic murmur of aortic regurgitation.
- ▶ When the patient has been transferred from the community directly to the cardiac catheterisation laboratory, hand-held echocardiography should be rapidly used by the cardiologist to assess for aortic root dilatation or a pericardial effusion.
- ▶ During cardiac catheterisation, difficulty in engaging a coronary ostium and an oscillating catheter tip movement, raise the possibility of aortic regurgitation with dissection. This can be confirmed with an aortogram.

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