CASE REPORT

ST elevation without myocardial infarction

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SUMMARY

Acute myocarditis may mimic myocardial infarction because the affected patients report 'classical' chest pain; the ECG changes and echocardiography are identical to those observed in acute coronary syndromes, and serum markers are increased. We describe a case with ST segment elevation on admission ECG, and coronary angiography was normal. Cardiac magnetic resonance with myocardial delayed enhancement sequences is a non-invasive alternative for diagnosing myocarditis.

BACKGROUND

It is common to manage patients admitted to a coronary care unit with chest pain, localised ischaemic ECG abnormalities, segmental left ventricular dysfunction on echocardiogram and elevated cardiac enzymes with thrombolysis and other anti-ischaemic measures. It will be a diagnostic dilemma when coronary angiography is normal. Myocarditis should be always considered in the differential diagnosis.

Owing to the non-specific pattern of clinical presentation and the lack of universally accepted and standardised diagnostic criteria in myocarditis, it remains a challenge. The characteristic findings in cardiac magnetic resonance (CMR) can be an important non-invasive radiological tool for diagnosing myocarditis.

CASE PRESENTATION

A 48-year-old man was brought to the emergency room with his first episode of central compressing chest pain radiating to both arms. The pain began 2 h prior to presentation. With the exception of a recent upper respiratory tract infection, he had been healthy, and his medical history was unremarkable. The 12-lead ECG showed ST-segment elevation of >1 mm in leads I, AVL and V56 (figure 1). He was treated with thrombolysis and transferred to the coronary care unit. Serial high-sensitivity troponin values were 200, 800 and 1200 pg/mL at 3 h intervals (normal less than 24 pg/mL), and creatinine kinase values were 450 and 900 U/L at 6 h intervals (normal less than 230 U/L). The lateral wall of the left ventricle showed mild hypokinesia on transthoracic echocardiography. The chest pain disappeared 1 h after admission. Serial ECGs showed T wave inversion in the same leads (figure 2). Coronary angiography was normal. The patient had a CMR examination 3 days after presentation. There was subepicardial delayed enhancement of the free lateral wall of the basal and middle portions of the left ventricle with

Figure 1 ECG on admission.

oedema of the involved muscle; these features are consistent with acute myocarditis. There was no evidence of ischaemic heart disease (figure 3).

OUTCOME AND FOLLOW-UP

The patient was discharged in stable condition. Thirty days later, he was seen as a medical outpatient: his physical examination, ECG and echocardiography were all normal.

DISCUSSION

Acute myocarditis mimicking acute myocardial infarction is documented in the literature by case reports.^{1 2} The occasional similarity in clinical presentation of myocarditis and myocardial infarction add challenge to the diagnosis and management and neither symptoms nor ECG changes are specific to this condition. In patients with myocarditis presenting with chest pain and ECG changes, the first goal is to rule out ongoing myocardial infarction before considering a diagnosis of myocarditis. In this regard, coronary angiography is most commonly the first examination performed.

Figure 2 ECG 24 h after admission.

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Figure 3 Four-chamber cardiac magnetic resonance with subepicardial delay enhancement in the lateral wall of the left ventricle. S is the septum and L is the lateral wall of the left ventricle.

Although a normal coronary angiogram makes a myocardial infarction unlikely, it does not exclude it completely. Other conditions which may also have a normal coronary angiography with elevated cardiac biomarkers and ECG changes include massive pulmonary embolus, transient left ventricular apical ballooning syndrome/Takotsubo cardiomyopathy, myocardial ischaemia/infarction secondary to transient coronary abnormalities (in situ thrombosis or embolisation with subsequent clot lysis and recanalisation, coronary artery spasm and endothelial dysfunction), myocardial bridging, vasculitis and patients with head injuries or intracranial haemorrhage.³

CMR imaging can help in the diagnosis of myocarditis by detecting myocardial oedema and myocyte injury, and in differentiating it from myocardial ischaemia. Findings include increase in focal and global T2 signal intensity, increase in focal and global myocardial contrast enhancement relative to skeletal muscle and the presence of late gadolinium enhancement.⁴ The best diagnostic performance may be obtained by requiring positivity for any two of these three sequences, which have yielded 76% sensitivity and 96% specificity.⁵ Distinguishing myocarditis from ischaemic cardiac disease depends on the pattern of gadolinium enhancement.

In myocarditis, late gadolinium enhancement preferentially involves the epicardium and mid-myocardium and spares the endocardium, most often in the left ventricular free wall. In ischaemic heart disease, late gadolinium enhancement typically involves the endocardium with variable extension into the mid-myocardium and epicardium.⁶

Endomyocardial biopsy and microscopic examination of the heart tissue can confirm the diagnosis of myocarditis. The patchy inflammatory infiltrate nature of myocarditis can frequently lead to sampling errors; nevertheless, there is a variability in observer interpretation.⁷ In a large case series, the sensitivity of endomyocardial biopsy was only 35% compared with a clinical criterion standard that included recovery of myocardial function.⁸ Although CMR can increase the sensitivity of endomyocardial biopsy by identifying regions of myocarditis, the endomyocardial biopsy is indicated only in patients with complicated myocarditis.⁹

Despite a low cardiac risk score supporting a diagnosis of myocarditis in our patient, the localised lateral ST-segment elevation and segmental left ventricular dysfunction raised the possibility of an ST elevation myocardial infarction, which required thrombolysis and cardiac catheterisation. Diagnosis in these types of patients is difficult. A diagnosis of myocarditis needs to

be kept in the differential diagnosis in young people with acute coronary syndrome.

Learning points

- ▶ Acute myocarditis may mimic myocardial infarction.
- ▶ The first goal is to rule out ongoing myocardial infarction before considering a diagnosis of myocarditis.
- ▶ Coronary angiography is most commonly the first examination performed.
- ▶ Cardiac magnetic resonance with myocardial delayed enhancement sequences is an important non-invasive imaging test for diagnosing myocarditis.

Contributors ZIB suggested the idea of writing the article. MS and KA helped take care of the patient and editorial input.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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