

# Electrocardiographic Case: A Non-Ischaemic Cause Of ST-Segment Elevation

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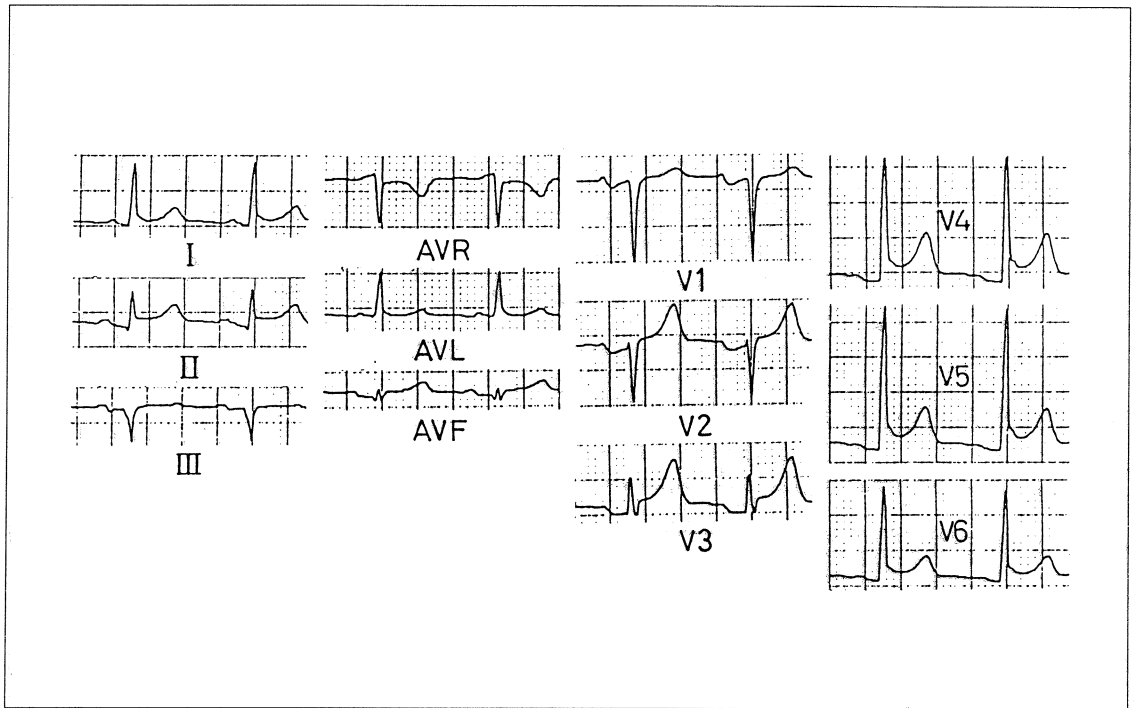


Fig 1

## CASE HISTORY

A 50-year-old man was seen at the emergency room with a complaint of recent-onset pleuritic chest pain. Clinical examination revealed normal dual heart sounds. His ECG is shown in Fig 1. What is the diagnosis?

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## ANSWER

### Acute pericarditis

#### DISCUSSION

Acute pericarditis is a syndrome due to inflammation of the pericardium and is characterised by chest pain, pericardial rub and typical electrocardiographic (ECG) features. The most common causes of acute pericarditis are idiopathic or viral pericarditis, infection (bacterial, tuberculous, fungal), neoplasm, post-myocardial infarction, uraemia, post-cardiotomy and trauma. Pericardial rub, though pathognomonic of acute pericarditis, may be evanescent, absent or only faintly heard in some patients.

The two main ECG features seen in this patient are diffuse ST-segment elevation and PR-segment depression (Fig 1). Along with his clinical history of recent-onset pleuritic chest pain, these ECG findings are consistent with the diagnosis of acute pericarditis. In the ECG shown in Fig 1, the most prominent abnormality is the diffuse up-sloping ST segment elevation seen in leads I, II, aVF and V2 to V6. Importantly, the ST-segment elevation in the inferior leads is maximal in lead II which is typical of acute pericarditis.

In acute pericarditis, ST-segment elevation is generally recorded in all the leads that face the epicardial surface of the ventricles with ST-segment depression seen only in the leads orientated towards the ventricular cavity (eg lead aVR). This ECG finding is attributed to underlying subepicardial myocarditis causing injury to the superficial layer of the heart muscle. It occurs in as many as 90% of patients<sup>(1)</sup> and is more common in those with idiopathic and infective pericarditis than in those with uraemia. It may be quite evanescent, occurring as part of an evolutionary ST- and T- wave changes. Spodick<sup>(2,3)</sup> described 4 stages of the ECG changes in association with acute pericarditis: Stage 1: ST-segment elevation; Stage 2: normalisation of the ST-segment and diminution of the T wave amplitude; Stage 3: T wave inversion, and Stage 4: complete ECG normalisation.

In contrast to acute myocardial infarction where ST-segment elevation is also the cardinal ECG abnormality, in acute pericarditis: 1) reciprocal ST-segment depression is not present except in lead aVR and 2) the ST-segment elevation is considerably more widespread, being frequently present in both the precordial as well as the limb leads. Furthermore, unlike acute myocardial infarction, abnormal Q waves do not appear with evolution of the disease. Another

ECG pattern which may be confused with acute pericarditis is the early repolarisation syndrome. However, in patients with the early repolarisation syndrome where there is also ST-segment elevation, the amplitude of the T waves are in addition, increased. This results in a ST/T wave ratio of <25% in lead V6 unlike in acute pericarditis<sup>(4)</sup>.

A less common but unique ECG abnormality that can occur in acute pericarditis is PR-segment depression which is also present in this patient. In Fig 1, the PR segment depression is prominent in the inferior (II, III & aVF) and the precordial (V2 to V6) leads. This phenomenon was first described by Spodick<sup>(2,3)</sup> and Charles et al<sup>(5)</sup>. This ECG change is attributed to associated subepicardial atrial injury. Because the atria are located superiorly, posteriorly and to the right of the ventricles, the electrical forces are generated towards the direction that give rise to the PR-segment depression in the above lead distribution. It is proposed that any PR-segment depression of more than 0.8 mm or elevation of more than 0.5 mm is consistent with atrial injury. PR-segment change usually occurs very early in the disease process when the ST-segment is still elevated or returning to the baseline, and before the T waves have become inverted.

During the patient's stay in the hospital, it was noted that the cardiac enzymes were not elevated. Before discharge from the hospital, the ECG had reverted to normal.

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