Country cardiograms case 39: Answer

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Figure 1 (on page 63) shows a normal sinus rhythm at 90 beats/min. The PR interval, QRS duration, QT interval, QRS axis and P waves are all within normal limits. Slight PR segment depression is present in leads II and V4–V6. Significant ST-segment elevation is seen in leads I, II, aVL, aVF and V4–V6. These raised ST segments have a contour that shows a "concave upwards" pattern. The only leads with ST segment depression are aVR and V1. The T waves appear normal.

Figure 2 (on page 64) shows normal sinus rhythm at a rate of 70 beats/min. The intervals and axis remain normal. ST-segment elevation is still present in the same leads and now includes lead V3. The interval change lies in the T waves, which are now symmetrically inverted in leads V3–V6. QRS morphology is unchanged.

DISCUSSION

This case displays some of the features of acute pericarditis, along with pitfalls in its diagnosis and potential confusion with the features of acute ST-elevation myocardial infarction (STEMI).

In this case, young age and male sex tend to favour a diagnosis of acute pericarditis (the male to female ratio is about 2:1). So do the history of a possible viral infection and the nature of the pain, which in cases of acute pericarditis typically varies with position (often worse when supine, better when leaning forward). However, this history is not always present, and ischemic pain may also sometimes seem to vary with position. The character of the chest pain is therefore worth enquiring about, but is not diagnostic.

A pericardial friction rub, if heard, is highly specific for acute pericarditis, but may not be present, as in this case. It may also be transient, and may be missed unless frequent auscultation is performed.

Acute pericarditis is one of the causes of elevated troponin levels, which therefore are not of much use in distinguishing it from myocardial damage associated with acute STEMI.

Electrocardiographic changes are consequently of great diagnostic importance, but they are not as straightforward as is sometimes believed.

The presence of ST-segment elevation in many leads, known as the "concave upwards" pattern, is one of the hallmarks of acute pericarditis. This is contrasted with the findings in acute STEMI, in which the pattern of ST-segment elevation corresponds with the area of the affected myocardium, and is typically coved or "convex upwards." However, the ST-segment elevation in acute pericarditis is often confined to just a few leads.

The absence of reciprocal changes of ST-segment depression in acute pericarditis is another useful distinguishing feature. In contrast, these are often present in an acute STEMI (ST-segment elevation in the inferior leads being matched by reciprocal ST-segment depression in leads I and aVL, and vice versa). However, ST-segment depression is often seen in lead aVR in acute pericarditis, less frequently seen in lead V1 and sometimes seen in lead III; these changes can be safely ignored.

Figure 1 provides an illustration of these changes of acute pericarditis: widespread ST-segment elevation, with the characteristic contour and no reciprocal changes (just ST-segment depression in

leads aVR and V1, which can be discounted).

Downsloping PR-segment depression is often viewed as a further distinguishing feature of acute pericarditis, but may not be present, or may be present to a mild or equivocal degree, as in Figure 1. Acute pericarditis is often best appreciated by looking for PR-segment *elevation* in lead aVR.

The classic sequence of changes in acute pericarditis is then as follows: the ST segments normalize (also known as the phase of pseudonormalization), after which T-wave inversion develops, followed by the final, true normalization phase. However, the phase of T-wave inversion is frequently not noted.

Furthermore, Figure 2 illustrates that even when T-wave inversion is recorded, this typical sequence does not invariably occur: in this case, ST-segment elevation is seen in conjunction with T-wave inversion. Seen in isolation, and in the context of the raised troponin levels, it would be extremely easy to interpret this electrocardiogram as representing an anterolateral STEMI pattern. Only the concomitant ST-segment elevation in leads II and aVF suggests acute pericarditis.

Finally, the absence of evolving Q-wave changes is a feature of acute pericarditis, whereas the development of Q waves is typical of an evolving acute STEMI. However, such changes are usually apparent only over a period of time, and thus allow a retrospective diagnosis.

The dangers of misdiagnosing acute pericarditis as acute STEMI are significant. They include the risks in a rural or remote setting of giving thrombolytic therapy to a patient with acute pericarditis. This may lead to the dreaded complication of pericardial effusion developing into a fatal hemorrhagic tamponade.

A complete blood count, testing for levels of C-reactive protein (or other inflammatory markers), chest radiography and echocardiography are recommended in the further workup of a patient with acute pericarditis. Rest and acetylsalicylic acid or nonsteroidal anti-inflammatory agents form the only necessary treatment in uncomplicated cases, although colchicine may be effective in symptom management and in decreasing the risks of recurrence.

This patient was observed, treated with rest and ibuprofen, and went on to make a full recovery. Four days after the initial presentation, electrocardiogram results had returned to normal.

For the question, see page 63.