Country cardiograms case 37: Answer

Charles Helm, MD, CCFP
Tumbler Ridge, BC

Figure 1 (on page 118) displays normal sinus rhythm, with a rate of 92 beats/min. The ST segments are disturbing: there is significant ST segment depression in leads V1 and V2, and a pattern of slight coved elevation in the inferior leads (II, III and aVF) and lateral leads (V5 and V6). In combination, these are suggestive of a pattern of inferolateral ST elevation myocardial infarction (STEMI). There are no reciprocal changes in leads I or aVL; if present, such changes would have supported this diagnosis.

Given the patient's young age and the relatively short duration of pain, this patient would be an ideal candidate for thrombolysis in a rural setting if electrocardiogram (ECG) criteria were met. Figure 1 provides us with a strong suspicion of STEMI. However, up to 40% of inferior myocardial infarctions (MIs) are complicated by posterior wall infarction or right ventricular infarction, with an associated increase in complications and mortality.

Inferior STEMI changes therefore mandate a 15-lead ECG, using, in addition to the standard 12-lead ECG, the 3 additional leads V4R, V8 and V9. Lead V4R is placed as a "mirror-image" of lead V4, that is, in the fifth intercostal space in the midclavicular line, but on the right side of the chest. Leads V8 and V9 are placed on the posterior aspect of the chest wall by extending the imaginary line from lead V4 through V5 and V6, such that V8 is in the left midscapular line, and V9 is in the left paraspinal line (V7 is not used in a 15-lead ECG but would be along this same imaginary line, in the posterior axillary line). It is necessary when using older ECG machines to mark these leads correctly by hand on the ECG printout; many newer models have the capacity to print complete 15-lead ECGs.

In this patient, Figure 2 (on page 119) provides further evidence that eases the decision to proceed with thrombolysis. It displays no interval changes in the inferior leads, but interesting interval changes have occurred in V1 and V2. In these leads, ST depression is not as dramatic as before, but an upright T wave has emerged in V2, which could correspond to the familiar T-wave inversion of an evolving MI. Leads V4, V5 and V6 have been replaced in this tracing with V4R, V8 and V9. The normal ST segment in V4R reassures us that significant right ventricular involvement (which always needs to be considered with an inferior MI) is unlikely. However, the coved, elevated ST segments in V8 and V9 provide definite evidence of a pattern of posterior STEMI.

These findings are significant, not only in clinching the diagnosis, but also in implying that a considerable area of myocardium (inferior wall, lateral wall and posterior wall) is involved. In this case, thrombolysis with tenecteplase was rapidly effective, leading to a resolution of all ST segment changes as well as patient symptoms.

Another trick that aids in the ECG interpretation of a posterior MI pattern is to take the initial 12-lead ECG, invert it, hold it in front of a mirror, and examine leads V1 and V2 in the mirror image. The familiar infarction pattern will then be apparent (this can be done with Fig. 1 and 2). Over time a tall R wave often develops in V1 and V2 in a posterior STEMI, which is a "Q-wave equivalent." This will appear as a Q wave in leads V8 and V9, or in leads V1 and V2 using the mirror trick.

For the question, see page 118.