Country cardiograms case 24: Interpretation and discussion

Charles Helm, MD
Tumbler Ridge, BC

The first ECG (Fig. 1) shows sinus bradycardia, rate 54 beats/min. All intervals are normal, as is the QRS axis. The only area of possible concern lies in leads V_1 and V_2. In V_1, the magnitude of the height of the R wave is approximately equal to that of the depth of the S wave, and in V_2 a much taller R wave is present.

Three common possibilities should be considered when this type of phenomenon is encountered: right ventricular hypertrophy, posterior myocardial infarction or counter-clockwise rotation.

Right ventricular hypertrophy is excluded in this case by the absence of any other supporting ECG features.

In many cases it is not possible to distinguish between counterclockwise rotation and isolated old posterior myocardial infarction. In this case, in the absence of an old tracing for comparison, we cannot tell whether the prominent R waves are old or new. However, ST-T segment changes, if present, would point to an ischemic process. The ST segment in V_1 in the first ECG (Fig. 1), shows possibly some slight ST depression and T-wave inversion. Yet T-wave inversion is normal in this lead, and the possible ST-segment depression is probably minor enough not to cause undue concern.

The first ECG could therefore be interpreted as: sinus bradycardia; early transition; unknown cause.

For this patient with chest pain,

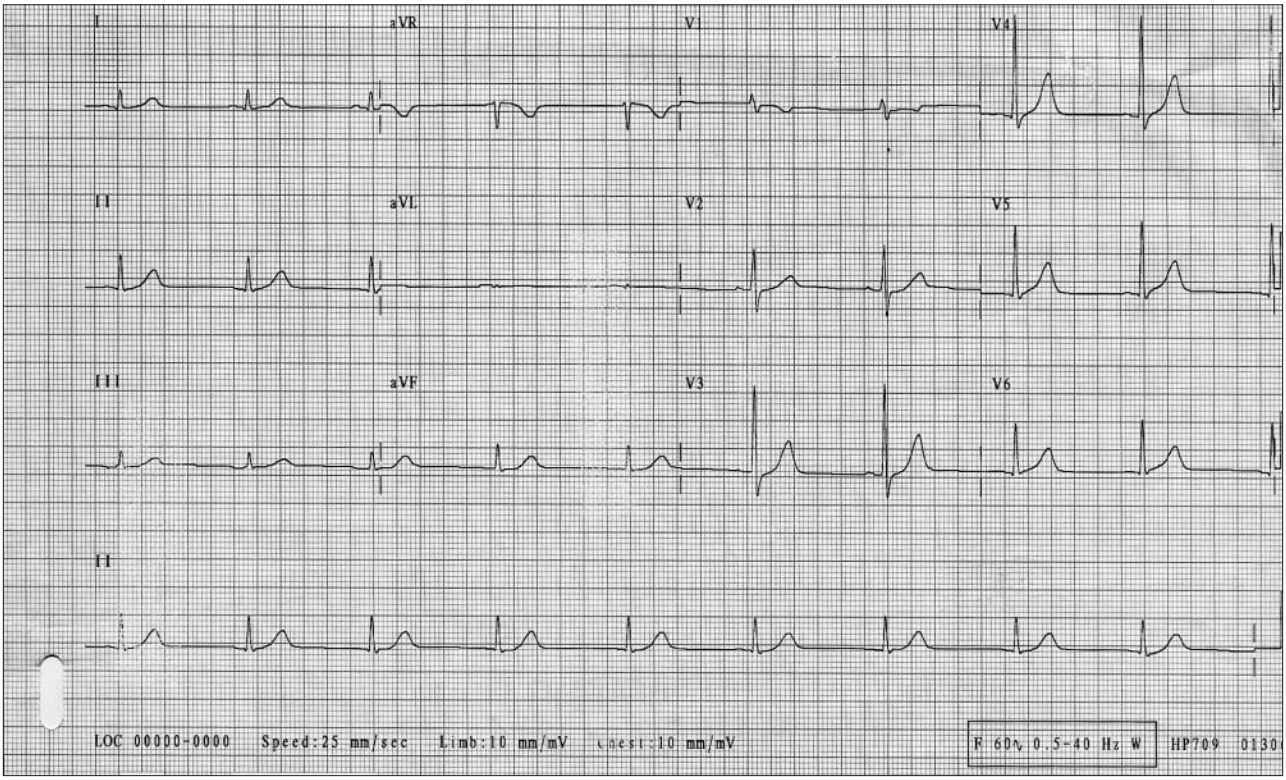

Fig. 1. First ECG of a 51-year-old man with intermittent chest pain.

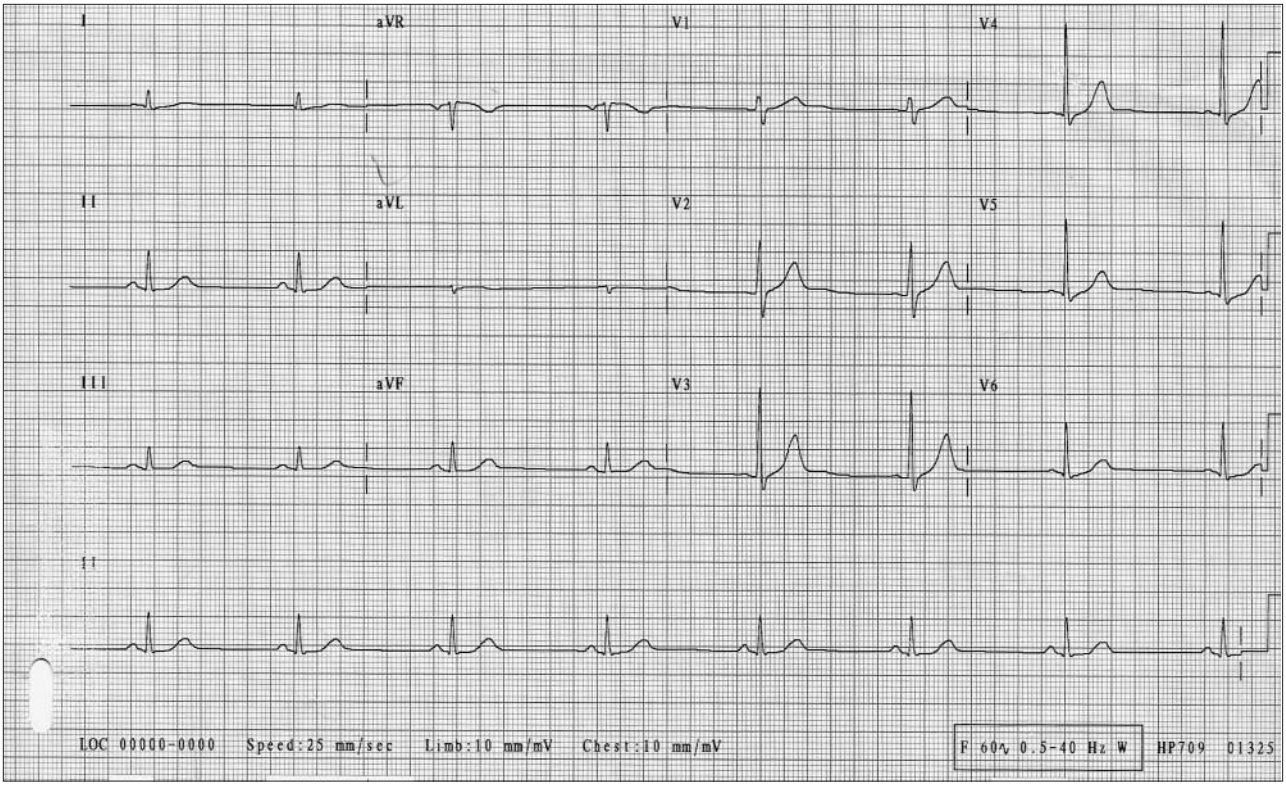

Fig. 2. Second electrocardiogram.

however, the need for follow-up tracings must have been clear. In isolation, the second ECG (Fig. 2) could likewise be interpreted as: sinus bradycardia, 46 beats/min; early transition; unknown cause.

However, these two ECGs dramatically show the value of serial tracings and meticulous comparison because there are indeed significant interval changes that allow a diagnosis of acute posterior myocardial infarction to be made with confidence.

Comparison of lead V_1 in the two ECGs reveals that in the second ECG the R wave has possibly become a bit taller. There is no longer any ST depression, and the T waves have become markedly upright. Although T waves may normally be upright or inverted in V_1, they should not change from the one to the other. This interval change alone is evidence of a posterior event. Remember that on the 12-lead ECG the posterior wall of the heart cannot be recorded directly. Instead we need to look for reciprocal changes, in which a tall R wave represents a deep Q wave, ST-segment depression represents ST elevation, and a T wave that changes from being inverted to being upright actually indicates developing T-wave inversion. For this reason many physicians prefer a 15-lead ECG in which lead V_9 is placed posteriorly, and allows posterior changes to be seen in the usual fashion.

Comparison of these two tracings therefore demonstrates changes in Q-wave morphology, resolving ST-segment elevation, and developing T-wave inversion, even though in isolation each ECG could be interpreted as just showing early transition. It can be argued that the change in R-wave height in V_1 could be due to a slightly different lead placement if the leads were not kept in place, and that the ST-segment changes are too subtle to be of definite significance. However, the interval T-wave changes are quite clearly pathologic. Acute posterior myocardial infarction can be diagnosed, and in this case was supported by the finding of a positive troponin T test.

For the Question, see page 37.