Country cardiograms case 32: Answer

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At first glance, this tracing may look like sinus rhythm with one long R–R interval (see Fig. 1 on page 41). However, closer scrutiny reveals a number of interesting features. First, although the first 5 QRS complexes are evenly spaced, those after the long R–R interval are not. They actually show a subtle bigeminal pattern, with R–R interval alternately 0.72 seconds and 0.64 seconds. Although P waves in this portion all look fairly similar in the rhythm strip (lead II), it is evident from lead V1 that alternate P waves are in fact significantly different, and this portion of the ECG thus depicts an atrial bigeminal rhythm (the deep negative P wave deflection in V1 meets criteria for left atrial abnormality).

Furthermore, there are unusual features in the ST segments. Following each of the first 5 QRS complexes, the ST segments appear to be significantly elevated in leads II, III and aVF (giving rise to the computer interpretation). However, for the remainder of the tracing they are perfectly normal. There is no adequate explanation for abrupt ST changes of this nature; even Prinzmetal's angina would come and go more gradually. Clearly something else must be going on.

The answer lies in the P waves. In lead II they are prominent, and almost meet the criteria for right atrial abnormality. There are additional P waves exactly half way between the obvious P waves in this section of the rhythm strip, and these are what give rise to this "pseudo-ST elevation" appearance. The run of rapid P waves terminates abruptly, is followed by the long R–R interval, and then by the atrial bigeminal rhythm.

This implies that 1) an atrial tachycardia is present, and 2) only every second P wave is conducted to the ventricles. This arrhythmia is paroxysmal atrial tachycardia with 2:1 block. This is one of the less common supraventricular tachycardias. It is usually associated with digitalis toxicity and hypokalaemia, but neither of these was present in this case.

As it is the differences between the first and second parts of this ECG that make the diagnosis easy in this case, it is worthwhile asking the questions: What if the initial rhythm had persisted throughout this tracing? Could this have been misdiagnosed as an ST elevation myocardial infarction and the patient unnecessarily thrombolysed? Hopefully this patient's symptoms would prompt a search for an arrhythmia, but in the frenzy of pushing for an acceptable "door-to-drug time," it is also possible for critical decisions to be made in haste.

There are a number of patterns and contours of ST segment elevation. Coved (convexity upwards) ST elevation is often associated with myocardial infarction, whereas upward concavity is often characteristic of acute pericarditis. The early repolarization pattern often involves a normal contour but a high take-off (J point) in leads V2–V4. The pseudo- ST elevation present in this case does not follow any of these patterns, and once looked for, the characteristic shape of the P wave can be identified.

In summary, be healthily sceptical about the computerized ECG interpretation, and remember that "ST elevation" is not always what it seems.

For the Question, see page 41.