

ECG Quiz

WAI-LUN WONG

From Department of Medicine, Tuen Mun Hospital, Hong Kong

A 57-year-old gentleman with known history of chronic obstructive airway disease was admitted for vague symptom of palpitation and shortness of breath. He had no chest discomfort. Physical examination revealed no gross abnormality of major systems. His haemodynamic parameters were stable.

Chest X-ray showed mild hyperinflated change with clear lung field. ECG was done in the Emergency Department (Figure 1).

What are the abnormalities? What is the diagnosis & the most informative investigation?

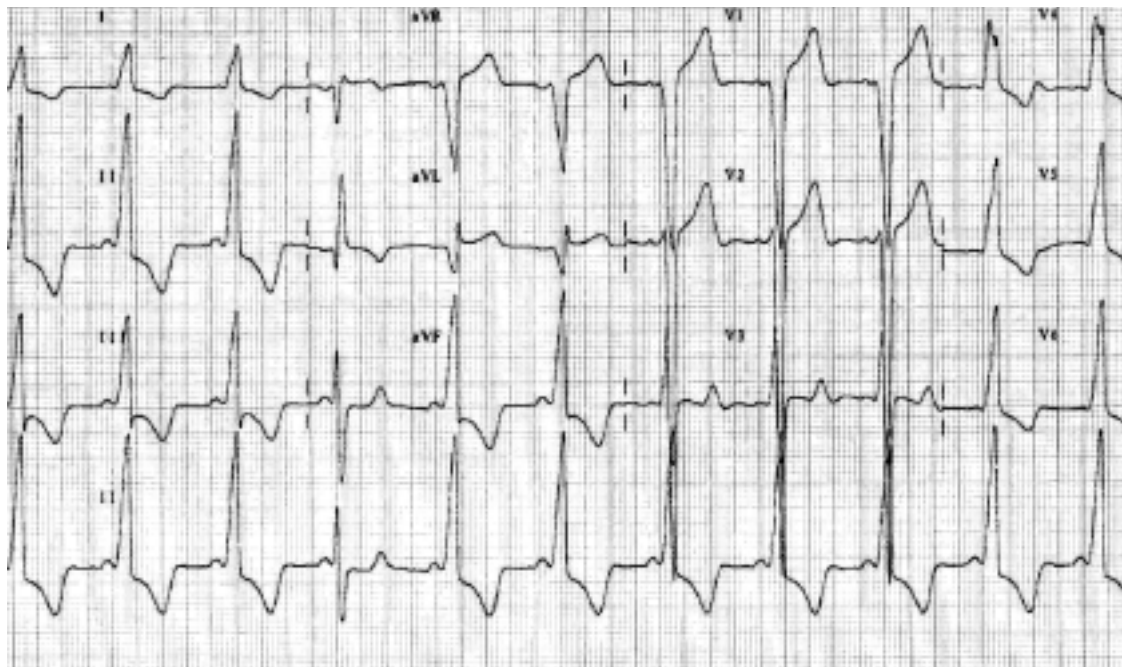


Figure 1.

Answer

At first glance, the 12 lead electrocardiogram resembled a left bundle branch block morphology, as suggested by the diagnosis given by the electrocardiogram machine. In that case one would have to consider the possibility of new onset left bundle branch block representing acute ischemia. Serial electrocardiogram and cardiac marker will be the appropriate investigations. Other possibility would be structure heart disease where echocardiogram will be most informative.

But at a closer look, there were several abnormalities in that electrocardiogram:

1. Short PR interval (despite the measurement by the computer showing 133 ms).
2. Delta wave contributing to a wide QRS.
3. Lack of slow up stroke usually seen in patient with structure heart disease.

These findings had led to the question whether there was pre-excitation due to accessory pathway. No arrhythmia was documented throughout the hospitalization period.

Assuming there is a single discrete accessory pathway, the likely location of the pathway would be along the right anterior/ anteroseptal atrio-ventricular ring.

It was deduced by the morphological criteria of the delta waves:

1. R/S <1 in V2 lead
2. Delta positive in III lead
3. Delta negative in V1 lead

An electrophysiology study would then be the most informative investigation (Figure 2).

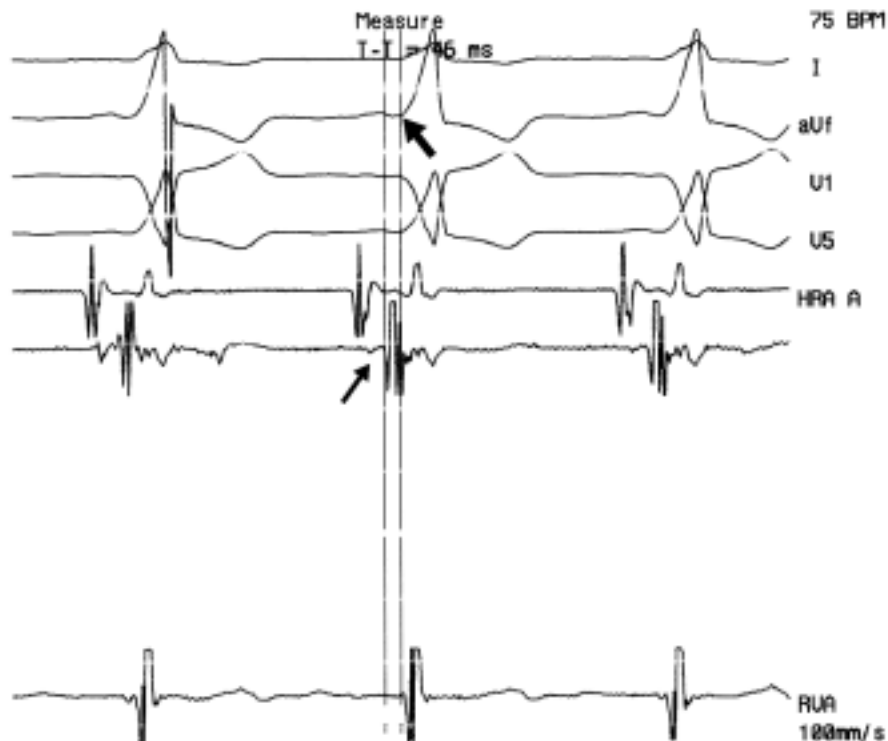


Figure 2. Activation mapping - Mapping catheter showing local V (thin arrow) 46ms earlier than onset of delta wave (thick arrow) on surface electrocardiogram.

Electrophysiological study

Mapping during baseline sinus rhythm showed that the earliest ventricular signal was obtained at the anteroseptal area. There was inducible orthodromic atrio-ventricular re-entrant tachycardia by atrial pacing. There was advancement of atrial signal with ventricular pacing at His refractory during tachycardia, supporting the presence of accessory pathway. The antegrade effective refractory period of the accessory pathway was 440 ms at 600 ms driving cycles, making the chance of

fast conduction with rapid ventricular response unlikely. Successful ablation can be accomplished in greater than 90% of patients with anteroseptal pathway. There is an increased chance of complete heart block when compared to free wall pathway. It was generally reported to be less than 5-10%. There is also increased risk for developing right bundle branch block, quoted to be up to 40%. After discussing the pros and cons with the patient, he opted not to proceed for radio-frequency ablation at the moment. There was no spontaneous arrhythmia detected before discharge.