

# ECG CLINIC

## Choosing the Correct Rhythm Strip

By Keith J.C. Finnie, MB, ChB; and L.J. Melendez, MD

### Vignette

A 63-year-old man with a history of myocardial infarction (MI) three years earlier presents with complaints of palpitations and mild shortness of breath, but no chest pain. On examination, his heart rate is 125 beats per minute and his blood pressure is 110/70 mmHg. The ECG in Figure 1 is obtained and compared with an ECG recorded one year earlier (Figure 2).

### Questions

- 1) What abnormalities are seen on the initial ECG, and how does this ECG differ from the one in Figure 2?
- 2) What is the arrhythmia?



Figure 1

Dr. Finnie is professor of medicine, University of Western Ontario, and site chief of cardiology, London Health Sciences Centre, Victoria Campus, South Street, London, Ontario.

Dr. Melendez is professor of medicine, University of Western Ontario, and cardiologist, London Health Sciences Centre, Victoria Campus, South Street, London, Ontario.



Figure 2

### Answers

1) The initial ECG (Figure 1) shows a regular tachycardia with a somewhat atypical right bundle branch block (RBBB) configuration at a rate of 125 beats per minute. Three QRS complexes (the 10th, 15th and 20th beats in the sequence) show quite different morphology in some leads. When compared with the ECG in Figure 2, the heart rate is obviously different. At first glance, however, both recordings appear to show a similar atypical RBBB pattern, but with abnormal left-axis deviation in Figure 1 and a rightward, vertical axis in Figure 2. Small, but abnormally wide Q waves in leads II, III and aVF in the ECG in Figure 2 are consistent with an old inferior myocardial infarction (MI).

2) One might be tempted to consider a diagnosis of supraventricular tachycardia (SVT) with an axis shift, but this would not be correct. The three different QRS complexes and close inspection of a lead V<sub>1</sub> rhythm strip (Figure 3) provide the clues to the correct diagnosis of ventricular tachycardia. Note that the lead II rhythm strip routinely recorded and printed out with the 12 lead ECG is singularly unhelpful in this case. Close scrutiny of the V<sub>1</sub> rhythm strip reveals clear evidence of atrioventricular dissociation (dissociated P waves marked with arrows). The three different QRS complexes are fusion beats: note (again in the V<sub>1</sub> rhythm strip) how the first two are preceded by P waves with a PR interval close to that seen in the ECG in Figure 2, with resultant QRS morphology very similar to that seen in the chest leads in Figure 2. The third different QRS complex is intermediate in morphology, representing a different degree of fusion. Note that a complete sinus capture beat during ventricular tachycardia in this case will not result in a normal QRS complex, because of the preceding RBBB, but the presence of partial capture/fusion beats remains a powerful clue to the diagnosis of ventricular tachycardia.



Figure 3