ECG Quiz

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ECG Quiz

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Introduction

A 27-year-old man presented to the Accident and Emergency Department for palpitation. He enjoyed good past health and had no significant drug history. He was conscious and alert with a systolic blood pressure around 100 mm Hg, and a 12-lead ECG was performed (Figure 1).

A provisional diagnosis of paroxysmal supraventricular tachycardia (PSVT) with aberration was made. Intravenous adenosine was given with no effect and the tachycardia was eventually converted by intravenous verapamil to sinus rhythm (Figure 2). Subsequent investigations including blood tests, chest

![Figure 1. Presenting arrhythmia.](image1)

![Figure 2. Sinus rhythm.](image2)
XR and echocardiography were all normal. The patient developed repeated attacks of tachycardia in the coronary care unit. He consented to an electrophysiological (EP) study and radiofrequency (RF) catheter ablation with a view for arrhythmia cure.

What could be the diagnosis?

Discussion

The patient’s presentation (a healthy young man with a regular tachycardia) might suggest a diagnosis of PSVT. There were, however, a few unusual and interesting points to consider:

1. The presenting arrhythmia (250/min) was of right bundle branch block (RBBB) pattern and left axis deviation.

2. The tachycardia was aborted by intravenous verapamil and not by intravenous adenosine.

3. There was a fusion beat noted in Figure 1 (the third beat in lead V1), revealing that the underlying mechanism was indeed ventricular tachycardia (VT).

These features strongly suggested a diagnosis of left fascicular VT (involving the left posterior fascicle), which was one form of idiopathic VT.

The diagnosis was confirmed by the EP study. A coronary angiogram performed at the same setting was normal. During the EP study, the clinical tachycardia was readily induced with ventricular and atrial extrastimuli under isoprenaline challenge and was clearly VT with ventriculoatrial dissociation. Earliest Purkinje potential (a short-duration, high-frequency potential preceding earliest ventricular activation) of 40ms earlier than QRS onset (Figure 3) was noted during endocardial mapping at posteroseptal region. RF energy applications at that site eliminated the tachycardia and prevented its reinduction by programmed stimulation with isoprenaline infusion. The patient was discharged uneventfully two days after the RF procedure. There was no recurrence of tachycardia after a follow-up of

Figure 3. Endocardial mapping: Purkinje potential (arrow) 40ms earlier than the onset of QRS complex recorded at the posteroseptal region of left ventricle.
Verapamil-sensitive, idiopathic left ventricular tachycardia with RBBB and left-axis deviation was suggested to originate from the left posterior fascicle. There were controversies on the role of a false tendon or fibromuscular band extending from posteroinferior left ventricle to the basal septum as the anatomic substrate.¹²

Many strategies have been used to identify the exact site for ablation. Nakagawa et al³ emphasized a short-duration, high frequency potential preceding earliest ventricular activation (the Purkinje potential) as a guide for RF. The Purkinje potential was thought to be the activation of a segment of the left posterior fascicle. However, not all electrophysiologists agreed with this approach. Other investigators⁴-⁶ used a combined approach of pace mapping and activation mapping. Concordance in QRS morphology between the 12-lead ECG during VT and pace mapping, and local ventricular activation that preceded the surface QRS complex by ≥30 msec were considered effective criteria. RF success was achieved in about 85%⁷ with good long-term result by using either approach.

References