OVERVIEW OF THE ECG

This is a wide complex, regular tachycardia with a ventricular rate of 234 bpm. The QRS complexes are wide (about 150ms) and monomorphic. The QRS axis is -90 degrees. The differential diagnosis of a wide complex, regular tachycardia includes the usual suspects: (1) monomorphic ventricular tachycardia (VT); (2) supraventricular tachycardia (SVT) with a bundle branch block; (3) SVT with a non-specific intraventricular conduction abnormality; (4) pre-excited tachycardia; and (5) pacemaker tachycardia.

A SVT with an intraventricular conduction abnormality is a possibility, but is very unlikely. An intraventricular conduction abnormality with marked left axis deviation would be most unusual in a 17-year-old man with a structurally normal heart. The absence of an intraventricular conduction abnormality in sinus rhythm would be useful to exclude the diagnosis. A pacemaker tachycardia is excluded, as QRS complexes do not resemble a paced rhythm and a pacing rate of 234 bpm is highly unlikely.

VT is therefore the diagnosis. The axis is -90 degrees, which suggests an origin near the left posterior inferior septal region. In a young man with a structurally normal heart, the most likely diagnosis is an idiopathic left posterior fascicular VT.

The correct answer is: (4) Ventricular tachycardia arising from the left ventricle

DISCUSSION

Idiopathic fascicular left ventricular tachycardia accounts for 10% - 15% of idiopathic ventricular tachycardias (VTs). Left posterior fascicular ventricular tachycardia (LPFVT) accounts for 90% - 95% of fascicular VTs. LPFVT typically presents in young adults (15 - 40 years) and males are predominantly affected, and may result in an underlying tachycardia-induced cardiomyopathy. This tachycardia is calcium-dependent and is not cAMP-mediated triggered activity, as in the case of the more common idiopathic outflow tract VTs.

Electrocardiographically, LPFVT is characterised by an atypical right bundle branch block (RBBB) pattern with left axis deviation, as the exit site of the VT is located in the left ventricular inferior posterior septum. The re-entrant VT circuit consists of an antegrade limb (abnormal Purkinje tissue, which has slow decremental conduction that is verapamil-sensitive) and a retrograde limb that consists of part of the left posterior fascicle (see Figure 1). A much rarer form of idiopathic LV VT is...
left anterior fascicular VT, which has an atypical RBBB morphology with right axis deviation, and involves the left anterior fascicle.

LPFVT is frequently misdiagnosed as a supraventricular tachycardia (SVT) with RBBB and left anterior fascicular block, because they both occur in young patients with normal hearts, are well tolerated clinically, and are verapamil-sensitive. Although the presence of AV dissociation will confirm the diagnosis of LPFVT, AV dissociation is not always seen, as in this case.

In a recent study that compared ECG characteristics of LPFVT with SVT with RBBB and left anterior fascicular block, the authors identified 4 features that suggested LPFVT: (1) atypical RBBB morphology in V1; (2) QRS width <=140ms, as part of the ventricle is activated via the normal His Purkinje system; (3) V6 R/S ratio<=1; and (4) positive aVR. Patients with 3 of 4 features had a high probability of LPFVT, whereas patients with <=1 feature always had a diagnosis of SVT with RBBB plus left anterior fascicular block. Our patient displayed 3 of 4 features of LPFVT.
An ECG of a patient with repaired infundibular pulmonary stenosis with a SVT with RBBB and left anterior fascicular block, is shown in Figure 2. The patient has an atypical atrial flutter with 2:1 AV block. This patient has typical features of RBBB in V1 and V6. Using the above criteria, the patient has no features of LPFVT. In addition to the typical RBBB morphology in V1 and V6, the QRS width was 160ms, the V6 R/S ratio was >1 and aVR was predominantly negative.

Intravenous verapamil can be successful in terminating LPFVT. Verapamil should never be administered to a wide complex tachycardia. LPFVT is a rare exception where verapamil can be administered for acute termination – but this should only be done in stable patients with a confirmed diagnosis of LPFVT. Termination with adenosine, vagal manoeuvres and beta-blockers is very rare, as the tachycardia is not cAMP-mediated. Chronic management involves oral verapamil, which can be useful to prevent recurrent episodes. Radiofrequency ablation of the LPFVT can be effective for drug-refractory cases.

The correct answer is: (4) Intravenous verapamil.

CONCLUSION

Left posterior fascicular ventricular tachycardia (LPFVT) is an idiopathic VT with an atypical right bundle branch morphology with left axis deviation.

Distinguishing LPFVT from a SVT with RBBB and left anterior fascicular block can be made by careful inspection of the morphology of the QRS complexes in V1, V6, aVR and QRS width.

Intravenous verapamil can terminate a LPFVT, and should only be administered in patients with a confirmed diagnosis.

REFERENCES


Conflict of interest: none declared.