accessory pathways responsible for the WPW syndrome) in that it has decremental properties similar to those of the AV node.(1) As a result, the sinus rhythm ECG is usually normal with no delta wave (Figure 2), but pre-excitation with a LBBB pattern is occasionally present. As the accessory pathway inserts into the distal RBB, the tachycardia has a typical LBBB morphology (QRS usually <150ms) with left axis deviation as ventricular activation begins in the distal right bundle near the RV apical region.

Mahaim tachycardia is also known as an atriofascicular tachycardia. Mahaim initially described fibres connecting the His Bundle to the ventricular myocardium (so called nodoventricular and nodofascicular fibres) and not atriofascicular fibres. Although the terms “Mahaim fibres” and “Mahaim tachycardia” are still commonly used, it is better to describe the accessory pathway and tachycardia involved e.g. atriofascicular accessory pathway/tachycardia. Pathways with Mahaim characteristics can be atriofascicular, atrioventricular, nodofascicular and nodoventricular, depending on their variable proximal and distal insertions. Tachycardias involving Mahaim pathways, other than atriofascicular, do occur but are considered rare.(1)

Confirmation of the diagnosis requires invasive electrophysiological study (EPS). Atrial pacing at faster rates leads to pre-excitation with left bundle branch block morphology as a result of the slowing of AV nodal conduction exceeding that of the Mahaim pathway. As the A-H interval increases, the H-V interval decreases. During Mahaim (atriofascicular) tachycardia, the right bundle potential precedes His bundle activation.

The correct answer is therefore (c): Mahaim tachycardia.

(B) INTERVENTIONS

Adenosine should be avoided in wide QRS tachycardias. If the tachycardia is ventricular (the majority are) the catecholamine surge following adenosine vasodilatation may provoke ventricular fibrillation. If it is atrial flutter, 1:1 conduction may occur after the brief AV nodal blockade wears off. If it is orthodromic AVRT, pre-excited atrial fibrillation may be induced(2) which can degenerate into VF.

Intravenous amiodarone will only terminate a minority of VTs (about 20% - 30%) and may cause haemodynamic collapse.
Intravenous adenosine and amiodarone may terminate a Mahaim tachycardia but should not be the first choice of treatment.

Carotid sinus massage or the Valsalva manoeuvre may terminate a Mahaim tachycardia (AV node is part of the circuit) and AV junctional re-entry tachycardia – useful both therapeutically and diagnostically. Vagal manoeuvres are ineffective in VT, although they may induce VA block/AV dissociation which would confirm the diagnosis. They should preferably be performed with at least a 3 channel ECG running, to document the mechanism of termination or the atrial mechanism during transient slowing.

Synchronised DC cardioversion is the treatment of choice for termination of a regular wide QRS tachycardia (default diagnosis – VT), whether haemodynamically stable or not. It will terminate most tachycardias, other than ectopic atrial tachycardia.

The answer to (B) is (c) Carotid sinus massage followed, if necessary, by DC cardioversion.

**FIGURE 1:** Diagrams showing the atriofascicular accessory (Mahaim) pathway connecting the right atrium at the lateral tricuspid annulus to the distal end of the right bundle branch.

On the left, during sinus rhythm, there is no pre-excitation as the impulse travelling via the AV node reaches the ventricles before the long, slowly conducting atriofascicular pathway.

On the right, during antidromic atrioventricular (Mahaim) tachycardia, conduction via the accessory pathway activates the right ventricle near the distal end of the right bundle from where the impulse travels retrogradely via the normal conducting system back to the right atrium. As a result, the ECG shows left axis deviation and LBBB.
In addition to confirming the diagnosis, EPS forms part of long-term management in that the accessory pathway can be located and ablated with a high degree of success and low risk. This young woman’s pathway was located at the lateral tricuspid annulus by recording accessory pathway potentials and consequently successfully ablated, curing her tachycardias.

LESSONS AND CONCLUSIONS

- While most (80%) regular wide QRS tachycardias are ventricular, other mechanisms should be considered when the QRS pattern is typical for left or right bundle branch block.
- Mahaim tachycardia is a rare form of antidromic AVRT in which an accessory pathway with decremental properties, similar to the AV node, connects the right atrium to the right bundle branch (atriofascicular accessory pathway).
- The tachycardia has a pattern of typical LBBB, usually with left axis deviation, but sometimes a horizontal or normal axis, depending on the site of ventricular insertion.
- The ECG in sinus rhythm is usually normal but may show different degrees of pre-excitation with LBBB morphology.
- The accessory pathway can be located at EPS and ablated with radiofrequency via the catheter.

REFERENCES


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