

Uncommon Cause of Wide QRS Complex Tachycardia, Mahaim Tachycardia Revisited

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Abstract: Patients who present with wide complex tachycardia are always challenging both diagnostically and therapeutically. Mahaim fiber is an uncommon cause of tachycardia in which cardiac pre-excitation occurs via slow-conducting, long accessory pathways that terminate in the right ventricular free wall or into the adjacent right bundle. It was first reported by Mahaim and Bennett in 1937, subsequently, other investigators have elucidated the electrophysiologic properties of this pathway. We report a 45 years old man presented to the emergency department with history of sudden onset palpitations associated with fatigue. He was known case of diabetes mellitus and hypertension. Twelve leads electrocardiogram was suggestive of narrow QRS regular tachycardia with left bundle branch block (LBBB) morphology, left axis deviation with late transition of QRS in precordial leads in V5 (figure 1). Patient was hemodynamically stable and was given intravenous adenosine. Subsequently 2D transthoracic echocardiogram revealed normal study. Baseline electrocardiogram showed normal sinus rhythm with no septal q waves in left precordial leads and rS pattern in lead III. (figure 2) typical of Mahaim tachycardia. Electrophysiologic study then confirmed the diagnosis of Mahaim fiber tachycardia. Treatment was successful with mapping of the accessory pathways followed by radiofrequency ablation. In this situation, clinicians must not administer agents that slow conduction through the AV node, as this makes conduction via the accessory pathway more likely and results in immediate hemodynamic collapse, ventricular fibrillation, or death.

Keywords: Wide QRS tachycardia, Mahaim, LBBB morphology, regular, rS complex.

1. Case Report

We report a 45 years old man presented to the emergency department with history of sudden onset palpitations associated with fatigue. He was known case of diabetes mellitus and hypertension. Twelve leads electrocardiogram was suggestive of narrow QRS regular tachycardia with left bundle branch block (LBBB) morphology, left axis deviation with late transition of QRS in precordial leads in V5 (figure 1). Patient was hemodynamically stable and was given intravenous adenosine. Subsequently 2D transthoracic echocardiogram revealed normal study. Baseline

electrocardiogram showed normal sinus rhythm with no septal q waves in left precordial leads and rS pattern in lead III. (figure 2) typical of Mahaim tachycardia. Electrophysiologic study then confirmed the diagnosis of Mahaim fiber tachycardia. Treatment was successful with mapping of the accessory pathways followed by radiofrequency ablation. In this situation, clinicians must not administer agents that slow conduction through the AV node, as this makes conduction via the accessory pathway more likely and results in immediate hemodynamic collapse, ventricular fibrillation, or death.



Figure 1: Electrocardiogram during tachycardia showing narrow complex tachycardia with LBBB morphology, left axis deviation with QRS transition in V5.

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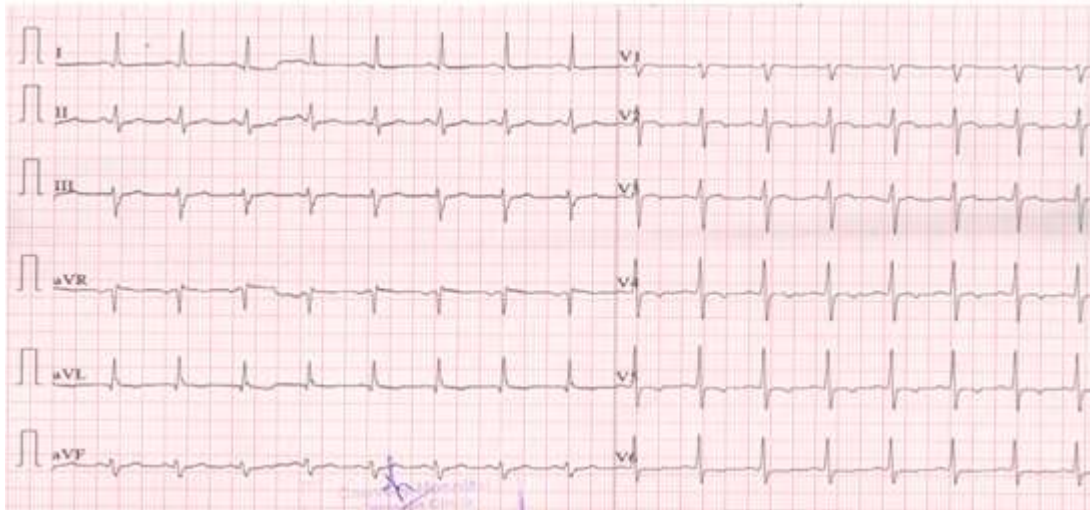


Figure 2: Baseline ECG during sinus rhythm showing apical absence of septal q waves in left oriented leads with Rs complex in lead III.

2. Discussion

The term 'Mahaim fibre' was first conceived in 1937 by Mahaim and Bennet to describe multiple muscular connections in the normal heart that joined the AV bundle to the crest of the ventricular septum. Such accessory pathways originated from the His bundle and inserted into the distal right bundle branch (fasciculoventricular fibres). This definition was later expanded to include accessory pathways of conducting tissue extending from the AV node to the right ventricular myocardium (nodoventricular fibres). The exact prevalence of Mahaim fibre is not known, but the consensus in the literature is that it is relatively uncommon, representing less than 3% of all mapped AV accessory pathways(3). The most common presenting arrhythmia is a re-entrant tachycardia, with the Mahaim fibre acting as the antegrade limb and the AV node as the retrograde limb of the circuit. Typically, the surface ECG reveals a left bundle branch pattern and left axis deviation. Management is either pharmacological with class Ia or Ic anti-arrhythmics and/or beta blockers, or, more commonly, a curative approach through radiofrequency ablation of the Mahaim fibre.

3. Conclusion

Mahaim fibre tachycardias form a distinct subgroup of pre-excitation syndromes constituting a part of wide QRS tachycardia. This should be suspected if the ECG in tachycardia reveals a left bundle branch block morphology with left axis deviation and baseline ECG showing qs complex in lead III. In this situation, clinicians must not administer agents that slow conduction through the AV node, as this makes conduction via the accessory pathway more likely to prevent lifethreatening complications. Electrophysiologic mapping of the fibers is the key to diagnosis and successful ablation.

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