Case report

‘Ablation before Pacemaker’ in a patient with bradycardia: a case report

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Introduction

Symptomatic sinus bradycardia is a common clinical condition encountered by clinicians. The current guidelines recommend treatment of symptomatic sinus bradycardia with a pacemaker implantation. However it is important to be cognizant of some potential confounding factors and recognizing these can sometimes be difficult. We report a case of symptomatic bradycardia that was treated with ablation due to the presence of underlying dual Atrio-Ventricular (AV) nodal pathways.

Case

A 77-year-old male with a past medical history of hypertension and dyslipidemia presented to the emergency department with complaints of episodic dizziness. He was feeling well until the day of presentation when he experienced ‘severe dizziness’ which was worse with exertion and partly improved with rest. He denied chest pain or palpitations. On physical examination the patient was afebrile with a pulse of 39 beats per minute, an oxygen saturation of 98% on room air and a blood pressure of 141/66 in the seated position without postural changes. Initial laboratory data including troponins were within normal limits. Serial ECGs showed evidence of dual AV nodal pathways (Figures 1 and 2).

Discussion

Dual AV nodal physiology requires two functional electrical pathways (which may not be anatomically distinct) within or proximal to the AV node that have different conduction velocities and refractory periods.1 AVNRT can be typical or atypical depending on the pathways utilized for the circus movement. The typical form, which constitutes the majority of AVNRT, is usually initiated when a premature atrial beat arrives at the AV node when the fast pathway is refractory but the slow pathway is excitable. The premature atrial impulse conducts anterograde down the slow pathway and results in a prolonged PR interval. Failure of the fast pathway to conduct during antegrade conduction results in conduction over the slow pathway with retrograde conduction over the fast pathway to create a self-perpetuating circuit. Other sub forms of AVNRT include the...
slow–slow form wherein both anterograde and retrograde conduction takes place through multiple slow pathways and the fast–slow form where the fast pathway is utilized for anterograde conduction and the slow pathway is utilized for retrograde conduction.2,3

Uncommonly dual AV nodal pathways can have spontaneous ECG manifestations during sinus rhythm in the form of abrupt change of the PR interval (seen in our patient), PR interval alternans, or dual ventricular responses to a single supraventricular stimulus. The sudden change in PR interval can be spontaneous or it can be initiated and terminated by an atrial premature contraction (APC). One proposed theory for the spontaneous change is that changes in autonomic tone alter the refractoriness or conduction of fast pathway shifting conduction to the slow pathway.4,5

Figure 1. ECG showing patient had sinus bradycardia with sudden change in PR interval indicative of possible conduction via slow pathway.

Figure 2. ECG showing atrioventricular reentrant rhythm with retrograde atrial activation.
Rarely a single atrial impulse conducts along the fast and slow pathways inscribing two QRS complexes. This is the least common ECG manifestation of dual AV nodal physiology. It can happen if the conduction in the slow pathway is sufficiently slow to allow the His–Purkinje system to recover after excitation by the impulse conducted along the fast pathway. There should be a unidirectional retrograde block in the slow pathway.\(^5,6\)

At presentation this patient was found to have sinus bradycardia with a heart rate <40 bpm. According to ACC/AHA guidelines sinus node dysfunction occurring spontaneously, with symptoms and with a heart rate <40 bpm is an indication for a permanent pacemaker.\(^7\) On initial consideration, it seemed like this patient needed a permanent pacemaker, however due to the detection of dual AV nodal physiology we believe his symptoms were due to AVNRT rather than sinus bradycardia. Therefore he underwent slow pathway ablation, which led to abatement of his symptoms. This case underscores the importance of giving consideration to other confounding factors before implantation of a permanent pacemaker for ‘symptomatic bradycardia’.

Conflict of interest: None declared.

References