CASE REPORTS

Secondary r' Wave in V₁ as a Sign of Left-Sided Antegrade Accessory Pathway Conduction

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A secondary r' wave in V₁ on surface electrocardiogram (ECG) has been described in association with left ventricular preexcitation via an accessory pathway. We present a case that demonstrates the mechanism for this ECG observation.

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A 60-year-old man with documented left anterolateral accessory pathway and paroxysmal atrial arrhythmias presented with severe left ventricular failure. On admission, he had sudden decompensation due to a wide complex tachycardia requiring cardioversion, intravenous inotropic therapy, and mechanical ventilation. He was treated with intravenous amiodarone and metoprolol for ongoing atrial arrhythmias with rapid ventricular response and intermittent preexcitation. At electrophysiology study, his 12-lead ECG showed sinus rhythm with subtle preexcitation and a secondary r' wave in V₁ (Fig. 1). Maximal preexcitation occurred with pacing from the coronary sinus and the shortest stim-delta time was consistent with a left lateral accessory pathway. A single radiofrequency application (2 o'clock position in left anterior oblique view) resulted in loss of preexcitation and the secondary r' wave in V₁.

Lau et al.¹ had previously reported three cases of pseudo-partial right bundle branch block pattern in V₁ during sinus rhythm as the only manifestation of left-ventricular preexcitation. The proposed

Figure 1. Secondary r' wave in V₁ (long oblique arrows) before RF application. Loss of preexcitation and secondary r' wave with RF application (short vertical arrow). Pacing from distal coronary sinus initiated prior to RF application with marked left ventricular preexcitation. QRS duration measured at 130 ms pre- compared to 135 ms postablation.

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Figure 2. Preexcitation of the LV (relative to RV) via left-sided accessory pathway conduction before ablation with r' wave in V₁ (thick arrow, left panel). LV activation coincides with RV activation with loss of r' wave in V₁ postablation (thin arrow, right panel). The RV catheter was positioned at the RV apex. The ablation catheter was positioned in the left atrium over the successful ablation site.

hypothesis—that activation of the left ventricle base (usually activated last via the His-Purkinje system) via antegrade accessory pathway conduction allows some of the vector of right ventricular activation to be unopposed, producing a secondary r' wave in V₁—is supported by this case. First, the QRS duration in sinus rhythm was shorter before ablation of the accessory pathway, suggesting that total ventricular activation time may be reduced by preexcitation of the left ventricular base. Second, the intracardiac recordings (Fig. 2, left panel) at the site of successful ablation demonstrate pre-excitation of the left ventricle as expected with

effectively unopposed right ventricular activation at the time of the secondary r' wave. In contrast, activation of the left ventricular base dominated the terminal half of the QRS complex following successful ablation of the accessory pathway, with consequent loss of the secondary r' wave (Fig. 2, right panel).

REFERENCE

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