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Risk Stratification of an Accessory Pathway Using Isoproterenol after Cardiac Arrest

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Abstract

A 43-year-old man presented after ventricular fibrillation cardiac arrest with evidence of pre-excited atrial fibrillation. Electrophysiology study with guideline-directed testing demonstrated a low risk accessory pathway effective refractory period, which became high-risk with isoproterenol infusion. This case represents a challenging scenario wherein a high-risk pathway may be misclassified using the currently indicated methods of risk stratification.

Case Report

A 43-year-old man with no past medical history presented after out-of-hospital cardiac arrest. The initial rhythm was ventricular fibrillation (VF). The patient was defibrillated and found to be in pre-excited atrial fibrillation (AF); he subsequently underwent direct current cardioversion. The resting electrocardiogram demonstrated sinus rhythm with pre-excitation and no acute ischemic changes.

The patient underwent electrophysiological study (EPS) which revealed an accessory pathway effective refractory period (ERP) of 290ms. When decremental pacing was performed from the atrium, the accessory pathway had 1:1atrio-ventricular conductionat 230ms (see figure). The accessory pathway ERP was 280ms with isoproterenol infusion, and there was 1:1 atrio-ventricular conduction at 200ms with atrial burst pacing (see figure). Atrial fibrillation could not be induced with or without isoproterenol infusion. The accessory pathway was successfully ablated.

Discussion

The shortest R-R interval during AF is considered the best indicator of a high risk accessory pathway due to the fact it reproduces the clinical situation that would lead one to develop VF[1]. It has been demonstrated that the accessory pathway ERP is strongly correlated with thes hortest pre-excited R-R interval (SPERRI) and also with the mean R-R interval during AF[1]. Isoproteronol can be used during EPS as a surrogate of adrenergic stimulation by shortening the SPERRI in patients with WPW. However, the routine use of isoproterenol in risk stratification of accessory pathways is not discussed in the current guidelines, and there is limited data on the significance of a SPERRI < 250 ms with isoproterenol infusion and the risk of sudden cardiac death [2]. There are few case reports of high-risk accessory pathways (SPERRI < 250 ms) being unmasked by isoproterenol infusion.

Our patient did not demonstrate a high risk accessory pathway ERP on or off isoproterenol. However, AV conduction over the accessory pathway improved on isoproterenol from 230ms to 200ms, suggesting a very high risk accessory pathway.

In this particular case, the presentation of ventricular fibrillation with pre-excited atrial fibrillation provided relative certainty regarding the high-risk nature of the accessory pathway. However, had this patient presented for routine EPS with current guideline-based risk stratification, the accessory pathway would have been considered low risk[3]. Atrial fibrillation could not be induced during EPS, further limiting the ability to accurately assess the ERP of the accessory pathway. The challenge presented by this case is the potential for misclassifying high-risk pathways using the currently indicated methods of risk stratification.

Key Words

Wolff-Parkinson White Syndrome, Cardiac Arrest, Electrophysiology Study, Risk Stratification

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Conflicts of interest

Vidal Essebag receives honoraria from St. Jude Medical, Medtronic Inc, Bayer, Boehringer Ingelheim, Bristol-Myers Squibb, and Pfizer pharmaceuticals.

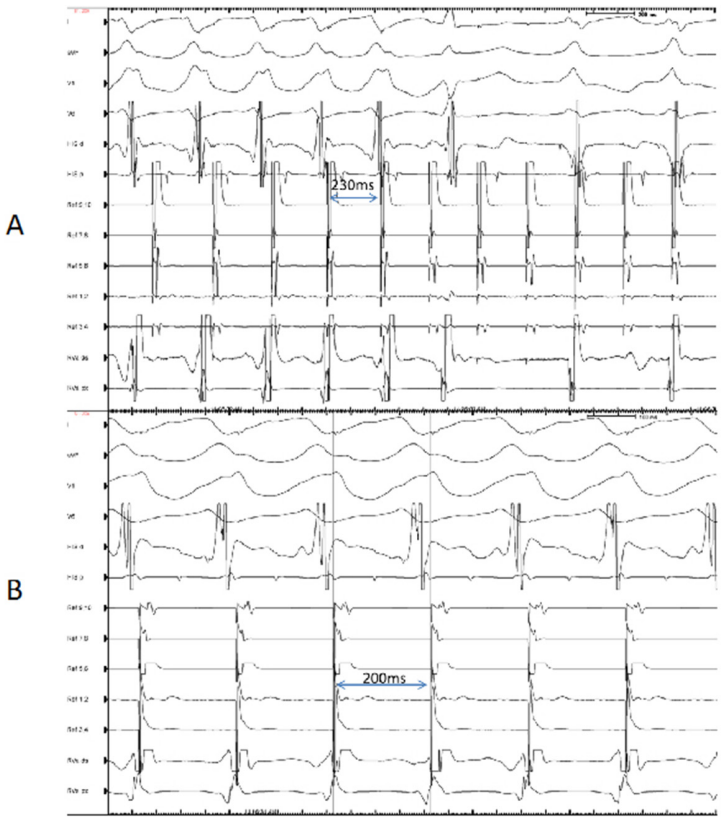

Figure 1: **Maximum 1:1 atrio-ventricular conduction through the accessory pathway with atrial pacing at baseline (A) and with isoproterenol infusion (B)**

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