Epsilon waves in giant-cell myocarditis

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A 44-year-old male with palpitations and dyspnoea presented with sustained ventricular tachycardia (VT) (Panel A). ECG during sinus rhythm (SR) showed late potentials after the QRS complex, particularly in the right precordial leads (Panel B, red arrows), consistent with epsilon waves. Echocardiography revealed moderate biventricular wall thickening, normal left ventricular (LV) size and systolic function but moderate right ventricular (RV) dilatation. Coronary angiography ruled out coronary artery disease. Cardiac magnetic resonance imaging findings (Panel C, short-axis, T1-weighted late gadolinium enhancement) were consistent with myocarditis with prominent RV involvement. Immunohistology of RV endomyocardial biopsies revealed active giant-cell myocarditis (Panel D, arrow: CD68-positive giant cells). Immunosuppression (steroids and cyclosporine) was initiated and ICD implantation planned. Upon placement of the transvenous ICD lead, only markedly delayed potentials of low amplitude (≤2.5 mV) could be acquired from different RV sites, making implantation of an epimyocardial LV pace-sense electrode necessary. Eleven weeks later, an invasive EP study was performed due to recurrent VT despite amiodarone therapy. During SR, electroanatomical mapping (CARTO3, Biosense Webster, USA) of both ventricles showed large areas of diseased myocardium [local bipolar amplitude (Bip) <1.5 mV, Panel E] within the RV. Notable, marked RV activation delays (Panel F, LAT, local activation time with respect to QRS onset) correlated with epsilon waves on surface ECG (Panel G, MAP, mapping catheter signal).

When VT occurs in a mid-aged male with normal coronary arteries and evidence for prominent RV disease, ARVC, sarcoidosis and giant-cell myocarditis should be considered. Epsilon waves are a major diagnostic criterion for ARVC, but this case illustrates that also other cardiac pathologies such as giant-cell myocarditis can cause severe RV conduction disturbances manifesting with VT and epsilon waves on surface ECG.

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