Ablation-induced epsilon wave

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Epsilon waves (low-amplitude deflections between the QRS and the T-wave onset) in the right precordial ECG leads are a major diagnostic criterion for arrhythmogenic right ventricular cardiomyopathy (ARVC).1 Here we present a unique case of de novo epsilon wave formation occurring after catheter ablation.

A 23-year-old ARVC patient with a pathologic DSP mutation (position c.1292dupA) was admitted with repeated...
shocks from her implantable cardioverter-defibrillator. Device interrogation confirmed appropriate therapy for ventricular tachycardia (VT), cycle length 380 to 400 ms. We elected to perform VT ablation. Prior cardiac magnetic resonance imaging showed a dilated right ventricle (RV) with microaneurysms in the RV free wall but no fibrofatty replacement. The left ventricle was extensively involved (ejection fraction 42%). Resting ECG prior to the ablation showed minor interventricular conduction delay and flat T waves in the right precordial leads but no epsilon waves (Figure 1).

RV geometry was created using a standard curve NaviStar ablation catheter and CARTO (both Biosense Webster, Diamond Bar, CA). A voltage map showed extensive scarring with fractionated potentials in the RV, especially from the anterior to high lateral position. The clinical VT was easily induced and well tolerated. During VT activation mapping, very early signals (75 ms ahead of QRS) were observed at the scar anterolaterally. Entrainment demonstrated that this was the exit site. Ablation was performed here and extended laterally and superiorly until the clinical VT was terminated. A faster, poorly tolerated VT was induced and mapped to the septum. Ablation here produced local delayed activation and manifest epsilon waves. ECG postablation showed more profound interventricular conduction delay with frank T-wave inversion and new epsilon waves in the right precordial leads (Figure 1). The epsilon waves remained static at 12-month follow-up.

Major ECG diagnostic criteria for ARVC can be subdivided into abnormalities of repolarization (T-wave inversion V1–V3 or beyond in absence of right bundle branch block) or depolarization/conduction, which was recently restricted to the presence of epsilon waves in the right precordial leads. Epsilon waves are believed to represent delayed activation of the RV free wall and their presence to reflect more diffuse RV involvement. In keeping with this, epsilon waves can be dynamic early in ARVC and can appear years after the initial diagnosis with disease progression. The case reported here is the first to show development postablation, which by its nature increases scarring within the RV. The presence of epsilon waves did not herald an increased risk of ventricular arrhythmia, as has been previously shown.

References

CORRIGENDUM

“Corrigendum to ‘Specificity of electrocardiographic criteria for the differential diagnosis of wide QRS complex tachycardia in patients with intraventricular conduction defect.’ by Datino Romaniega T, Almendral J, Avila P, González-Torreella E, Atienza F, Arenal A, Fernández-Avilés F, HeartRhythm 2013 Sep;10(9):1393-401. The first author would like to note his name should be recognized as Tomás Datino (Datino T) and not as Tomás Datino Romaniega (Datino Romaniega T) in this article.”