Giant epsilon waves in 12 leads in a patient with severe arrhythmogenic cardiomyopathy

Erika López-Moreno*, Juan Jiménez-Jáimez, and Luis Tercedor

Department of Cardiology, Complejo Hospitalario Universitario de Granada, Avenida de las Fuerzas Armadas, 2, 18014 Granada, Spain

* Corresponding author. Tel: +34 617 69 54 38; *E-mail address*: lopezmorenoerika@gmail.com

The epsilon wave, which is found in the right-sided precordial leads, is a major criterion for arrhythmogenic cardiomyopathy (AC). We describe the electrocardiogram of a 65 years old woman diagnosed with a severe biventricular AC that showed mega-epsilon waves in 12 leads. This rare feature has never been mentioned in AC and may reflect a severe form of the disease.

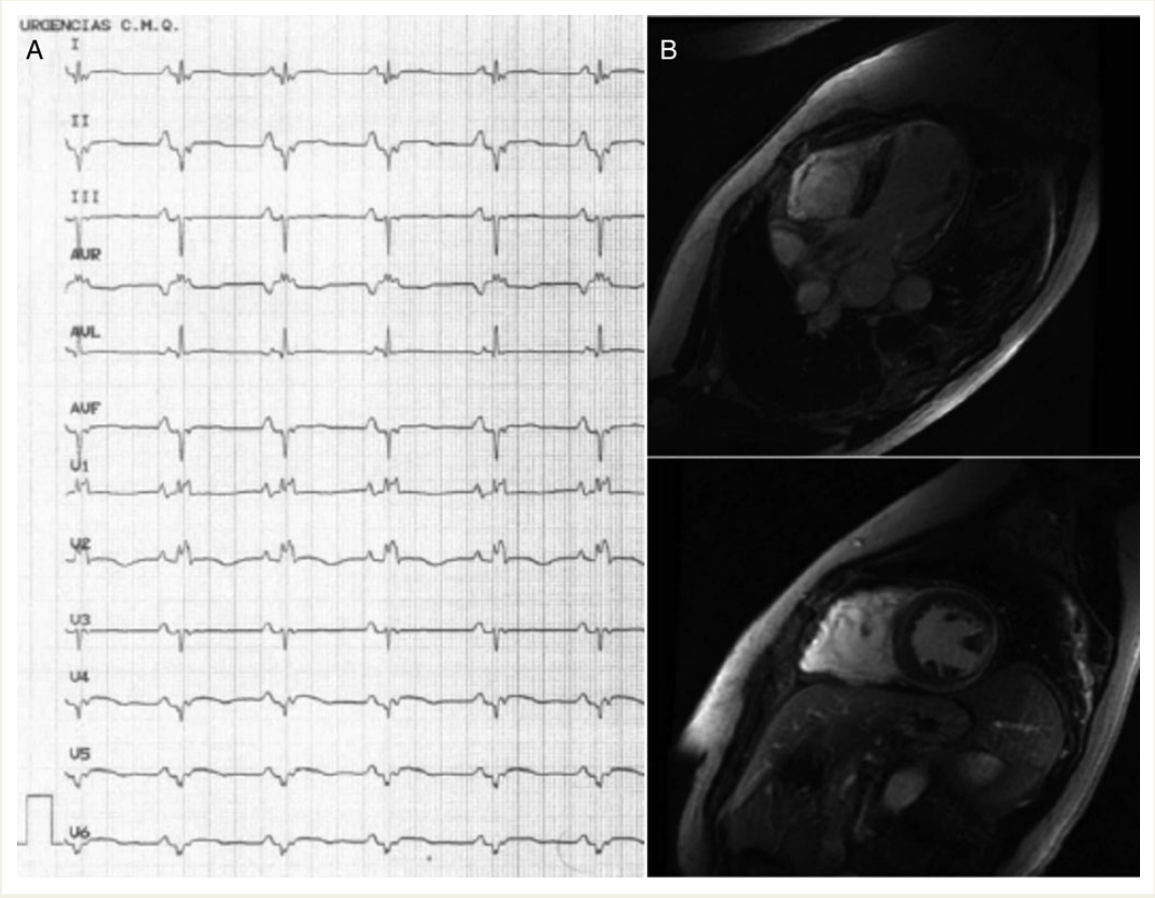

Figure 1 (*A*) Standard 12-lead ECG showing generalized T wave inversion in all precordial leads with giant epsilon waves throughout the 12 leads. (*B*) Extensive diffuse subepicardial late gadolinium enhancement affecting both ventricles.

The epsilon wave reflects a delay in depolarization due to a slow conduction through the ventricle wall. This feature, which is chiefly found in the right-sided precordial leads, is a major criterion in the diagnosis of arrhythmogenic cardiomyopathy (AC). It is estimated to appear in 9–36% of the cases, and it is defined as a small spike wave and smooth potential between the end of the QRS complex and the beginning of the ST segment.[1]

We describe the case of a 65 years old woman who presented to the Emergency Department with shortness of breath in the context of a congestive heart failure. During the admission in Cardiology, standard electrocardiogram (ECG), echocardiography, cardiac magnetic resonance imaging (MRI), and genetic testing were performed. As a result, the patient was diagnosed with AC with biventricular involvement, due to meeting four major (regional right ventricle aneurysms and ejection fraction $<$40% by MRI, ECG with inverted T wave in all precordial leads in the absence of complete right bundle branch block, epsilon wave, and identification of a pathogenic mutation associated with AC in genetic testing) and one minor criteria (regional right ventricle dyskinesia and right ventricular outflow tract diameter in parasternal short-axis of 35 mm by echocardiography) according to revised 2010 Task Force Criteria. The standard 12-lead ECG (*Figure 1A*) showed a normal sinus rhythm, tall p-wave in Leads II and V1 (right atrial dilatation), left anterior fascicular block, incomplete right bundle branch block, and inverted-flat T waves in precordial and inferior leads. We noted the presence of mega-epsilon waves in all 12 leads, with even higher amplitude than QRS in V1–2. Genetic testing showed that she was a heterozygous Desmoglein-2 mutation carrier. The patient presented a severe phenotype with dilatation and severe systolic dysfunction of both ventricles, with diffuse subepicardial biventricular late gadolinium enhancement (*Figure 1B*). An apical thrombus was found in left ventricle. Significant coronary artery disease was excluded by coronary angiography. Before hospital discharge, she underwent implantable cardioverter defibrillator implantation for primary prevention. No ventricular arrhythmias have been reported in the 2-year follow-up. In summary, we demonstrated the rare occurrence of large and diffusely recorded late potentials that may be the equivalent of epsilon waves in a patient with an extensive and severe form of AC.[2]

References

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2. Francés RJ. Arrhythmogenic right ventricular dysplasia/cardiomyopathy. A review and update. *Int J Cardiol* 2006;**110**:279–87.