


Clinical vignette
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Epicardial ablation of an arrhythmogenic left ventricular micro-aneurysm guided by fusion of electro-anatomical activation maps and computed tomography images

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A 32-year-old male patient presented with palpitations and near loss of consciousness during exercise because of a broad complex tachycardia of 220 bpm terminating spontaneously. A 12-lead ECG showed sinus rhythm, small Q-waves in the inferolateral leads, an incomplete right bundle branch block (RBBB), and VPBs with an RBBB morphology and a north-west axis. Echocardiogram and coronaryography were normal. The left ventriculography showed a small aneurysm (14 mm x 10 mm) in the inferolateral wall. This was confirmed by a 16-slice computed tomography (CT) study. No sustained arrhythmia could be induced during programmed electrical stimulation; isoprenaline initiated a VT with a cycle length of 220 ms and a morphology identical to the VPBs. An arrhythmogenic left ventricular micro-aneurysm was diagnosed and scheduled for ablation.

Dedicated software (CARTO Merge, Biosense Webster) segmented the three-dimensional CT data into the right ventricle, the left ventricle with the micro-aneurysm, and the aortic root. An epicardial activation map obtained via open subxyphoidal pericardial access showed a non-uniform propagation pattern with an ‘island’ of late, low-amplitude, and fragmented potentials at the inferolateral wall of the left ventricle. Pacing at this site resulted in a QRS morphology identical to the induced VT and the spontaneously occurring VPBs. Merging of CT images and the electro-anatomical activation map demonstrated that the anatomical position of the micro-aneurysm overlapped with the arrhythmogenic substrate identified during mapping. An ablation line encircling the arrhythmogenic substrate and the aneurysm resulted in the disappearance of VPBs and non-sustained VT. Isoprenaline failed to initiate the arrhythmia.

Panel A. The 12-lead ECG during sinus rhythm, the spontaneously occurring VPBs (RBBB morphology and north-west axis), and epicardial pace mapping from the epicardial aneurysm.

Panel B. Small aneurysm (yellow arrows) detected during ventriculography.

Panel C. Upper part: three-dimensional CT imaging of the single micro-aneurysm at the inferolateral free wall of the left ventricle (left anterior oblique view with four-chamber view cutplane). Lower part: segmented data set (CARTO Merge, left posterior oblique view). The micro-aneurysm is shown in blue (outpouching of the lumen on the endocardial delineation).

Panel D. ‘Merge’ between the three-dimensional CT and the epicardial activation map (blue and purple colours indicate the latest activation). The arrhythmogenic substrate was found to overlap the anatomical position of the micro-aneurysm.