

EP CASE REPORT

Clinical impact of speckle tracking echocardiography for detecting the origin of posterior papillary muscle ventricular arrhythmia

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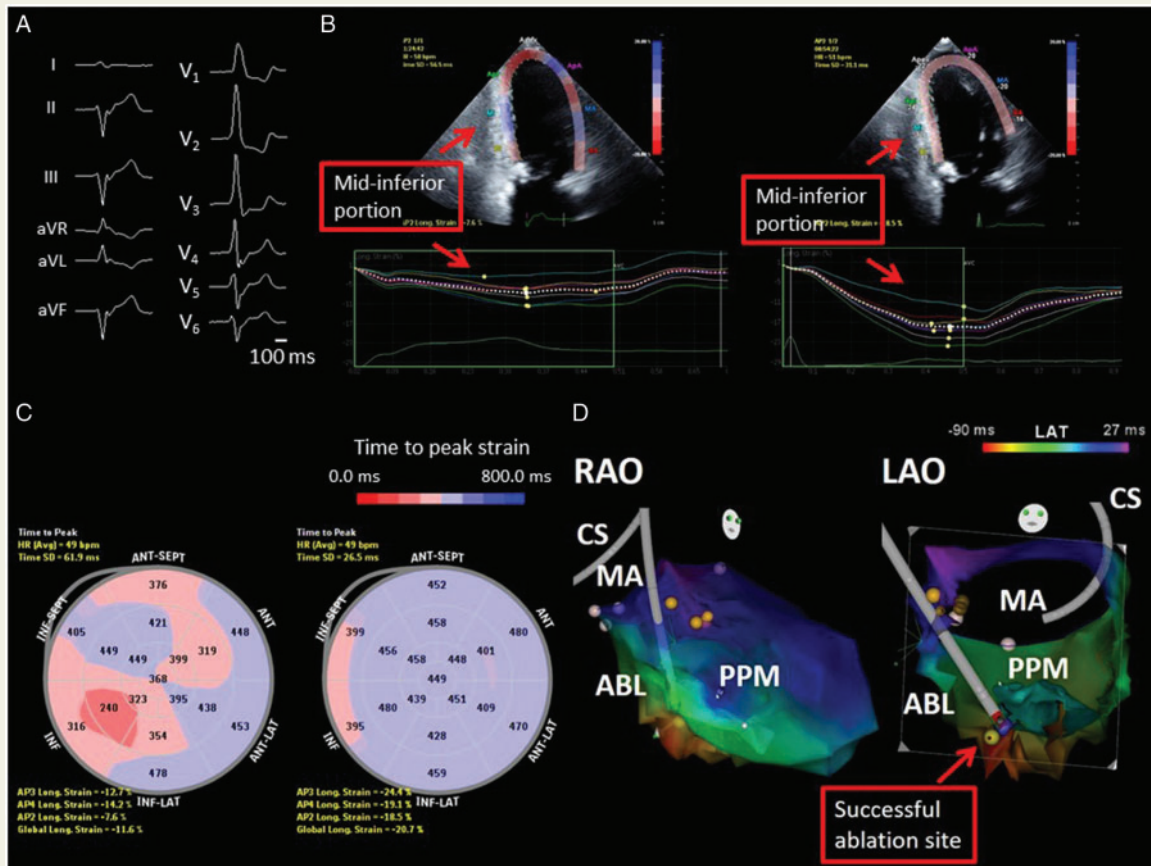


Figure 1 Premature ventricular contraction originating from the posterior papillary muscle. (A) Twelve-lead electrocardiogram morphology of PVC. (B) Strain pattern of one cardiac cycle in the two-chamber view. Left panel shows strain pattern of PVC before catheter ablation. Right panel shows strain pattern of a normal beat after catheter ablation. (C) Bulls-eye figure of time to peak systolic strain in each segment of the LV. Left panel shows a bulls-eye plot of PVC before catheter ablation. The shortest time (red) from peak QRS of PVC to peak systolic strain is located at the mid-inferior portion of the LV. Right panel shows a bulls-eye plot of a normal beat after catheter ablation. (D) The local activation time is colour-coded in 3D electroanatomic mapping. The earliest activation (red) originates from the region of the posterior papillary muscle and propagation spread centrifugally (left panel). Successful ablation (blue dot) was achieved at the earliest activation site (right panel). ABL, ablation; ANT, anterior; CS, coronary sinus; INF, inferior; LAO, left anterior oblique; LAT, lateral; MA, mitral annulus; PPM, posterior papillary muscle; PVC, premature ventricular contraction; RAO, right anterior oblique; LV, left ventricle; SEPT, septal.

A 64-year-old man consulted emergency department due to severe palpitations. The 12-lead ECG showed frequent premature ventricular contractions (PVCs) and repetitive non-sustained monomorphic ventricular tachycardia. QRS morphology of PVCs was right bundle branch block pattern and superior axis with a notch of the Q wave in the inferior leads and QRS duration of 164 ms (*Figure 1A*). A previous electrocardiographic algorithm suggested the origin of PVCs as the posterior aspect of the mitral annulus.¹ Prior to intracardiac mapping and ablation procedure, time from peak QRS of PVC to peak systolic strain in each segment of the left ventricle (LV) was measured using 2D strain echocardiography (EPIQ 7, Philips Medical Systems, Bothell, Washington, DC, USA) as shown in *Figure 1B*. Bulls-eye figure of time to peak systolic strain demonstrated that the shortest time (red) representing the earliest activation of PVC existed at the mid-inferior portion of the LV (*Figure 1C*). These findings suggested that the origin of the targeted PVC was the posterior papillary muscle. Activation mapping with simultaneous reconstruction of the LV geometry, especially focused on the posterior papillary muscle, was performed using a multi-electrode mapping catheter (DECANV, Biosense Webster, Diamond Bar, CA, USA) and an electroanatomic mapping system (CARTO3, Biosense Webster) with intracardiac echocardiography guidance (SOUNDSTAR, Biosense Webster). As shown in *Figure 1D*, the earliest activation (red) was located at the region of the posterior papillary muscle and propagation spread centrifugally. Thus, radiofrequency energy was delivered to the area, and completely abolished PVCs. After ablation procedure, ventricular arrhythmias became non-inducible with ventricular overdrive stimulation during isoproterenol infusion. Speckle tracking echocardiography may be useful for identifying the origin and deciding clinical approaches before intracardiac mapping and ablation procedure for monomorphic PVCs originating from the papillary muscles.

Conflict of interest: none declared.

Reference

1. Tada H, Ito S, Naito S, Kurosaki K, Kubota S, Sugiyasu A et al. Idiopathic ventricular arrhythmia arising from the mitral annulus: a distinct subgroup of idiopathic ventricular arrhythmias. *J Am Coll Cardiol* 2005;**45**:877–86.