High-Resolution Mapping to Unmask and Localize Presystolic Purkinje Potentials During Idiopathic Verapamil-Sensitive Left Anterior Papillary Muscle Fascicular-Purkinje Ventricular Tachycardia

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A 20-year-old male with a structurally normal heart underwent catheter ablation (CA) for verapamil-sensitive ventricular tachycardia (VT; **Figure A**). During VT, the left ventricle (LV) was mapped with a 3.5-mm-tip linear quadripolar catheter (Thermocool SF, Biosense Webster, Diamond Bar, CA, USA). No low-voltage area was seen. The earliest activation occurred at the basal anterolateral LV area with a tiny Purkinje potential (PP; 0.05 mV), preceding the QRS by 35 ms (**Figure A**). The LV was then re-mapped with a 5-spline 1-mm electrode 20-pole 2-6-2-mm spacing PentaRay catheter (Biosense Webster), identifying an earlier (−51 ms) distinct high-amplitude (1.5 mV) presystolic PP followed by fractionated potentials at the medial surface of the anterior papillary muscle (APM) (**Figure B**). The entrainment study confirmed this site as an exit of the VT (**Supplementary Figure**), and left APM fascicular-Purkinje VT was diagnosed.¹ Radio-frequency CA was successful.

Mapping with small, closely spaced multielectrode catheters can improve resolution within low-voltage areas and is expected to enhance CA for scar-related VTs. This case demonstrates the value of high-resolution PentaRay mapping to find critical PPs in left APM fascicular-Purkinje VT. In addition, the flexible splines may have played an important role in mapping the left anterior fascicular area

including the APM, where varying perpendicular orientations are more likely with a linear catheter. The orientation of the bipole with a PentaRay is more likely to be in parallel with the endocardial tissue, and the thin splines may allow better access to small pouches. In this patient, the PentaRay was placed with 2 splines (**Figure B** white arrowheads) hugging the protruding APM, and the earliest PP during VT was recorded on one of the splines (**Figure B**).

Conflict of Interest

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Reference

1. Komatsu Y, Nogami A, Kurosaki K, Morishima I, Masuda K, Ozawa T, et al. Fascicular ventricular tachycardia originating from papillary muscles: Purkinje network involvement in the reentrant circuit. *Circ Arrhythm Electrophysiol* 2017; 10: e004549.

Supplementary Files

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Figure. Local activation time mapping during ventricular tachycardia with a standard ablation (ABL) catheter (**A**) and a PentaRay (PR) (**B**).