

Local Atrial Conduction Velocity During Pacing as Indication of Atrial Fibrillation Substrate Complexity

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Background: Pulmonary vein isolation (PVI) for termination of atrial fibrillation (AF) is not effective in up to 50% of patients with persistent AF; AF drivers outside of the pulmonary veins can contribute to AF recurrences after PVI. Atrial conduction characteristics during sinus rhythm or slow pacing may provide an indication of local conduction heterogeneities as potential drivers for AF. In this study we explored the potential use of local conduction velocity (CV) during pacing as a marker of left atrial (LA) substrate complexity.

Methods: LA activation times were recorded for 4 AF patients during coronary sinus (CS) pacing before PVI using a Pentaray catheter. Activation times were relative to the CS pacing spike to reconstruct a single conduction pattern on the LA while using sequential mapping. LA activation locations were triangularized to calculate CV: the local direction and speed of the activation wave front. Local CV distribution was quantified by the dominant velocity and the full width at half maximum (FWHM) of the CV distribution. CVs < 0.5m/s were considered slow.

Results: CV maps highlighted differences in CV magnitude and distribution between all patients. AF recurrence during follow-up occurred in 3 out of 4 patients. Patients with recurrence showed either a wide distribution (FWHM: 0.91-0.94 m/s) or a slow dominant velocity (0.18 m/s)

Conclusion: This exploratory study shows that CV distribution may provide a good surrogate measure of conduction heterogeneities, and as such should be taken into consideration as a potential tool to predict AF recurrence after PVI.

