

Mean Temporal Spatial Isochrones Direction as marker for Activation Delay in Patients with Arrhythmogenic Cardiomyopathy.

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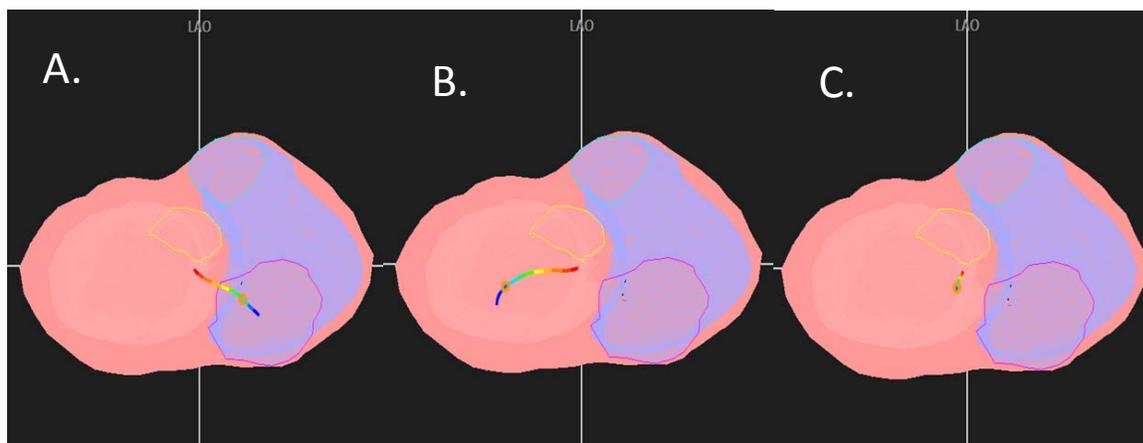
Introduction Patients with arrhythmogenic cardiomyopathy (ACM) often present with ventricular arrhythmias due to local activation delay caused by myocardial fibrosis or fibrofatty replacement. Mutations in the Plakophilin-2 (PKP2) gene can cause ACM. Currently, the only available diagnostic methods to detect activation delay are the electrocardiogram (ECG) or an invasive electrophysiological study. The aim of this study is to use ECG derived mean temporal spatial isochrones (meanTSI) as marker of local activation delay.

Methods We included 14 patients with ACM due to PKP2 mutations, 6 asymptomatic PKP2 mutation carriers and 7 controls. The normal 12 lead ECG was used to construct vector cardiographic signals (VCG). A standard model of the heart was used to derive VCG signals. The activation propagation through the myocardium was computed by estimating the mean TSI from the VCG signals. The mean TSI of the second half of the QRS complex was analyzed with the intraventricular septum as starting point. The direction of this last part of the meanTSI indicates the direction of activation during the last part of depolarization.

Results In 10 of the 14 patients with ACM the terminal part of the meanTSI pointed to the right ventricle and in 2 patients to the left ventricle. In 4 of the 6 asymptomatic mutation carriers, the meanTSI was directed to the left ventricle. This was comparable to controls where the meanTSI was located in the left ventricle in 6 of the 7 cases. In the remaining 5 of the 27 included cases the terminal part of the meanTSI pointed to the basal part of the heart model.

Conclusion In patients with ACM the meanTSI based on the second half of the QRS complex was directed at the right ventricle. The ongoing study will focus on the relation between meanTSI and changes in activation delay during follow-up.

Figure 1. The meanTSI in 3 standard heart models with LAO view.



The red part of the meanTSI represents the mid QRS, the blue part most the terminal part of the QRS. The blue parts indicates the activation direction during the last part of depolarization. The meanTSI direction: A: The right ventricle. B: The left ventricle. C: Basal.