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Abstract 15492: Non-Invasive Radiation Therapy of Ventricular Tachycardia Storm Guided by Computerized 12-Lead ECG-Based Mapping

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Abstract

Introduction: Stereotactic radioablation of ventricular tachycardia (VT) guided by epicardial body surface imaging (ECGi) has been performed in a few patients with promising results.

Hypothesis: We hypothesized that a novel, noninvasive computational mapping system using the 12-lead ECG would successfully facilitate stereotactic radioablation in a patient with VT storm refractory to catheter ablation.

Methods: A 76 year old male with non-ischemic cardiomyopathy (EF 29%) presented with VT storm totaling 2700 anti-tachycardia therapies and 52 ICD shocks despite maximal antiarrhythmic medications (sotalol, lidocaine, procainamide, and esmolol) and a history of amiodarone pulmonary fibrosis. He had previously failed 3 catheter ablations at outside institutions. Left-sided ablation was contraindicated due to an aortic valve mass and severe aortic valve insufficiency. He was declined surgical ablation due to frailty. Non-invasive mapping and radioablation was planned. Programmed stimulation using the ICD was performed to induce 2 different VTs, which were recorded on 12-lead ECGs. The computer algorithm localized VT origins to the left aortic cusp and the epicardial basal lateral LV (Fig 1A). An internal target volume and avoidance structures were contoured on a cardiac computed tomography scan based on ECG mapping correlated by fibrosis detected by cardiac magnetic resonance imaging. The contours were transferred onto a free-breathing simulation CT (Fig 1B). 25 Gy of targeted radiation was delivered using a linear accelerator (Varian, Palo Alto).

Results: ICD shocks decreased from 12 to 1 (on day 2) and ATP decreased from 78 to 10 in the month before compared to the month after ablation (relative reduction 92% and 87%). No adverse events were observed.

Conclusions: This case illustrates the efficacy of non-invasive 12-lead ECG mapping and radioablation in a patient who failed invasive VT therapies. Additional studies with longer follow-up are ongoing.