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Characteristics of Cardiac Memory in Patients with Implanted Cardioverter Defibrillator: the CAMI study

Kazi Haq, Ph.D., Jian Cao, PhD, and Larisa G. Tereshchenko, MD, PhD

OHSU

Keywords

Cardiac Memory, Vectorcardiogram, GEH

Abstract

Introduction

The goal of this study was to determine factors associated with cardiac memory (CM) in patients with implantable cardioverter-defibrillators (ICD).

Methods

Patients with structural heart disease (n=20; mean age 72.6±11.6 y; 80% male; mean left ventricular ejection fraction (LVEF) 31.7±7.6%; history of myocardial infarction (MI) in 75%, ventricular tachycardia (VT) in 85%) and preserved atrioventricular (AV) conduction received primary (80%) or secondary (20%) prevention dual-chamber ICD. Standard 12-lead ECG was recorded in AAI and DDD mode, before and after 7 days of right ventricular (RV) pacing in DDD mode with short AV delay. Direction (azimuth and elevation) and magnitude of spatial QRS, T, and ventricular gradient (SVG) vectors were measured before and after 7 days of RV pacing. CM was quantified as the degree of alignment between QRSDDD-7 and TAAI-7 vectors (QRSDDD-7-TAAI-7 angle). Circular statistics and mixed models with a random slope and intercept were adjusted for days 1-7 change in cardiac activation, LVEF, known risk factors, and use of medications known to affect CM.

Results

QRSDDD-7-TAAI-7 angle strongly correlated (circular $r = -0.972$; $P < 0.0001$) with TAAI-7-TDDD-7 angle. In the mixed models, history of MI (-180° (95%CI -320° to -40°); $P = 0.011$) and female sex (-162° (95%CI -268° to -55°); $P = 0.003$) counteracted CM-T azimuth changes ($+132^\circ$ (95%CI 80° - 184°); $P < 0.0001$). History of VT ($+27$ (95%CI 4 - 46) mV^*ms ; $P = 0.007$) amplified CM-T area increase ($+15$ (95%CI 6 - 24) mV^*ms ; $P < 0.0001$).

Conclusions

Existing cardiac remodeling affects CM in response to RV pacing. Women develop less CM than men. Activation memory is another manifestation of CM.