Temporal variability of T-wave morphology and risk of sudden cardiac death in patients with coronary artery disease

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Background: The possible relationship between temporal variability of electrocardiographic spatial heterogeneity of repolarisation and the risk of sudden cardiac death (SCD) in patients with coronary artery disease (CAD) is not completely understood.

Purpose: To investigate the prognostic value of temporal variability of T-wave spatial heterogeneity in SCD in patients with CAD.

Methods: The Innovation to reduce Cardiovascular Complications of Diabetes at the Intersection (ARTEMIS) study population consisted of 1,946 patients with angiographically verified CAD. T-wave morphology dispersion (TMD), which estimates the average angle between all reconstruction vector pairs in T-wave loop based on leads I-II and V2-V6, was analysed on beat-to-beat basis from 10 minutes period of the baseline electrocardiographic recording in 1,678 study subjects. The temporal variability of TMD was evaluated by standard deviation of TMD (TMD-SD).

Results: After on average of 7.4±2.0 years of follow-up, a total of 47 of the 1,678 study subjects (2.8%) had experienced SCD or were resuscitated from sudden cardiac arrest (SCA). TMD-SD was significantly higher in patients who had experienced SCD/SCA compared with those who remained alive (3.64±2.57 vs. 2.65±2.54, p<0.01, respectively), but did not differ significantly between the patients who had experienced non-sudden cardiac death (n=40, 2.4%) and those who remained alive (2.98±2.43 vs. 2.67±2.55, p=0.45, respectively) or between the patients who succumbed to non-cardiac death (n=88, 5.2%) and those who stayed alive (2.74±2.44 vs. 2.67±2.55, p=0.81). After adjustments with relevant clinical risk indicators of SCD/SCA, such as left ventricular ejection fraction, diabetes, left bundle branch block and Canadian Cardiac Society class, TMD-SD still predicted SCD/SCA (HR 1.113, 95% CIs 1.028-1.206, p<0.01). The discrimination and reclassification accuracy increased significantly (p=0.02, p=0.033) and the C-index increased from 0.733 to 0.741 when TMD-SD was added to the clinical risk model of SCD/SCA. The Kaplan-Meier survival curves show proportional probabilities of event-free survival for different modes of death for patients classified according to the optimised TMD-SD cut-off point (Figure).

Conclusions: Temporal variability of electrocardiographic spatial heterogeneity of repolarisation represented by TMD-SD independently predicts long-term risk of SCD/SCA in patients with CAD.
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