Long-term prognostic significance of dispersion of ventricular repolarization in patients with cardiac sarcoidosis

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Topic(s):
Infiltrative Myocardial Disease

Backgrounds: Although the presence of cardiac involvement is recognised as a determinant of worse clinical outcomes in sarcoidosis patients, the determinants of adverse outcomes in patients with cardiac sarcoidosis (CS) have not been well understood. T-peak to T-end interval (TpTe) on the surface electrocardiogram (ECG) was proposed as a marker of dispersion of ventricular repolarisation. Prolonged TpTe to QT interval ratio (TpTe/QT) represents a period of potential vulnerability to reentrant ventricular arrhythmias. Notably, prolonged TpTe/QT has been associated with increased risk of mortality in hypertrophic cardiomyopathy, congenital long-QT syndrome, and Brugada syndrome. However, its prognostic implication in patients with CS is unclear.

Purpose: We sought to investigate whether TpTe/QT was associated with long-term clinical outcomes in patients with CS.

Methods: A total of 108 consecutive CS patients between August 1986 and March 2019 in two academic hospitals who had ECG data before initiation of immunosuppressive therapy were examined. We excluded patients who received pacemaker (n=15) or cardiac resynchronization therapy (n=3) at the time of ECG.

Ultimately, 90 CS patients were included in this study. All standard 12-lead ECGs were recorded at 25 mm/s with an amplification of 10 mm/mV. TpTe was measured from the peak of T wave to the end of T wave which defined as the intersection of the tangent to the down slope of the T wave and the isoelectric line. Lead V5 was selected for the analyses. If V5 is not suitable for analyses, V4 was selected. The primary outcome was the composite of advanced atrioventricular block (AVB), ventricular tachycardia or ventricular fibrillation (VT/VF), heart failure hospitalisation and all-cause death.

Results: During a median follow-up period of 4.70 (interquartile range [IQR] 2.06-7.23) years, adverse events occurred in 21 patients (23.3%), including 2 advanced AVB, 12 VT/VF, 4 heart failure hospitalisation and 3 all-cause death. Events group had higher TpTe/QT compared to no events group (0.231 [IQR 0.193-0.261] vs. 0.282 [IQR 0.263-0.304] P<0.001). Kaplan-Meier analyses revealed that the primary outcome, especially VT/VF or sudden cardiac death more frequently occurred in patients with higher TpTe/QT (≥0.242, the median) compared to those with lower TpTe/QT (Figure). Multivariable Cox regression analysis showed that higher TpTe/QT was independently associated with increased subsequent risk of adverse events (hazard ratio 1.09, 95% confidence interval [CI] 1.02-1.17, P=0.014) even after adjustment for age, sex and left ventricular ejection fraction. Furthermore, the optimal cut-off value of TpTe/QT for the discriminatory of primary outcome was 0.257, and c-index was 0.77 (95% CI 0.64-0.89).

Conclusions: Higher TpTe/QT was associated with worse long-term clinical outcomes in patients with CS. Our findings indicate the importance of assessing TpTe/QT for risk stratification in patients with CS.
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Figure. Survival analyses for adverse events categorised by T-peak to T-end /QT ratio