

Evaluation of Ventricular Repolarization Variability in Patients With Nonischemic Dilated Cardiomyopathy From Vectorcardiography Signals

Martin Schmidt, Filip Karisik, Sebastian Zauneder, Axel Linke, Hagen Malberg, Mathias Baumert

TU Dresden, Germany; University of Adelaide, Australia; FH Dortmund, Germany

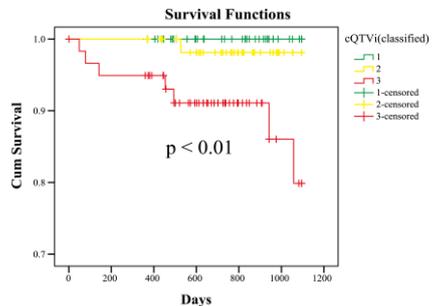
Ventricular repolarization variability (VRV) has predictive value for mortality in patients with ischemic heart disease. However, the potential for risk stratification in patients with nonischemic cardiomyopathy remains unclear. To investigate the predictive value of VRV for all-cause mortality in patients with nonischemic dilated cardiomyopathy, we analyzed the Defibrillator in Non-Ischemic Cardiomyopathy Treatment Evaluation trial (DEFINITE).

The Telemetric and Holter ECG Warehouse (THEW) data set E-HOL-03-0401-017 was used for analysis. The data set comprises 393 recordings from 236 patients (67 women, age 60 ± 14 years; 168 men, age: 58 ± 12 years; 1 record not specified). All patients had a left ventricular ejection fraction $< 36\%$ and were randomized to receiving standard medical therapy with or without an ICD. 24h-Holter 3-lead (Frank lead system) ECGs were performed at enrollment and after up to 5 years' follow-up. The all-cause mortality during the follow-up period was 4.8%.

We analyzed three-dimensional variability of the T-loop and QT interval variability on a single lead basis by employing three-dimensional signals adaptation and two-dimensional signal warping, respectively, to quantify VRV. To assess the predictive value of VRV parameters, Kaplan-Meier survival curves of baseline Holter ECGs were calculated.

Preliminary results showed significant association to survival ($p < 0.01$ by the log-rank test) for distance variability of the three-dimensional T-loop and T wave amplitude corrected QT interval variability index (cQTVi) on single lead basis. Low cQTVi group showed a rate of death of 0.0% for the entire observation period (see figure).

Further investigations will focus on the comparison of risk stratification based on a three-dimensional and single lead VRV parameters.



Kaplan-Meier survival curves; Estimated survival of DEFINITE patients for cQTVi.