Holter Electrocardiogram Parameters in Risk Stratification of Arrhythmic Events in Idiopathic Dilated Cardiomyopathy

More Studies Are Needed*

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Recent advancements in the management of patients with acute coronary syndromes and chronic coronary artery disease have contributed to a decreasing number of ischemic patients developing advanced left ventricular dysfunction and heart failure. Trends in clinical practices using device therapy in patients with heart failure and left ventricular dysfunction indicate that the incidence of nonischemic or idiopathic dilated cardiomyopathy (DCM) is increasing. Current guidelines for the primary prevention of cardiac mortality with implantable cardioverter-defibrillators (ICDs) in DCM patients are based on the landmark DEFINITE (Defibrillators in Non-Ischemic Cardiomyopathy Treatment Evaluation) trial (1) and the SCD-HeFT (Sudden Cardiac Death in Heart Failure Trial) (1,2). The DEFINITE trial enrolled DCM patients with ejection fraction ≤35% and a history of symptomatic heart failure and the presence of ambient arrhythmias (1). The SCD-HeFT (2) used low ejection fraction and presence of symptomatic heart failure (New York Heart Association [NYHA] functional class II or III) as entry criteria. Both trials showed a marked improvement in survival with ICD therapy; however, in both trials the majority of patients (even those assigned to conventional therapy) remained asymptomatic during follow-up. This high proportion of patients without cardiac events raises the question of whether we are able to identify high- and low-risk subsets of

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impairment. Therefore, a controversy still exists regarding the prognostic significance of NSVT in DCM patients, and further studies are needed to document this association in patients with well-documented arrhythmic events by interrogated implantable devices.

Another important contribution of the study by Iacoviello et al. (3) is the analysis of QT/RR slopes in DCM patients. This is the first study evaluating the prognostic significance of QT dynamics in DCM population. The QT/RR slope was found to be predictive for arrhythmic events after adjustment for clinical covariates and presence of NSVT in the model. Patients with arrhythmic events had significantly steeper QT/RR slope in comparison with arrhythmia-free patients. Increased QT/RR slope (>0.19) was able to identify high-risk subset of DCM patients with ejection fraction <35%. Patients with low ejection fraction but with less steep slope (QT/RR slope ≤0.19) had much lower event rates. These findings indicate that evaluating QT dynamics might provide clinically useful information when considering ICD therapy. The observations by Iacoviello et al. (3) correspond to a similar analysis conducted by Chevalier et al. (7) in postinfarction patients, where increased slope (>0.18) also identified a high-risk subset of patients. Facilitation of re-entry by shortening of the refractory period might be considered as a potential mechanism behind this phenomenon (8).

Patients with ejection fraction >35% in the study by Iacoviello et al. (3) were few in number and experienced very few events. As a result, there was limited statistical power to determine the prognostic usefulness of studied ECG parameters in this subgroup of patients. It is possible that DCM patients with relatively preserved ejection fraction might benefit from ECG-based risk stratification and optimization of therapy, but no studies have addressed this group of patients so far.

The study by Iacoviello et al. (3) also provides insight into a comprehensive approach for risk stratification combining clinical, echocardiographic, ECG, and Holter-based parameters. This approach reflects clinical practice and utilizes standard and broadly accessible technologies. We have learned from this study that QRS duration, QTc duration, or heart rate variability was not predictive for arrhythmic events in studied DCM patients. Instead, the authors propose a risk-stratification algorithm based on a combination of 3 parameters: low ejection fraction, NSVT, and QT/RR slope, each reflecting different mechanistic pathways that could lead to arrhythmic events. This algorithm requires further testing in prospective cohorts to enable validation of the concept.

It is worth stressing that there are several other risk-stratification methods utilizing the ECG including T-wave alternans (9), QT variability (10,11), and heart rate turbulence (12,13). A direct comparison of these methods may provide us with clinically useful information to further improve clinical management of DCM patients. These ECG methods will, in the future, be complemented by imaging techniques like magnetic resonance imaging, allowing a more precise assessment of myocardial changes and their propensity for major cardiac events.

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