Usefulness of Microvolt T-Wave Alternans for Prediction of Ventricular Tachyarrhythmic Events in Patients With Dilated Cardiomyopathy: Results From a Prospective Observational Study

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OBJECTIVES

This study was designed to evaluate the ability of microvolt-level T-wave alternans (MTWA) to identify prospectively patients with idiopathic dilated cardiomyopathy (DCM) at risk of ventricular tachyarrhythmic events and to compare its predictive accuracy with that of conventional risk stratifiers.

BACKGROUND

Patients with DCM are at increased risk of sudden death from ventricular tachyarrhythmias. At present, there are no established methods of assessing this risk.

METHODS

A total of 137 patients with DCM underwent risk stratification through assessment of MTWA, left ventricular ejection fraction, baroreflex sensitivity (BRS), heart rate variability, presence of nonsustained ventricular tachycardia (VT), signal-averaged electrocardiogram, and presence of intraventricular conduction defect. The study end point was either sudden death, resuscitated ventricular fibrillation, or documented hemodynamically unstable VT.

RESULTS

During an average follow-up of 14 ± 6 months, MTWA and BRS were significant univariate predictors of ventricular tachyarrhythmic events (p < 0.035 and p < 0.015, respectively). Multivariate Cox regression analysis revealed that only MTWA was a significant predictor.

CONCLUSIONS

Microvolt-level T-wave alternans is a powerful independent predictor of ventricular tachyarrhythmic events in patients with DCM. (J Am Coll Cardiol 2003;41:2220–4) © 2003 by the American College of Cardiology Foundation

Idiopathic dilated cardiomyopathy (DCM) represents the substrate for approximately 10% of sudden cardiac deaths (SCDs) in the adult population (1). Mortality in patients with DCM ranges between 10% and 50% annually, mainly determined by the severity of the disease (2).

Recently, it has been demonstrated that in patients with a history of sustained ventricular tachycardia (VT) or aborted SCD, the implantable defibrillator (ICD) is superior to antiarrhythmic pharmacotherapy in prolonging life (3–5). In these studies, a significant proportion of enrolled patients suffered from DCM. Even in DCM patients without aborted SCD but with syncope as the initial presentation, in whom no arrhythmias could be provoked at electrophysiologic (EP) testing, there was a high incidence of appropriate device therapy (6). However, a recently published study in 104 patients with DCM and a left ventricular ejection fraction (LVEF) ≤0.30 who randomly either did or did not receive the device failed to show benefit from prophylactic ICD therapy (7). This emphasizes the need of better identification of DCM patients at high risk of arrhythmogenic death. Moreover, widespread application of such a risk stratification approach requires noninvasive, inexpensive, and easy-to-perform risk stratification methods.

Analysis of microvolt-level T-wave alternans (MTWA) from the surface electrocardiogram (ECG) has been introduced as a new approach for evaluating arrhythmogenic risk (8–11). Microvolt-level T-wave alternans analysis involves the detection of alterations in T-wave morphology that occur on an every-other-beat basis. Microvolt-level T-wave alternans is thought to reflect the occurrence of localized action potential alternans, which creates dispersion of recovery, which in turn promotes the development of reentrant arrhythmias. In a recent study in patients with heart failure, MTWA was shown to predict the occurrence of arrhythmias (12). However, in that study the majority of patients suffered from coronary artery disease as the underlying structural heart disease. Other investigators have studied the association between MTWA and presence of Holter-documented VT in DCM patients (13), retrospectively analyzed the relationship between MTWA and prior ventricular tachyarrhythmic events in DCM patients (14), and evaluated MTWA as a predictor of ventricular tachycardia.