The problem of indeterminate microvolt T-wave alternans results in patients with left ventricular dysfunction referred for implantable cardioverter-defibrillator implantation in the primary prevention of sudden cardiac death

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Abstract

Background: Microvolt T-wave alternans (MTWA) is a recommended noninvasive diagnostic test for predicting the risk of sudden cardiac death (SCD). However, about 6% to 41% of MTWA results are indeterminate. The causes, interpretation and clinical significance of these results have not been clearly established.

Aim: To assess frequency, causes, and prognostic significance of indeterminate MTWA results in a group of patients with left ventricular dysfunction referred for implantable cardioverter-defibrillator (ICD) placement in the primary prevention of SCD.

Methods: Patients with left ventricular ejection fraction (LVEF) £ 35% underwent MTWA evaluation during a treadmill exercise test (CH2000 system, Cambridge Heart Inc. Bedford MA, USA). MTWA results (spectral analysis) were categorised as positive, negative, or indeterminate (MTWApos, MTWAneg, and MTWAnd, respectively). Patients were followed up for the occurrence of SCD, ventricular tachycardia (VT), and ventricular fibrillation (VF).

Results: Mean age of participants (n = 93) was 63 ± 13 years, an ischaemic cause of left ventricular dysfunction was present in 70 (75%) patients, and average LVEF was 30 ± 7%. MTWApos was found in 27 (29%) patients, MTWAneg in 41 (44%) patients, and MTWAnd in 25 (27%) patients. Causes of MTWAnd included inability to achieve a diagnostic HR in 12 (48%) patients, ventricular ectopy in 5 (20%) patients, nonsustained alternans in 3 (12%) patients, and technical factors (artifacts due to a high noise level) in 5 patients (20% of indeterminate results, 5.4% of the whole study group). During follow-up, 8 SCD/VT/VF events were noted (4 patients with MTWApos and 4 patients with MTWAnd due to patient-related factors). The rate of SCD/VT/VF was 35% in patients with MTWApos and 34.6% in MTWAnd due to patient-related factors, significantly higher compared to those with MTWAneg or MTWAnd due to technical factors (p < 0.05).

Conclusions: Although the proportion of indeterminate MTWA results in patients with left ventricular dysfunction referred for ICD implantation in the primary prevention of SCD was high, the proportion of indeterminate MTWA results due to technical factors, probably of no prognostic significance, was small.

Key words: microvolt T-wave alternans (MTWA), implantable cardioverter-defibrillator (ICD), systolic dysfunction

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