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T-wave alternans testing in pacemaker patients: comparison of pacing modes and long-term prognostic relevance

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Aims: Microvolt T-wave alternans (MTWA) is an effective tool for identifying patients who are at risk for sudden cardiac death. Since MTWA is heart rate dependent, testing requires controlled increase of heart rate which can be achieved by either physical exercise or by pacemaker stimulation.We aimed to determine the effects of different pacing modes on test results and long-term prognostic relevance of MTWA in patients with prior DDD (dual-chamber) pacemaker implantation.

Methods and results: Sixty-three patients (mean age 68±13 years) with structural heart disease and implanted DDD pacemaker were enrolled. Left ventricular (LV) function was normal or moderately impaired (mean LV ejection fraction 61±13%). All patients underwent sequential MTWA testing during atrial and ventricular pacing, respectively. During atrial pacing, 21% of MTWA tests were positive, 50% negative, and 29% indeterminate. When using ventricular pacing, 18% of tests were positive, 41% negative, and 41% indeterminate. When positive and indeterminate tests were grouped as non-negative, the concordance between atrial and ventricular pacing was 70%. After a mean follow-up of 8.1±2.8 years, 26 (41%) patients had died. Better survival was predicted by the absence of MTWA during atrial pacing ($p = 0.0324$) but not during ventricular pacing ($p = 0.82$).

Conclusion: In patients with permanent pacemakers, there is a low concordance of MTWA test results among different pacing protocols. During long-term follow-up, only MTWA during atrial pacing is of prognostic relevance and should therefore remain one of the standards of MTWA measurements.