Microvolt T-wave alternans testing is abnormal both in left- and right-sided pathology

Microvolt T-wave alternans (MTWA) is one method of sudden cardiac death (SCD) risk stratification.

Clinical relevance of non-invasive risk markers for SCD has had some better and worse periods. According to current European Society of Cardiology guidelines on SCD (2015), markers such as heart rate variability (HRV), heart rate turbulence (HRT), late potentials (LP), and MWTA have limited value. The main, well-documented risk factor for SCD is decreased left ventricular ejection fraction (LVEF) <35% (1).

Regardless of the less-than-promising results of previous studies on clinical relevance of MWTA, further analyses in this field have been published. MWTA analysis in patients with ischemic and non-ischemic LV dysfunction may especially be of clinical value. Negative MWTA is characteristic of patients who have low SCD risk. MWTA has high negative predictive value (97%).

Data on MWTA in patients with a rare heart disease such as pulmonary arterial hypertension (PAH) are scarce. Authors such as Daniłowicz-Szymanowicz et al. (2) are pioneers who were the first to analyze this problem in the literature (3). One novel concept was to test MWTA as a risk factor for arrhythmic death in LV pathology in patients with pulmonary arterial pathology as well as secondary changes in right ventricle (RV).

The authors analyzed MTWA results for patients with PAH and compared them with those of MTWA performed for patients who had LV systolic dysfunction and healthy volunteers.

What was the main finding of the study? First, MTWA testing was positive/abnormal in a high percentage of patients with PAH, which is similar to that observed in patients with LV systolic dysfunction, despite relevant differences in LVEF.

Abnormal MTWA in PAH group corresponded to decreased LVEF even when it remained within normal range. Moreover, PAH patients with abnormal MTWA had higher N-terminal pro b-type natriuretic peptide levels. Thus, when analyzing RV pathology, MTWA must still be combined with any LV abnormalities.

The main limitation was the inhomogeneous population of patients examined, the heterogeneity of PAH patients with respect to underlying etiology. Patients with congenital heart disease constituted 68% of the study group. We should be conscious that patients may represent a wide range of congenital pathologies, e.g., atrial septal defect, or in some cases, Eisenmenger syndrome, in single ventricle physiology. In these cases, it is sometimes difficult to differentiate left- from right-sided pathology. Objective difficulties in proper assessment of LVEF in advanced pathologies, e.g., large ventricular septal defect of tetralogy of Fallot, may also occur.

Regardless of the above-mentioned limitations, some data about MTWA testing in congenital heart diseases are provided in the literature (4, 5).

The next data that should be taken into consideration is duration of PAH therapy. We do not have any data about whether the therapy was efficient or whether the authors achieved the goals of PAH therapy?

Another question is whether the abnormal MTWA corresponded to worse prognosis or increased risk for SCD? This is especially important, as SCD that primarily results from ventricular arrhythmia is still responsible for 30–40% mortality rate in adults with PAH. The indications for implantable cardioverter-defibrillators in primary prophylaxis are still unknown for this group. Further studies are also needed to answer this question. The small number of subjects with PAH constitutes a limitation for long-term observation studies and the evaluation of risk factors. On the other hand, it should be mentioned that all non-invasive SCD markers have low positive predictive value. It is probably better to identify low-risk groups that are characterized by a negative MWTA value.

An interesting topic for further studies in this field would be an evaluation of whether efficient PAH-therapy can convert positive/abnormal MWTA into negative MWTA testing, which could possibly reduce the risk for SCD.

Despite these comments, I would like congratulate the authors for presenting an interesting, novel idea that may allow for a better understanding of PAH-related pathology.

Katarzyna Mizia-Stec
First Department of Cardiology, School of Medicine in Katowice, Medical University of Silesia; Katowice-*Poland*

References

1. Priori SG, Blomström-Lundqvist C, Mazzanti A, Blom N, Borggrefe M, Camm et al. 2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J 2015; 36: 2793-867. Crossref
2. Daniłowicz-Szymanowicz L, Szwoch M, Lewicka E, Dąbrowska-Kugacka A, Kwiatkowska J, Raczak G. Microvolt T-wave alternans test in patients with pulmonary arterial hypertension. Pol Przegl Kardiol 2013; 15: 18-23.

Address for correspondence: Prof. Katarzyna Mizia-Stec, MD, PhD, First Department of Cardiology
School of Medicine in Katowice, Medical University of Silesia, Katowice, Poland
PL-40-635 Katowice, Ziolowa 47-*Poland*
Phone: +4832-3598890 Fax: +4832-2523658 E-mail: kmizia@op.pl, 1klinkard@sum.edu.pl
Accepted Date: 03.08.2016

DOI:10.14744/AnatolJCardiol.2016.21130

3. Lewicka E, Daniłowicz-Szymanowicz L, Dąbrowska-Kugacka A, Zięba B, Zagożdżon P, Raczak G. Microvolt T-wave alternans profile in patients with pulmonary arterial hypertension. Int J Cardiol 2014: 176: 1294-6. Crossref
4. Cieplucha A, Trojnarska O, Bartczak A, Kramer L, Grajek S. Microvolt T wave alternans in adults with congenital heart diseases characterized by right ventricle pathology or single ventricle physiology: a case control study. BMC Cardiovasc Disord 2013; 13: 26. Crossref
5. Trojnarska O, Ciepłucha A, Bartczak A, Kramer L, Grajek S. Microvolt T-wave alternans in adults with complex congenital heart diseases. Cardiol J 2014; 21: 144-51. Crossref

From Prof. Dr. Arif Akşit's photograph, the stone in the garden of Prof. Dr. Bilgin Timuralp