

Microvolt t-wave alternans in adult patients with repaired tetralogy of Fallot.

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Introduction: Sudden cardiac death (SCD) occurs in 6% patients (P) with repaired tetralogy of Fallot (TOF). Indications for SCD primary prevention in TOF are unknown. Microvolt t-wave alternans (MTWA) is applied for SCD risk stratification. Study aim: evaluation of spectral MTWA occurrence in adults after TOF repair and determination its association with ventricular arrhythmia (VA) and potential risk factors of VA and SCD.

Methods: Study group: 102 adults after TOF repair (46 men) in sinus rhythm aged mean 31,2±8,3years operated at mean 6,2±4,3years. Surgery: palliative Blalock-Taussig shunt- 27P (26,5%), reoperation- 13P (12,7%). 89P (87,3%) NYHA I. Control group: 45 adults (23 men) aged mean 31,0±9,2years. MTWA classification: positive(+), indeterminate(ind), negative(-), non-negative(non-) (including MTWA(+) and MTWA(ind) due to similar prognostic significance). VA classification: malignant-sustained ventricular tachycardia (sVT), potentially malignant-nonsustained ventricular tachycardia (nsVT) and >10 premature ventricular complexes per hour (PVC/h).

Results: 13P-MTWA(+), 25P-MTWA(ind) and 64P-MTWA(-). 15P excluded due to excessive noise. MTWA(+) significantly more frequent in TOF vs. control group (1P (2,2%), P=0,0001). Male gender domination in MTWA(+) vs. MTWA(-) (P=0,005). No difference in sVT occurrence, heart rate variability and BNP between analyzed subgroups. Enddiastolic right ventricle diameter (RVEDD) smaller in MTWA(-) vs. MTWA(+) and MTWA(non-) (P=0,004; P=0,005, respectively). Pulmonary insufficiency (IP) more frequent in both MTWA(+) and MTWA(non-) vs. MTWA(-) (P=0,045; P=0,015, respectively). Greater QT dispersion (QTd) in both MTWA(+) and MTWA(non-) vs. MTWA(-) (P=0,004; P=0,04, respectively). Maximal oxygen consumption (peakVO₂) greater in MTWA(-) vs. MTWA(non-) (P=0,012). VE/VCO₂ slope smaller in MTWA(-) vs. MTWA(non-) (P=0,04). Factors increasing MTWA(+) occurrence in univariate logistic regression: male sex (OR=8,04), IP (OR=3,5), RVEDD (OR=1,14), QTd (OR=1,03) and in multivariate logistic regression: male sex (OR=10,5), QTd (OR=1,06). Factors increasing MTWA(non-) occurrence in univariate logistic regression: IP (OR=3,57), >10PVC/h and/or nsVT and/or sVT (OR=3,26), RVEDD (OR=1,11), QTd (OR=1,03), VE/VCO₂ (OR=1,08) and peakVO₂ fall (OR= 0,91).

Conclusions: Abnormal MTWA occurs more often in adults with repaired TOF, especially men, compared to healthy population. Presence of malignant VA does not increase probability of MTWA. Occurrence of abnormal MTWA rises with SCD risk factors like IP, RVEDD resulting in heart failure. MTWA potential significance in SCD risk assessment in TOF population needs further observation.