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Increased Microvolt T-wave Alternans in Children and Adolescents with Pulmonary Hypertension

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Background: Pulmonary arterial hypertension (PAH) is a devastating disease with poor prognosis of which the major factor is developing of right heart failure. Structural, mechanical and electrical remodeling on the right ventricle led to increase the risk of arrhythmia and even sudden death. There are limited studies about non-invasive tests, such as T-wave alternans (TWA), used to determine the risk of ventricular arrhythmias and sudden cardiac death in adults with PAH. This is the first study which aims to compare the microvolt TWA values in children with PAH and controls.

Methods: Fourteen patients with PAH: 9 with ventricular septal defect (VSD), 4 with atrioventricular septal defect, 1 with primer PAH and 18 healthy controls were included in the study. The TWA values through 24-hour ECG recordings of the patients were evaluated. Analysis of microvolt TWA was considered on the basis of three leads (V5, V1 and aVF). In all patients right heart catheterization, 6-minute walk test (6-MWT), BNP levels, and echocardiographic parameters were obtained.

Results: TWA values; lead V5 was 83.15 ± 10.4 in the patient group (63.5 ± 18 in the control group), lead V1 was 73.6 ± 17 (73 ± 16.8 control group), and lead aVF was 72.1 ± 18.2 (72.6 ± 16.2 in the control group) respectively. When TWA values compared between patients and controls, only lead V5 values statistically increased in PAH group ($p=0.003$). 6-MWT, pulmonary artery acceleration time and RV free wall thickness significantly correlated lead V5 respectively ($r=-582$, $p=0.029$, $r=-553$, $p=0.017$ and $r=448$, $p=0.040$). RA volume and inferior vena cava diameter significantly correlated with lead V1 ($r=-589$, $p=0.01$ and $r=-498$, $p=0.035$). Tei index ve inferior vena cava diameter significantly correlated with lead aVF ($r=-593$, $p=0.01$ and $r=-546$, $p=0.019$).

Conclusion: As a result, microvolt TWA lead V5 values were increased in children with PAH patients and these values were correlated with 6-MWT, pulmonary artery acceleration time and RV free wall thickness. In order to determine the cut-off levels of microvolt TWA as well as their possible predictable values for arrhythmia or cardiovascular mortality in these patients, further studies are required.