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Subclinical myocardial dysfunction in pediatric kidney transplant recipients: a two-dimensional speckle-tracking echocardiography study

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Chronic kidney disease is associated with increased risk of cardiovascular mortality and morbidity in pediatric patients as well. Renal transplantation results in improved survival, however, several factors contribute to markedly elevated cardiovascular complication rate compared to the healthy population. While major cardiac events occur rarely in pediatric population, detection of subclinical changes in cardiac morphology and function may be of high interest to effectively identify high-risk patients.

Accordingly, our aim was to investigate left (LV)- and right ventricular (RV) morphology and function using conventional and two-dimensional (2D) speckle-tracking echocardiography (STE) in pediatric renal transplant recipients.

Our study group consisted of 41 kidney transplanted children (RTX; mean age: 14±3 years, m/f: 25/16) and 39 age- and gender matched healthy controls. Using 2D echocardiography, LV and RV focused apical loops were obtained and LV end-diastolic volume index (EDVi), ejection fraction (EF), mass index (Mi), RV end-diastolic area index (EDAi) and fractional area change (FAC) were measured. Using STE, we have determined LV global longitudinal (GLS) and circumferential strain (GCS), RV GLS, and LV and RV early diastolic longitudinal strain rate (LSrE).

LV EDVi did not differ between RTX and controls (51±13 vs. 52±10 mL/m², p=NS), while LVMi was markedly higher in RTX patients (36±8 vs. 28±6 g/m², p<0.0001). LVEF was comparable between the two groups (62±5 vs. 62±3%; p=NS), while LV GLS was significantly lower in RTX (-20.6±2.1 vs. -21.8±2.1%, p=0.01) along with a tendential increase in LV GCS (-31.6±4.3 vs. -29.7±4.6%, p=0.06). LV LSrE was significantly lower in RTX patients (1.29±0.29 vs. 1.45±0.27 1/s, p<0.05). RV EDAi did not differ between the two groups (11.2±2.3 vs. 11.6±2.0 cm²/m², p=NS). Interestingly however, RTX patients had significantly higher RV FAC and RV GLS (FAC: 46±7 vs. 42±4%, GLS: -24.6±3.7 vs. -22.4±2.6%, both p<0.01) along with lower RV LSrE (1.32±0.57 vs. 1.60±0.43, p<0.05).

Cardiac morphology and function shows distinct changes after RTX. Along with comparable ventricular dimensions, LV hypertrophy and subclinical systolic and diastolic dysfunction is present. RV systolic function is relatively increased accompanied by subclinical diastolic dysfunction of the chamber, which may refer to previous RV overload. STE may be a useful tool to reveal early myocardial dysfunction in pediatric kidney transplant recipients.