

Left ventricular systolic dysfunction in children with chronic kidney disease

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Introduction

Adults with chronic kidney disease (CKD) have an excess of cardiovascular morbidity and mortality, with heart failure (HF) being particularly frequent. Reduced left ventricular ejection fraction (LVEF) defines left ventricular (LV) systolic dysfunction and is associated with poor prognosis. However, CKD patients may have HF symptoms with preserved LVEF. In this subgroup of patients, tissue Doppler imaging (TDI), and two-dimensional speckle tracking echocardiography (2D-STE) can detect LV systolic dysfunction by analysing LV myocardial deformation. The present study evaluated the prevalence of impaired LV global longitudinal strain (GLS) in CKD patients with preserved LVEF and its prognostic consequences. There are limited data in children. The aim of this study was to determine early changes in cardiac function of children with CKD by using TDI and 2D-STE.

Methods

Sixty three children and young adults (57% males, age 14.9 ± 6.4 years) with CKD and preserved LVEF ($\geq 50\%$) were evaluated. They were compared with age- and gender-matched controls. Left ventricular systolic dysfunction despite preserved LVEF was defined by LV GLS $< 15\%$. Peak systolic (s') and early diastolic (e') myocardial velocities in the LV and RV lateral wall, and basal septum were measured at rest using TDI.

Results

All subjects had normal resting LVEF (CKD $65.4 \pm 7.6\%$ vs control $67.5 \pm 5.7\%$; $p=0.12$). However, impaired LV GLS ($< 15\%$) despite preserved LVEF was observed in 14% of patients. Overall, CKD patients had lower GLS compared to controls ($-17.9 \pm 2.8\%$ vs $-20.1 \pm 1.5\%$; $p<0.001$). Moreover, TDI systolic parameters were significantly lower in the CKD group (IVS s' 6.9 ± 1.4 cm/s vs 8.6 ± 0.8 cm/s; $p<0.001$) (LV s' 8.5 ± 2.2 cm/s vs 10.5 ± 1.7 cm/s; $p<0.001$) (RV s' 10.7 ± 2.2 vs 12.9 ± 1.6 cm/s; $p<0.001$). At rest, LV and RV lateral wall, and basal septal e' velocities were lower in patients (12.2 ± 3.5 cm/s vs. 18.5 ± 2.2 cm/s, $p<0.001$; 10.8 ± 3.0 cm/s vs. 16.2 ± 2.7 cm/s, $p<0.001$; and 9.8 ± 2.3 cm/s vs. 14.6 ± 1.9 cm/s, $p<0.001$; respectively).

Conclusion

The study concluded that TDI and 2D-STE can determine cardiac involvement earlier than conventional echocardiography in children with chronic kidney disease having preserved ejection fraction.