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Functional Outcome in Children and Adolescents with Coarctation of the Aorta

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INTRODUCTION

Coarctation of the Aorta (CoA) was assumed being one of the congenital heart defects not associated with major long-term problems. Meanwhile it is known that there is an association to some side defects like vascular dysplasia which still exists after surgical correction. Due to this CoA patients are at higher risk for long-term vascular impairments and higher cardiac morbidity. This study investigates functional outcome measures in children with CoA in comparison with a healthy control group (CG).

METHODS

From May 2014 to October 2018, we examined 75 children (42.7% girls, 12.9 ± 3.6 years) with CoA for their arterial stiffness, Intima-Media Thickness (IMT) and Health-Related Physical Fitness (HRPF). The functional arterial stiffness measures, central systolic blood pressure and pulse wave velocity (PWV) were analyzed with an oscillometric device. Structural changes were measured by ultrasound of the arteria carotis communis IMT; in addition HRPF was tested by five tasks of the FITNESSGRAM®. The CG consisted of 2002 children (48.9% girls, 12.8 ± 2.8 years) they were recruited within two recent school projects.

RESULTS

In comparison to the CG, adjusted for age and sex, the CoA patients showed worse functional arterial stiffness measures with a 2.9mmHg higher central systolic blood pressure (CoA: 104.0 ± 7.7 mmHg vs CG: 101.1 ± 7.7 mmHg; $p=0.007$) and a 1.8mmHg lower peripheral diastolic blood pressure (CoA: 64.5 ± 7.2 mmHg vs CG: 66.3 ± 7.2 mmHg; $p=0.049$), whereas no significant difference in peripheral systolic blood pressure. Structural changes were also present in CoA patients with a 0.028mm thicker intima media vessel wall (CoA: 0.481 ± 0.037 mm vs CG: 0.454 ± 0.034 mm; $p<0.001$). Compared to the CG and adjusted for age and sex, children with CoA presented significantly lower HRPF (z-score -0.47 ± 0.65 ; $p<0.001$; 31th percentile).

CONCLUSIONS

Children with CoA show significant impairments in all parts. Especially functional arterial stiffness and IMT measures for structural changes are in close relation with higher risk for severe vascular and cardiac morbidities. Based on these aspects it is important to ensure a comprehensive and structured aftercare monitoring to prevent cardiovascular morbidity as soon as possible.