CMR Feature Tracking shows Preserved Myocardial Deformation Long-term after Coarctation Repair.

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Background: Arterial vasculopathy and residual aortic obstruction can lead to left ventricular (LV) dysfunction in patients with coarctation of the aorta (CoA) due to adverse ventriculo-arterial coupling. This study aimed to investigate potential differences in LV myocardial deformation indices between well-repaired CoA-patients and healthy controls.

Methods: Twenty-two well-repaired CoA patients (age 30±10.6 years) after surgical repair (12) or balloon angioplasty (10) (at 0.3-16 years) with >10 years of follow-up were compared to 22 healthy matched controls (age 30±3.8 years). Five CoA patients had been treated for re-coarctation. CMR-FT was used for LV longitudinal-, circumferential- and rotational deformation indices.

Results: Global systolic LV function was preserved in CoA patients (LV ejection fraction 58±4.8% vs. 60±6.8%, p=0.56) when compared to controls, with normal indexed LV end-diastolic volume (93±15.2ml/m² vs. 93±9.3ml/m², p=0.79), indexed LV end-systolic volume (26±7.0ml/m² vs. 31±7.3ml/m², p=0.05) and indexed LV mass (68±8.5g/m² vs. 63±8.6g/m², p=0.08). Twelve CoA patients (55%) were hypertensive (systolic and diastolic blood pressure of 144±9.3mmHg and 80±6.0mmHg, respectively) of whom 4 were on antihypertensive medication. LV global longitudinal strain was preserved in the horizontal (-18±4.4% vs. -16±4.7%, p=0.06) and vertical (-22±5.1% vs. -20±6.0%, p=0.22) long axis in CoA patients. Global circumferential strain was preserved at basal (-29±4.1% vs. -28±4.8%, p=0.43), mid-ventricular (-27±4.2% vs. -25±3.0%, p=0.09) and apical levels (-35±7.8% vs. -32±3.9%, p=0.32). Segmental increase of circumferential strain was seen in the basal-anterior (-28±10.1% vs. -21±9.6%, p=0.03) and the mid-posterior (-23±6.3% vs. -27±7.3%, p=0.04) segments. No differences were found in global torsion (2.4±1.3°/cm vs. 2.0±1.4°/cm, p=0.28), twist (14±5.8° vs. 12±6.3°, p=0.34) and recoil rate (-17±9.7°/cm/s vs. -17±7.1°/cm/s, p=0.97). Analysis of intra-observer variability demonstrated good reproducibility for all deformation indices.

Conclusion: Global and regional myocardial deformation indices are preserved in well-repaired CoA patients long-term after repair.