

## Aortic elasticity after aortic coarctation correction: comparison of state of the art therapies by cardiovascular MRI

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**Background:** Previous studies have shown impaired aortic bioelasticity and left ventricular mechanics in patients with aortic coarctation (CoA) despite successful CoA relief. However, rare studies exist comparing patients after surgical and interventional CoA treatment. The aim of this cardiovascular magnetic resonance (CMR) imaging study was to assess aortic bioelasticity and LV properties in CoA patients who underwent either endovascular stent implantation or surgical CoA repair.

**Methods:** 50 patients ( $20.5 \pm 9.5$ ) underwent 3-Tesla CMR. Out of them, 18 patients were treated with endovascular stent implantation and 32 patients had surgical CoA repair. We performed volumetric analysis of both ventricles (LV, RV) and left atrium (LA) to assess biventricular end-diastolic and -systolic volumes (LVEDV, LVESV, RVEDV, RVESV) and ejection fraction (LVEF, RVEF) as well as left atrial (LA) volumes and functional parameter (LAEF<sub>Passive</sub>, LAEF<sub>Contractile</sub>, LAEF<sub>Reservoir</sub>). Furthermore, aortic distensibility at six aortic positions and aortic pulse wave velocity (PWV) at two positions were measured. Native T1 mapping was applied to examine LV myocardial tissue properties. In a subgroup of patients (n=12) additional post-contrast T1 mapping was performed.

**Results:** CMR measurements of LV, RV and LA parameters did not significantly differ between the surgical and stent group. There was also no significant difference for aortic distensibility, PWV and native T1 relaxation times between both groups. Distensibility of aortic root correlated negatively with age, BMI, BSA and weight ( $r=-0.53$  to  $-0.56$ ;  $p<0.001$ ). Native T1 relaxation times correlated negatively with age, weight, BSA and BMI ( $r=-0.58$  to  $-0.66$ ;  $p<0.001$ ). The subgroup analysis showed that lower post-contrast T1 values were associated with lower aortic arch distensibility and higher aortic arch pulse wave velocity ( $r=0.66$  to  $0.71$ ;  $p<0.001$ ).

**Conclusions:** We could not demonstrate a difference in aortic elasticity between patients who underwent surgical CoA repair and patients who were treated with endovascular stent implantation. This suggests that probably other factors such as intrinsic aortic wall abnormalities have a greater contribution on aortic wall elasticity. Interestingly, our data suggests that native T1 values are influenced by age, weight, BSA and BMI.

