

**Evaluation of the aortic morphology and function in adolescents after coarctation (CoA) repair using MRI: New details of a systemic vessels disease**

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**INTRODUCTION:** Patients after CoA repair frequently have premature morbidity and mortality due to hypertension. Restenosis accounts for only a minority of these cases. Hypertension may be also associated with intrinsic abnormalities of the aortic wall. Therefore, the aim was to evaluate aortic morphology and elastic wall properties in adolescents after CoA repair and to correlate these results with severity of restenosis and arterial hypertension, non-invasive pressure gradients, time and kind of surgical procedure, and aortic arch geometry.

**METHODS:** Prospectively, 89 patients (age  $17 \pm 6,3$  y: end-to-end anastomosis (45), patch plastic (15), subclavian flap (9), others (20)) and 20 controls ( $18 \pm 4,92$  y) were examined using a 1.5 T whole-body MR scanner. 40% of the patients were surgically treated in 1st year of life. In addition to 3D-MR angiographies and phase-contrast flow measurements, 2D-CINE MRI were performed to assess the relative change in the aortic cross-sectional areas at the level of diaphragm to calculate aortic compliance (C).

**RESULTS:** Two thirds of all patients showed systemic hypertension ( $> 90$ th perc. of age correlated value;  $54\% > 95$ th p.), but more than half of them had not a significant stenosis (defined as  $\geq 30\%$ ). C was lower in CoA than in control group ( $3.30 \pm 2.43$  vs.  $4.67 \pm 2.21$  [ $10^{-5} \text{Pa}^{-1} \text{m}^{-2}$ ];  $p=0.024$ ). Significant differences were found also between hyper- and normotensive patients ( $2.61 \pm 1.60$  vs.  $4.11 \pm 2.95$ ;  $p=0,01$ ), gothic and roman arch geometry ( $2.64 \pm 1.58$  vs.  $3.78 \pm 2.81$ ;  $p=0,027$ ). There was a good correlation between C and hypertension ( $r=0.671$ ;  $p<0.01$ ). On the other side no correlation could be shown between C (and hypertension) and time or kind of repair, restenosis or pressure gradients.

**CONCLUSION:** The decreased aortic compliance at level of diaphragm, the high rate of persistence of hypertension without restenosis and the clear independency of time and kind of surgical repair confirm the hypothesis that CoA may not be limited to the small area of isthmus but may be a widespread (systemic) vascular anomaly with impaired elastic wall properties. This may potentially contribute to the decision for surgical or interventional approach in patients with restenosis and hypertension.