

Decreased cardiovascular function late after coarctation repair

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Introduction: Survival after repair of a coarctation of the aorta (CoA) is good but in adulthood late residua including hypertension, restenosis and heart failure are not uncommon. This study aims to evaluate cardiac function, heart rate variability, exercise capacity and physical activity in children late after CoA repair.

Methods: 32 patients (19 boys) after CoA repair and a healthy age-matched control group underwent detailed echocardiography, maximal exercise testing and 24h holter monitoring. Physical activity including physical education at school, regular biking/walking behavior and sports participation was mapped using a questionnaire.

Results: Age of the patients and controls ranged from 8-18y (mean 13.3 ± 2.9). Patients were operated at a mean age of 1 year (range 16 days – 5.8 years) and time after intervention was on average 12.3y. Left ventricular longitudinal strain and ejection fraction measured by 3D echocardiography were lower in patients compared to controls (11.4 ± 2.7 vs $14.6 \pm 3.3\%$ $p=0.002$ and 45.9 ± 6.8 vs $52.0 \pm 8.2\%$; $p=0.006$). Analysis of heart rate variability did not show any differences except for 24h standard deviation of inter-beat-intervals (corrected for prevailing heart rate); which was lower in patients (169.6 ± 40.4) vs controls (193.1 ± 39.1 $p=0.004$). Maximal oxygen uptake was lower in patients compared to controls ($VO_{2peak}=40.8 \pm 9.6$ vs 44.6 ± 7.2 mL/kg/min $p=0.031$) as was the anaerobic threshold (56.8 ± 10.2 vs $61.1 \pm 10.2\%$ of VO_{2peak} $p=0.040$). Maximal heart rate was not different ($p=0.779$). Diastolic blood pressure was higher at maximal exercise in patients (68.4 ± 14.7 mmHg) compared to controls (58.8 ± 15.9 mmHg, $p=0.005$). Patients were on average physically more active compared to controls but this was not statistically significant (21.6 ± 19.8 vs 13.1 ± 14.0 METs/week $p=0.058$). No relationships were found between cardiac function, heart rate variability and exercise capacity.

Conclusions: This study shows that 12 years after correction of a CoA, cardiac function and exercise capacity are already decreased in childhood. However, autonomic function as measured by heart rate variability was not different. Decreased exercise capacity could not be explained by a lower weekly physical activity in patients.