Arterial Stiffness and Motor Competence in Children and Adolescents with Univentricular Heart After Total Cavopulmonary Connection

Hock J. (1), Weberruss H. (2), Reiner B. (1), Oberhoffer R. (1,2), Ewert P. (1), Müller J. (1,2)
German Heart Centre, Technical University Munich, Munich, Germany (1)
Institute of Preventive Pediatrics, Technical University Munich, Munich, Germany (2)

Objective: Studies suggest that patients with congenital heart disease have increased arterial stiffness and impaired motor competence. The aim of this study is to investigate whether current patients after total cavo-pulmonary connection (TCPC) still have augmented arterial stiffness and deficits in motor competence.

Patients and Methods: From July 2014 to December 2015, 58 patients (15 girls, 11.8 ± 3.3 years) with TCPC underwent an arterial stiffness measurement and performed a motoric test with five tasks to assess muscle strength (push-ups and curl-ups), lower back strength, shoulder and hamstring flexibility. Arterial stiffness was measured using the oscillometric Mobil-o-Graph. Data was compared to a contemporary references pool of 1964 healthy subjects (956 girls, 12.7 ± 2.4 years) recently tested in different Bavarian schools. Patients’ data was compared to healthy controls using a multivariate regression model with correction for age, sex and BMI.

Results: Central systolic blood pressure, a surrogate for arterial stiffness, was 4.0 mmHg higher in TCPC patients compared to healthy peers (B=4.0, p<.002), whereas there was no difference in peripheral systolic blood pressure (p=.329). Motor competence of TCPC patients was impaired in all of the five performed motor tasks. Patients performed 2.4 push-ups (p=.041) and 10.0 curl-ups (p<.001) less. Moreover, they had impaired lower back strength (B=-9.0cm, p<.001), and shoulder (B=-7.9cm, p<.001) and hamstring flexibility (B=-53cm, p<.001).

Conclusions: In patients with TCPC central systolic blood pressure, a surrogate of arterial stiffness, is increased and motor competence in terms of strength and flexibility is impaired. Therefore measuring both during routine follow-up is recommended and treated if indicated.