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Imaging parameters predictive for exercise capacity in patients after the arterial switch operation

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Background: The arterial switch operation (ASO) for transposition of the great arteries has excellent survival, but a substantial number of patients suffers from a reduced exercise capacity. The goal of this study was to identify imaging parameters predictive for a reduced exercise capacity in patients after ASO.

Methods: A retrospective analysis was performed of ASO patients who underwent cardiopulmonary exercise testing (CPET) between 2007 and 2017. Reduced exercise performance was defined as a reduced workload peak (W_{peak}) with Z-score < -2 or a peak oxygen uptake indexed for weight (VO_{2peak}/kg) with Z-score < -2 . Data on echocardiography and cardiac magnetic resonance (CMR) performed within 1 year of the CPET were collected for comparison.

Results: A total of 81 ASO patients (age 17 ± 7 years) were included. Reduced exercise performance was found in 17 patients (21%) as expressed by a reduced W_{peak} and 15 patients (19%) with a reduced VO_{2peak}/kg . Left pulmonary artery stroke volume by CMR, and main pulmonary artery gradient and tricuspid regurgitation gradient by echocardiography were found to be predictive of reduced W_{peak} ($p=0.008$; $p=0.009$; $p=0.026$, respectively). The main pulmonary artery gradient and tricuspid regurgitation gradient by echocardiography were found to be predictive of reduced VO_{2peak}/kg ($p=0.031$; $p=0.035$, respectively).

Conclusion: This study demonstrates that ASO patients frequently experience reduced exercise capacity. Imaging parameters of main pulmonary artery and pulmonary artery branch stenosis and associated increased right ventricle pressure were predictive for reduced exercise capacity, and are therefore key during serial follow-up of ASO patients.