Decreased clinical performance in TGA-ASO patients after RVOT re-interventions; multicenter European collaboration

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On behalf of EPOCH consortium

Funding Acknowledgements: None.

Background: In patients with transposition of the great arteries and an arterial switch operation (TGA-ASO) right ventricular outflow tract (RVOT) obstruction is a common complication requiring one or more RVOT reinterventions. However, data on the impact of reinterventions on clinical performance is scarce. Therefore, we aimed to assess in TGA-ASO patients the cardiopulmonary exercise capacity (CPET) and right ventricular function stratified for the number of RVOT reinterventions.

Method: This multicenter observational study was performed in adult (≥16 years) TGA-ASO patients from the EPOCH (European Collaboration for Prospective Outcome Research in Congenital Heart disease). All patients underwent a comprehensive clinical workup including CPET and echocardiography, including right ventriculo-arterial (VA) coupling (defined as tricuspid annular plane systolic excursion (TAPSE) / right ventricular systolic pressure (RVSP) ratio). Patients were stratified for the number of reinterventions at the RVOT, including re-interventions at the pulmonary valve, main pulmonary artery and pulmonary branches. Association between RVOT re-intervention(s) and functional parameters, including predicted (%) peak oxygen uptake (peak VO2), TAPSE, right ventricle (RV) S’ and VA coupling of the RV were analyzed with linear regression.

Results: A total of 449 TGA patients were included in this study, with a mean age of 25.4 ± 5.6 years and median time until ASO was 8 days [IQR 6-15]. Eleven (2.5%) patients with previous re-interventions at the left ventricular outflow tract (LVOT) or aortic arch were excluded from the analysis. Twenty-six percent of the included patients had a ventricular septal defect (VSD) and 1.6% were diagnosed with double outlet right ventricle (DORV). In the total cohort, 13% of the patients had 1 previous RVOT re-intervention, 8% had 2 RVOT re-interventions and 5% had 3 RVOT re-interventions. Patients had echocardiographic examination and 56% underwent CPET. Predicted VO2peak was significantly reduced in patients with 1 RVOT re-intervention (72%), 2 RVOT re-interventions (69%) and 3 RVOT re-interventions (71%) compared to patients without any re-intervention (77%) (p=0.0268). Right VA coupling was a significant predictor (p=0.017) for reduced hemodynamic performance in patients with 1 RVOT re-intervention (0.50), 2 RVOT re-interventions (0.51) and 3 RVOT re-interventions (0.26).

Conclusion: In TGA-ASO patients, RVOT reinterventions were associated with a reduced clinical performance. VA coupling of the right ventricle was the most sensitive marker for hemodynamic performance in TGA-ASO patients.
Figure 1. Impaired clinical performance in TGA-ASO patient after recurrent RVOT re-interventions.