

Main pulmonary artery area limits exercise capacity in patients long-term after arterial switch operation for Transposition of the Great Arteries (TGA)

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Introduction: Right ventricular outflow tract obstruction (RVOTO) is the most frequent residual lesion in patients after arterial switch operation (ASO) for TGA. This study compares outflow tract area, distensibility and pulmonary blood flow (PBF) distribution of ASO patients to healthy controls and correlates these measurements to right ventricular (RV) function and exercise capacity. □

Methods: Participants underwent cardiac magnetic resonance imaging including angiography and flow measurements and cardio-pulmonary exercise testing. RV volumes and function, PBF distribution, smallest cross-sectional area of the main (MPA), left (LPA) and right pulmonary artery (RPA), LPA and RPA distensibility (relative area change) and percentage of predicted peak oxygen uptake ($VO_2\max/kg\%$) were measured. ASO patients were compared to healthy controls.

Results: Fifty patients were included (median follow-up 21.2 [12.1-32.8] yrs). Reintervention for RVOTO was performed in 9/50 (18%) of patients. ASO patients are compared to controls in table 1. MPA area was the only factor significantly correlated with RV stroke volume ($r^2=0.168$, $p<0.01$) and $VO_2\max/kg\%$ ($r^2=0.194$, $p<0.01$) in multivariate analysis.

Conclusions: In our cohort MPA, LPA and RPA areas were smaller compared to healthy controls. Only MPA area independently correlated to stroke volume and $VO_2\max/kg\%$, likely because distensibility and PBF distribution were comparable to controls. This should be considered when selecting patients for reintervention.

	ASO (n=48)	Healthy (n=21)
Age #	21.3 [12.2-35.3]**	26.4 [21.0-35.2]
Male (%)	32 (67%)	10 (48%)
RV function:		
RVEDV (ml/m ²)	101.5 (13.2)*	109.2 (18.0)
RVESV (ml/m ²)	50.3 (8.5)	55.2 (10.8)
RVEF (%)	50.4 (5.2)	49.7 (3.8)
RVmass (gr/m ²)	30.7 (5.4)**	22.2 (3.8)
RVOT areas:		
MPA (mm/m ²)#	184.6 [57.6-345.6]**	270.2 [197.2-537.5]
LPA (mm/m ²)#	58.9 [15.4-253.6]**	156.5 [117.5-261.6]
RPA (mm/m ²)	110.0 (53.2)**	151.2 (32.8)
LPA distensibility(%)	29.8 (8.9)	28.2 (6.8)
RPA distensibility(%)	32.2 (9.1)	33.5 (4.5)
Flow		
LPA : RPA(%)	46.2 : 53.8 (10.8)	44.9 : 55.1 (4.7)
Smallest branch flow	42.1 (8.2)	43.9 (3.2)

Table 1: ASO patients (without homografts) compared to healthy controls. Symbols: #Median [range] and Mann-Whitney U test, other mean (\pm SD) and Student T-test. *p-value compared to healthy controls <0.05 ; ** <0.001 .