

The interplay of systemic atrial and ventricular function in patients with transposition of the great arteries after arterial switch operation

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Background/Introduction: The role of systemic atrial (LA) function and its interplay with the systemic ventricle (LV) in patients with transposition of the great arteries (TGA) after arterial switch operation (ASO) is currently not well defined.

Purpose: Investigate the role of LA function and its interplay with the LV.

Methods: Between 2007 and 2018 patients with TGA corrected by ASO and control patients of comparable age, sex, height but without known cardiovascular disease were included in this prospective single centre analysis of 3 Tesla cardiac magnetic resonance cine imaging studies of atrial and ventricular function. Additionally, in TGA patients extracellular volume fraction (ECV) was assessed by T1 mapping and global longitudinal strain (GLS) by feature tracking.

Results: Overall, 81 TGA (16.3 [IQR 10.5-21.2] years, 32% female) and 30 control patients (11.9 [IQR 8.7-22.5] years, 63% female) were included in the current analysis. TGA patients had smaller LA maximum volume index, and reduced total atrial and conduit volume emptying. This resulted in a reduced LA reservoir and conduit function compared to controls. In TGA, a higher LA active/conduit and active/total ratio indicated impaired passive filling of the LV. (Table 1)

The median ECV was 28.3% (IQR 25.8-33.9) and the median GLS -24.2% (IQR -28.6- -20.4) in TGA patients. LA reservoir (Fig. 1A), conduit and contractile function showed a negative correlation with GLS ($r=-0.470$, $p < 0.001$, $r=-0.270$, $p = 0.022$ and $r=-0.257$, $p = 0.030$, respectively). Interestingly, the LA active/conduit ratio (Fig. 1B) and the active/total ratio showed a positive correlation with ECV ($r = 0.418$, $p = 0.002$ and $r = 0.339$, $p = 0.013$, respectively).

Conclusion: Impaired LA function is frequent among patients with TGA following ASO. The impairment of LA function is linked to both LV dysfunction and fibrosis.

Table 1

Variable	TGA (n = 81)	Control (n = 30)	p-value
LAVI max. [ml/m ²]	37.8 (29.9-42.9)	42.02 (38.3-51.6)	0.002
LAVI total emptying [ml/m ²]	16.8 (13.7-20.8)	24.3 (20.6-29.4)	<0.001
LAVI conduit emptying [ml/m ²]	10.3 (8.1-13.9)	17.5 (15.2-20.8)	<0.001
LAVI active [ml/m ²]	6.7 (4.1-8.6)	6.4 (5.0-7.9)	0.984
LA-EF-reservoir [%]	46.6 (42.0-50.5)	57.2 (51.2-60.1)	<0.001
LA-EF-conduit [%]	28.1 (23.4-34.3)	42.5 (35.4-45.8)	<0.001
LA-EF-active [%]	24.11 (17.9-29.1)	25.7 (21.5-29.7)	0.339
LA active/conduit ratio	0.60 (0.41-0.90)	0.37 (0.28-0.44)	<0.001
LA active/total ratio	0.38 (0.29-0.47)	0.27 (0.22-0.30)	<0.001

Differences in left atrial function between TGA and control patients

Abstract Figure. Fig. 1A and B

