After Tetralogy Repair Children Have Right Ventricular Dilation Disproportionate to Body Growth

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Background: After repair of tetralogy of Fallot (TOF), patients frequently exhibit significant pulmonary regurgitation (PR) that results in right ventricular (RV) dilation and ventricular septal dyskinesia predisposing to RV and left ventricular (LV) dysfunction. The rate of RV dilation and development of RV and LV dysfunction in the face of PR in growing children are unknown.
Hypothesis: After TOF repair, RV and LV growth remain proportionate to body growth, and RV and LV systolic performance parameters remain stable during childhood.
Methods: We retrospectively reviewed 35 consecutive repaired TOF patients who underwent ≥ 2 clinical cardiac magnetic resonance studies between 2005 and 2011. The first and last studies were compared. All patients were < 18 yrs and had moderate PR (Regurgitant Fraction > 20%) at both studies. Volumetric data was indexed for body surface area (BSA). Patients who underwent catheter or surgical intervention in the interim were excluded. Significance was $P < 0.05$.
Results: For the entire study population, the mean age and BSA were 9.8 ± 4.0 yrs (range 1.4 - 16.1 yrs) and 1.1 ± 0.3 m2 initially, with a mean follow up of 2.7 ± 1.1 yrs. The BSA increased to 1.3 ± 0.3 m2 at the follow-up study. Patients with at least moderate PR demonstrate increases in RV end-diastolic and end-systolic volumes (see Table). The RV ejection fraction mildly decreased (60.1 ± 7.0% vs 57.3 ± 6.0%, p=0.054). There was no significant difference in pulmonary regurgitant fraction, fractional net branch pulmonary blood flow, or LV performance parameters.
Conclusions: During childhood, patients with at least moderate PR exhibit RV dilation disproportionate to body growth. These data are important when considering TOF patients for surveillance studies and pulmonary valve replacement.

	Right Ventricle		Left Ventricle	
	I-EDV (cc/m^2)	I-ESV(cc/m^2)	I-EDV(cc/m^2)	I-ESV(cc/m^2)
First Visit	122.2 ± 29.8	49.7 ± 16.2	62.1 ± 11.8	18.9 ± 5.8
Final Visit	132.8 ± 31.9	57.8 ± 19.0	61.6 ± 14.1	19.3 ± 5.4
Average Δ per year	4.4 ± 9.5	3.2 ± 8.9	0.3 ± 5.4	0.3 ± 2.6
P-Value	0.002	0.007	0.845	0.723

*I-EDV = Indexed End-Diastolic Volume; I-ESV = Indexed End-Systolic Volume