Right ventricular remodeling after pulmonary valve replacement in children with repaired Tetralogy of Fallot and transannular patch

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Objectives:
Right ventricular dilation due to severe pulmonary valve regurgitation is the most frequent reason for re-operations in patients with repaired Tetralogy of Fallot and transannular patch. To preserve the right ventricular function, patients should undergo pulmonary valve replacement as soon as right ventricular end-diastolic volume exceeds 150ml/m². In this study, we assessed right ventricular remodeling after pulmonary valve replacement in children with repaired Tetralogy of Fallot using cardiac magnetic resonance imaging (MRI).

Methods:
30 children with repaired Tetralogy of Fallot and transannular patch underwent cardiac MRI before and after pulmonary valve replacement. Mean age was 128.13 ± 40.29 months, the mean interval of cardiac MRI before and after pulmonary valve replacement was 193.27 ± 135.54 days and 436.83 ± 230.33 days respectively. When MRI data showed a right ventricular end-diastolic volume of more than 150ml/m², pulmonary valve replacement was performed on average 122.76 ± 33.17 months after primary repair.

Results:
Significant reduction in end-diastolic and end-systolic right ventricular volume, as well as pulmonary regurgitation fraction could be shown by cardiac MRI. Right ventricular end-diastolic volume decreased from 167.48 ± 40.93ml/m² to 100.42 ± 26.83ml/m² (p<0.05) right ventricular end-systolic volume from 92.47 ± 25.03ml/m² to 56.83 ± 20.85ml/m² (p<0.05) and pulmonary regurgitation fraction from 43.60 ± 14.28% to 3.35 ± 7.77% (p<0.05). Right ventricular ejection fraction (42.61 ± 7.89% to 44.16 ± 8.37%) and left ventricular volumes did not change significantly.

Conclusion:
In children with corrected TOF, transannular patch and RV dilatation of more than 150 ml/m² pulmonary valve replacement led to a rapid, significant RV remodeling as assessed by MRI.