

Serial follow-up of biventricular function, contractile reserve, exercise capacity, and NT-proBNP measurements in repaired tetralogy of Fallot

*Luijnenburg S.E.(1-3), van den Berg J.(1), Moelker A.(1), Roos-Hesselink J.W.(1), Bogers A.J.J.C.(1), de Rijke Y.B.(1), Mulder B.J.M.(3), Vliegen H.W.(2), Helbing W.A.(1)
Erasmus University Medical Center, Rotterdam, the Netherlands (1), Leiden University Medical Center, Leiden, the Netherlands (2), Academic Medical Center, Amsterdam, the Netherlands (3)*

Introduction: Predicting the course of right ventricular (RV) remodelling after repair of tetralogy of Fallot (TOF) is difficult and serial follow-up studies are limited. Our aim was 1) to study the course of biventricular size, function, and contractile reserve in patients with repaired TOF, in relation to exercise capacity and NT-proBNP levels and 2) to establish guidelines for cardiovascular magnetic resonance (CMR) imaging intervals.

Methods: We performed serial follow-up in 36 TOF patients (15.1 ± 4.9 years at baseline; interval $5.1 (4.1 - 7.4)$ years) using CMR imaging at rest and during dobutamine stress, exercise testing, and NT-proBNP measurements. Subgroup analysis was performed, based on RV end-diastolic volume (RVEDV) at follow-up: subgroup I: $< 150 \text{ ml/m}^2$, subgroup II: $\geq 150 \text{ ml/m}^2$. Nine patients underwent pulmonary valve replacement (PVR) during follow-up and were analyzed as third subgroup.

Results: In subgroup II, RV volumes and pulmonary regurgitation (PR) increased significantly during follow-up; this did not occur in subgroup I. Peak oxygen uptake ($\text{VO}_2 \text{ max.}$) tended to decrease in subgroup II; other exercise parameters did not. Biventricular function, contractile reserve, and NT-proBNP levels remained stable in both subgroups and were not different between all 3 subgroups at follow-up. RV ejection fraction and left ventricular contractile reserve improved after PVR. A lower RV contractile reserve at baseline correlated with a larger RVEDV at follow-up and with an interstudy decrease in $\text{VO}_2 \text{ max.}$

Conclusions: In patients with an $\text{RVEDV} < 150 \text{ ml/m}^2$, no changes in ventricular function and clinical state occur during 5 year follow-up. We believe a conservative approach towards CMR imaging intervals and PVR is justified in these patients. Patients with an $\text{RVEDV} \geq 150 \text{ ml/m}^2$ should be monitored closely, since RV volumes and PR increase over time. $\text{VO}_2 \text{ max.}$ tended to decrease in these patients, but biventricular function, contractile reserve, and NT-proBNP remained stable, and did not differ from results in the other subgroups. In the absence of clinical deterioration, a 2 – 3 year interval between CMR imaging studies seems justified in patients with an $\text{RVEDV} \geq 150 \text{ ml/m}^2$. CMR stress imaging might be of additional value in the follow-up after TOF repair.