

## Right ventricular systolic function after Tetralogy of Fallot repair revisited: Does the outflow tract matter?

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**Objectives:** Quantification of right ventricular (RV) systolic function following Tetralogy of Fallot (TOF) repair remains challenging due to the complexity of the RV geometry. Cardiac magnetic resonance imaging (CMRI) is the gold standard for assessing RV volumes. Nevertheless, controversy persists over whether to include the non-contractile RV outflow tract (RVOT) in the calculation of RV ejection fraction (EF, see Figure). We aimed at evaluating various MRI and echocardiography derived descriptors of RV systolic function. In particular, we sought to assess the effect of excluding the aneurysmal RVOT after TOF repair on RVEF and to determine which of the examined methods serves as a better predictor of clinical status.

**Methods:** We reviewed the CMRIs, echocardiograms, and medical records of 50 consecutive patients with repaired TOF who were referred for CMRI. Cardiopulmonary exercise test results were used as surrogate parameters for clinical status. In addition to the routine CMRI data RV volumetry was repeated excluding the non-contractile RVOT in systole and diastole (Figure). The displacements of the RV inferior and lateral annulus were measured on CMRI.

**Results:** After excluding the akinetic RVOT, RVEF was higher ( $p < 0.0001$ ) and correlated slightly better with maximum oxygen consumption ( $VO_{2maxpred}$ ). ( $r = 0.36/p = 0.03$  vs.  $r = 0.33/p = 0.04$ ). RV inferior and lateral annular displacements correlated with  $VO_{2maxpred}$  ( $r = 0.49/p = 0.003$ , vs.  $r = 0.47/p = 0.049$ , respectively). Left ventricular EF, as measured by CMRI, RV end-diastolic volume and QRS duration were not predictive of exercise tolerance. Echocardiographically, RV wall longitudinal strain showed the best correlation with  $VO_{2maxpred}$ . The correlations of overall RV strain, average septal and lateral wall strains with exercise tolerance were  $r = 0.56/p = 0.0006$ ,  $r = 0.49/p = 0.003$  and  $r = 0.56/p = 0.0007$ , respectively.

**Conclusions:** Exclusion of the aneurysmal part of the RVOT in patients with TOF increased RVEF significantly, with a better correlation with exercise tolerance. However, a simple and quick MRI measurement – the displacement of the RV annulus in systole – showed a better correlation with  $VO_{2maxpred}$  than EF. RV wall longitudinal strain is the best echocardiographic predictor measures to predict exercise performance after TOF repair and LVEF does not determine exercise tolerance.

