Longitudinal systolic left ventricular-right ventricular interaction in pediatric and young adult patients with TOF: a magnetic resonance imaging and M-mode echocardiography study

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Introduction: In operated Tetralogy of Fallot (TOF) patients there is clear evidence that a possible impact of right ventricular (RV) dysfunction on left ventricular (LV) function must be considered. Aim of this study was to evaluate the longitudinal systolic left ventricular (LV) - RV interaction in operated patients with Tetralogy of Fallot (TOF).

Methods: Biventricular measures of indexed ventricular end-diastolic volume (EDVi), ejection fraction (EF), LV longitudinal function parameters determined by magnetic resonance imaging (MRI) were investigated and compared to established normal z-score values.

Results: In our patients we found a good correlation between mitral annular plane systolic excursion (MAPSE) and LVEF values ($r = 0.788; p < 0.001$). While LVEF was normal in patients with mildly reduced right ventricular RVEF, the LVEF was decreased in patients with significantly reduced RVEF after 22 postoperative years. Patients with RVEDVi ≤ 150 ml/m² had a mean MAPSE of 1.43 ± 0.20 cm, and patients with RVEDVi > 150 ml/m² a mean MAPSE of 1.30 ± 0.26 cm, the latter significantly reduced when compared to normal MAPSE z-score values. LV longitudinal function is decreased below the -2 SD of normal MAPSE z-score values 22 years after surgical repair in our TOF population.

Conclusions: Our data show that simple M-mode measurement of the systolic LV function (i.e. MAPSE) is a sufficient surrogate for the LVEF. Therefore, when the endocardium is suboptimal for tracing, MAPSE data can be used for LV longitudinal systolic function investigations and reduce the need for expensive investigations such as cardiac MRI.