Impact of loading conditions on ventricular function in Ebstein anomaly (EA) of tricuspid valve

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Introduction. In EA, both atrialised and functional components of the right ventricle are exposed to high preload and low afterload. The latest surgical repair (Cone operation) enables to eliminate tricuspid regurgitation (TR) and reposition tricuspid valve to its anatomic annulus. The aim of the study was to investigate the adaptation of right (RV) and left ventricles (LV) to change in loading conditions after Cone repair.

Methods. A retrospective longitudinal study was conducted from 2009 to 2014. All symptomatic patients with moderate to severe TR were included. Transthoracic advanced echocardiography was performed pre-operatively, at short-term (less than 30 days after Cone repair) and mid-term (2 months to 4 years). Conventional parameters, the systolic peak of longitudinal 2D strain and the time to systolic peak (onset of QRS to systolic peak of longitudinal strain) were measured for LV and RV. Paired t-test analyses were performed using Wilcoxon Matched-pairs signed rank test.

Results. From the 38 patients operated for EA, the echocardiographic data of 17 patients could be analysed. GOSH score was significantly reduced after Cone repair (1.07±0.24 vs. 0.30±0.07, p=0.020) as well as TR (3.53±0.24 vs. 1.18±0.37, p=0.003). However, the TAPSE (26.42±5.79 vs. 5.78±2.00, p=0.005), LV and RV systolic peaks were significantly reduced post-operatively (-19.80±1.05 vs. -15.85±1.13, p<0.001 for LV, -18.50±1.80 vs. -13.53±1.52, p<0.001 for RV), but with no significant reduction between pre-operative and mid-term post-operative period (-19.80±1.05 vs. -21.86±1.90, p=0.677 for LV, -18.50±1.80 vs. -18.74±1.80 vs. 3.66, p=0.285 for RV). LV time to peak was significantly reduced in short-term post-operative period (441±9 vs. 415±11, p<0.001) while RV free wall time to peak was significantly prolonged in mid-term post-operative period (445±8 vs. 469±13, p=0.001).

Conclusions. The rapid change from high preload/low afterload to low preload/relatively high afterload following Cone operation reduces myocardial contractility of both ventricles but with the trend to later recovery; LV myocardial mechanics appears better than preoperatively while continuing impairment of RV function may reflect intrinsic myocardial dysfunction likely due to myocardial deficiency.