Abstract: 2400
Early and late effects of cardiac resynchronization therapy in adult congenital heart disease

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Background: There are limited data regarding cardiac resynchronization therapy (CRT) in adult congenital heart disease (ACHD).

Purpose: We aimed to assess early and late outcomes of CRT amongst patients with ACHD.

Methods: We retrospectively studied ACHD patients receiving CRT (2004–2017). Clinical and echocardiographic data were analyzed at baseline, early (1.8±0.8 years) and late (4.7±0.8 years) follow-up after CRT.

Results: Fifty-four ACHD patients (median age 46 years, range 18–73 years, 74% male) had CRT (biventricular paced >90%) and were followed for 5.7±3.0 years. Thirty-nine (72%) patients had a systemic left ventricle (LV). Underlying cardiac anatomy included left ventricular outflow tract lesions (n=17; 32%), tetralogy of Fallot (n=11; 20%), right ventricular outflow tract lesions (n=5; 9%), atrioventricular septal defects (n=5; 9%) and atrial septal defect with right aortic arch (n=1; 2%). Fifteen (28%) patients had a systemic right ventricle (RV): 13 (24%) with congenitally corrected transposition of great arteries, and 2 (4%) with transposition of the great arteries after Mustard repair.

Compared to baseline, CRT was associated with significant improvement at early follow-up in NYHA functional class, QRS duration, cardiothoracic ratio, left and right atrial volume index (P<0.05 for all) in the overall population; improvement in NYHA class was sustained at late follow-up. Amongst patients with a systemic LV, there was significant increase in LV ejection fraction and reduction in LV end-systolic volume at early and late follow-up (P<0.05 for both). There is trend in improvement of RV fractional area change in the patients with a systemic RV but not met statistical significance (P=0.070). Findings were summarized in Figure 1.

Eleven patients died and 2 had heart transplantation unrelated to systemic ventricular morphology. Thirty-five (65%) patients responded positively to CRT but only baseline QRS duration was a predictor of the positive response.

Conclusion: CRT results in sustained improvement in functional class, systemic LV size and function. QRS duration but not QRS morphology was a predictor of the positive response seen at early follow-up in 2/3 of ACHD patients.
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Figure 1. Illustration of changes pre and post CRT in ACHD patients.

Example reduction of cardiothoracic ratio 0.79 pre-implantation (A1) which reduced to 0.55 at 1.2 years from CRT (A2). There was a significant early but not late reduction in CTR (B) and QRS duration (C) in the overall population. An improvement in NYHA functional class (D) was observed at early and late follow-up in the overall population. There was significant increase in LVEF (E) at early and late follow-up (P<0.05 for both) amongst patients with a systemic LV whereas improvement of RVFAC (F) approached but did not meet statistical significance (P>0.070) amongst patients with a systemic RV. ACHD: adult congenital heart disease; CRT: cardiac resynchronization therapy; CTR: cardiothoracic ratio; LV: left ventricle; LVEF: left ventricular ejection fraction; NYHA: New York Heart Association; RV: right ventricle; RVFAC: right ventricular fractional area change.