Effect of cardiac resynchronization therapy on right ventricle in adult with congenital heart disease

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Topic(s):
Cardiac Resynchronization Therapy

Citation:

Background:
There are published data about the effect of cardiac resynchronization therapy (CRT) on left ventricular function in adult with congenital heart diseases (ACHD), but it’s effect on right ventricular (RV) function and remodeling remains insufficiently elucidated.

Purpose:
To assess whether CRT is influenced by or affects RV function in ACHD.

Methods:
We retrospectively studied all ACHD patients with impaired systemic left ventricle who received CRT in our ACHD centre (2006-2017). Clinical and echocardiographic data were analysed at pre-CRT, early (1.5±0.5 years) and late (4.9±0.6 years) follow-up after CRT.

Results:
Forty patients with CRT (median age 48 years, range 22–73 years, 75% male) were followed for 5.6±2.7 years. The underlying anatomy was left-side obstructive lesions (n=17; 42%), right-sided lesions (n=10; 25%), shunt lesions (n=9, 23%) and double outlet right ventricle with ventricular septal defect (n=4, 10%). All patients had previous surgical repair, 21 (53%) were upgraded from RV pacing.

Right ventricular dysfunction (right ventricular fractional area change, RVFAC <35%) before CRT was observed in 26 (65%) patients. At early follow-up, patients with and without RV dysfunction exhibited a similar improvement in NYHA functional class, QRS duration, left ventricular function. The RVFAC was improved =5 unit in 62% of patients with RV dysfunction and in 29% of those without RV dysfunction (p=0.047). Magnitude of RVFAC in patients with RV dysfunction was higher than those without RV dysfunction (6.9±6.0% vs. 2.0±6.3%, p=0.020).

CRT was associated with significant improvement in RV diameters, RVFAC, tricuspid annular plane systolic excursion and tissue Doppler-derived tricuspid lateral annular systolic velocity (S’) at early follow-up, but only improvement in S’ was sustained at late follow-up (p <0.05).

Eight patients died and 2 had heart transplantation. On univariate Cox regression analysis, RVFAC was independently associated with transplantation and death from all causes. At early follow-up, normalization of RV function was observed in 11 patients (28%) with RV dysfunction at baseline, which invoked favorable clinical outcome. (p=0.034).

Conclusion:
Cardiac resynchronization therapy results in RV reverse remodeling, improves RV function and clinic outcomes in ACHD patients with impaired systemic LV. RVFAC was a determinant factor for survival. Improvement in RV function at early follow-up was associated with better outcome.
Abstract:
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Conclusion:
Cardiac resynchronization therapy results in RV reverse remodeling, improves RV function and clinic outcomes in ACHD patients with impaired systemic LV. RVFAC was a determinant factor for survival. Improvement in RV function at early follow-up was associated with better outcome.

Figure 1 A: There was a significant early but not late improvement in RVFAC. B: Kaplan-Meier plots of patients stratified by RVFAC, demonstrating that RVFAC ≥35% at early follow-up was associated with better clinical outcome with respect to freedom from death or heart transplantation. RVFAC = right ventricular fractional area change.