Differential effects on systolic and diastolic function after temporary suspension of long-term cardiac resynchronization therapy

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Background: Cardiac resynchronization therapy (CRT) is a promising nonpharmacological treatment modality for symptomatic patients with chronic left ventricular systolic dysfunction and intraventricular conduction delay. Clinical studies have shown short-term improvement in contractile function and mid-term improvement in clinical status with CRT. The aim of this study was to evaluate the hemodynamic consequences of temporary interruption of CRT after long-term stimulation.

Methods: Twenty patients (16 men, 4 women) in NYHA class III or IV heart failure despite optimal medical therapy and a GRS interval of 15±2 ms received a transvenous biventricular pacing device at the age of 64±7 years. Patients were studied 44±12 days after continuous CRT and again after 72 hours after withdrawal of biventricular pacing (CRT) keeping all medications constant. The maximal rate of left ventricular systolic pressure rise (dP/dt) was estimated by measuring the time interval between 1 and 3 ms on the mitral regurgitation continuous-wave Doppler spectrum. Parameters of left ventricular diastolic function were obtained with pulsed-wave Doppler echocardiography.

Results: Withdrawal of CRT was associated with a significant decrease in systolic blood pressure (106±25 vs. 152±7 mm Hg, P<0.01). Doppler-derived echocardiographic indices of systolic and diastolic function are listed in the table.

Doppler-derived indices

<table>
<thead>
<tr>
<th>CRT</th>
<th>OFF</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td>dP/dt (mm Hg/s)</td>
<td>747±261</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Diastolic filling time (ms)</td>
<td>428±67</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Mitral E/A ratio</td>
<td>0.94±0.92</td>
<td>NS</td>
</tr>
<tr>
<td>Deceleration time (ms)</td>
<td>193±46</td>
<td>NS</td>
</tr>
<tr>
<td>Isovolumic relaxation time (ms)</td>
<td>106±45</td>
<td>NS</td>
</tr>
<tr>
<td>Pulmonary vein systolic velocity ratio</td>
<td>1.42±0.93</td>
<td>NS</td>
</tr>
</tbody>
</table>

No, not significant

Summary and conclusion: While temporary cessation of long-term CRT resulted in a significant decline in left ventricular systolic pressure, parameters of diastolic function did not change with the exception of diastolic filling time. These results suggest a high risk of CRT after long-term stimulation. Therefore, every effort should be made to maintain CRT indefinitely.

Comparison of reverse remodeling in patients with ischemic cardiomyopathy versus idiopathic dilated cardiomyopathy after cardiac resynchronization therapy

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Background: Cardiac resynchronization therapy was shown to improve left ventricular size and function in patients with advanced heart failure and ventricular conduction abnormalities. Aim of this study was to assess whether the etiology of heart failure would have an influence on serial measurements of left ventricular function recovery.

Methods: Doppler echocardiograms were obtained at baseline before implantation, mid-term (9±4 months) and long-term (30±6 months) after resynchronization therapy in 77 patients (72 men, 5±10 years), with 28 (36%) having ischemic heart disease (IHD) and 49 (64%) dilated cardiomyopathy (DCM). Left ventricular and diastolic and end-systolic volumes (LVEDV and LVEF, respectively), and ejection fraction (EF) were evaluated. Patients were considered responders (R) if EF increased ≥25% versus baseline in either mid- or long-term echo, and nonresponders (NR) in all other cases.

Results: Baseline left ventricular measurements and NYHA class were similar in IHD and DCM. LV EDV significantly decreased over time in both in IHD (45±8±35 vs. 204±8±56 ml and 196±5±36 ml long-term) and in IDC patients (290±5±77 baseline, 232±3±93 mid, and 203±6±91 ml long-term; P<0.001 for time and p<0.05 for time*group interaction and group) and also in LVEF (47±8±26 baseline, 53±1±12 mid, and 53±1±12 ml long-term in IHD patients; 47±1±97 baseline, 57±1±16 mid, and 57±1±12 ml long-term in IDC patients; P<0.001 for time and p<0.05 for time*group interaction and group). EF significantly increased over time both in IHD (47±7±46 baseline, 62±4±46 mid, and 65±5±54 ml long-term, P<0.01) and in IDC patients (60±2±29 baseline, 62±3±40 mid, and 66±5±52 ml long-term, P<0.001 for time and p<0.01 for time*group interaction and group). Fourteen (50%) of IHD patients and 25 (51%) of IDC patients were R (P=0.87).

Conclusion: The reverse remodeling after cardiac resynchronization therapy was comparable in IHD and IDC patients, suggesting that the underlying etiology of heart failure was not related to the response to biventricular pacing.

Nominal programming of biventricular pacemakers assessed by tissue Doppler echocardiography

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Cardiac resynchronization therapy (CRT) can improve cardiac performance and functional class in patients with advanced heart failure and left bundle branch block (LBBB).

Aim: To evaluate the efficacy of nominal programming of biventricular pacemakers with tissue Doppler echocardiography.

Methods: We evaluated 11 consecutive patients, mean age 62±7±6.4 years (4 women) who had a biventricular pacemaker (all with an associated ICD) implanted for refractory heart failure, severe left ventricular dysfunction an LBBB. Mean QRS duration was 153±25 ms. Seven patients had ischemic cardiomyopathy and 4 patients had dilated cardiomyopathy. Echo evaluation was performed after each cycle and was considered as nominal programming of biventricular pacing. The cycle was defined as a 20 ms intervals. Patients were considered responders if EF increased ≥25% versus baseline in either mid- or long-term echo, and nonresponders (NR) if it did not.

Conclusion: The reverse remodeling after cardiac resynchronization therapy was comparable in IHD and IDC patients, suggesting that the underlying etiology of heart failure was not related to the response to biventricular pacing.

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472 Can we use echocardiography to assess dyssynchrony in heart failure patients with atrial fibrillation?

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Background: Recent studies have suggested that patients with severe heart failure (CHF) and atrial fibrillation (AF) may benefit from cardiac resynchronisation therapy (CRT). Echocardiographic criteria of dyssynchrony have not yet been validated in CHF patients with AF.

Aim of the study: We prospectively investigated the feasibility of analysing the echo criteria of dyssynchrony, that are actually used in sinus rhythm patients with CRT, in CHF patients with AF. We also analysed these criteria in function of the QRS duration.

Methods: All 46 patients (mean age 69±13 years) included were in NYHA class III. The mean ejection fraction was 28±5%. All the patients were under standard therapy for CHF. 22 patients with a QRS interval > or = 120 ms were assigned to group I and the remaining 24 with a QRS interval < 120 ms in group II. We have measured averaged (over 10 cycles) indexes of interventricular and intraventricular delay using previously described methods. The values obtained were compared to the QRS duration.

Results: 1) Aortic pre-ejection interval (APEI) was 133±33ms in group I compared to 105±34ms (p<0.05). The aortic-pulmonary delay was not measurable due to the variations in cycle length between the 2 acquisitions. 2) The M-mode intraventricular delay (septum-posterior) was not measurable in 51% of the patients. In the remaining patients it was 153±36ms and 115±31ms in group I and II respectively (p<0.01). 3) Intraventricular delay assessed by tissue Doppler imaging (TDI) was 63±32ms in group I vs 69±31ms in group II (NS). 4) The TDI intraventricular delay (septum-lateral peak velocity delay) was respectively 100±33ms and 84±33ms in group I and II (NS). 5) Indices of dispersion (TDI time to peak contraction of 6 walls, basal and mid segments) were not feasible due to cycles length variations during the 3 acquisitions required.

Conclusions: 1) In AF patients with CHF, some echo criteria for dyssynchrony were not feasible, in part due to the variation of cycle length, especially during the different image acquisitions. 2) QRS duration was not discriminating for the identification of patients with mechanical dyssynchrony detected by using TDI measuremnts of inter and intraventricular delay. Therefore, TDI velocity analysis of inter and intraventricular delay was probably the method of choice to assess the mechanical asynchrony, even in CHF patients in AF and with narrow QRS.

729 Left ventricular intraventricular and not interventricular asynchrony predicts clinical response to cardiac resynchronisation therapy

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Background: Up to 30% of patients with left ventricular (LV) dysfunction and LBBB do not respond to cardiac resynchronisation therapy (CRT). Our aim was to analyse the usefulness of echocardiography to identify pts who will respond to CRT.

Methods: 72 pts with heart failure, LV ejection fraction (EF)<35% and LBBB undergoing CRT were evaluated before implantation with echo-Doppler. Indices of intrinsic (VI) and LV intraventricular (IntrinsicLV) synchrony were assessed by means of diastolic filling time (DFT), intraventricular delay and LV septal posterior wall delay (M-mode scans) and LV septal to left-