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Improvement in exercise tolerance after cardiac resynchronization therapy related to efficiency in timing

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Background: The increase in exercise capacity after cardiac resynchronization therapy (CRT) may be related to a more efficient cardiac cycle due to decreasing

iso- and end-systolic times (IVT) and increased filling times (FT). IVT is a known determinant of exercise tolerance in heart failure.

Methods: In 51 patients, six minute walking test (6-MWT) and echo-Doppler were performed before and 3 month after implantation. FT and ejection time were obtained by echo-Doppler of mitral inflow and aortic outflow. Ejection time and FT were subtracted from total RR interval to obtain the IVT. During CRT, AV- and LV-intervals were optimized using invasive LV dp/dt measurements.

Results: A device was implanted in 51 patients (36 male, 70±8 years) with QRS duration 176±59 ms, ischemic etiology in 25 and idiopathic in 26 patients. Clinical response defined as an improvement in 6-MWT by more than 10%, was observed in 57% of patients. The mean LV ejection fraction increased 7%, 6-MWT was related to both IVT and FT at baseline. Moreover, the change in 6-MWT after 3 months was also related to the changes in IVT and FT during follow-up. No correlation between LVEF and exercise tolerance was observed (see table)

Table

<table>
<thead>
<tr>
<th>Time interval vs. Exercise Capacity</th>
<th>Comparison</th>
<th>Correlation</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVT pre vs. 6 WT pre</td>
<td>r=0.36</td>
<td>0.0085</td>
<td></td>
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<tr>
<td>LV pre vs. 6 WT pre</td>
<td>r=0.53</td>
<td>0.81</td>
<td></td>
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<tr>
<td>FT pre vs. 6 WT pre</td>
<td>r=0.43</td>
<td>0.0015</td>
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<tr>
<td>IVT change vs. 6WT increase</td>
<td>r=0.65</td>
<td>0.0001</td>
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<tr>
<td>LV EF change vs. 6WT increase</td>
<td>r=0.44</td>
<td>0.0012</td>
<td></td>
</tr>
<tr>
<td>LV EF change vs. 6WT increase</td>
<td>r=0.34</td>
<td>0.0016</td>
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</tr>
</tbody>
</table>

Conclusion: The improvement in exercise tolerance with biventricular pacing is related to efficiency in timing. These results re-emphasize the importance of time interval analysis of the cardiac cycle in CRT.

642 Cardiac incoordination and left ventricular function in patients with cardiomyopathy and left bundle branch block

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Background: Left bundle branch block (LBBB) worsens the LV performance in patients with idiopathic (DCMP) or ischemic cardiomyopathy (ICMP). We investigated the grade of cardiac incoordination (CI) in patients with LBBB and DCMP/ICMP by means of Tissue Velocity Echocardiography (TVE).

Methods: 83 subjects were studied: 20 Controls (C), 21 subjects with isolated LBBB, 23 with LBBB+DCMP and 19 with LBBB+ICMP. Longitudinal myocardial velocities were obtained from the averaged LV six basal segments and CI was calculated from the velocity profiles as follows: electro-mechanical delay (EMD), hemo-dynamic delay (HD), isovolumic contraction time (IVCT) and isovolumic relaxation time (IVRT). The peak systolic velocity (PSV) at the basal segments and the LV ejection fraction (EF) were also calculated. Data was compared using one-way ANOVA and P < 0.05 was considered statistically significant.

Results: The QRS was longer in LBBB than in C (P < 0.001), did not differ among LBBB, DCMP and ICMP (P = ns). Measures of CI are shown in figure. The HD, IVCT, and IVRT were significantly longer in DCMP than in LBBB and ICMP (P < 0.01) but similar between LBBB and ICMP (P = ns). The PSV was significantly lower in DCMP than in ICMP (P < 0.01) and higher in LBBB than in DCMP and ICMP (P < 0.001).

Figure

Conclusion: CI was worse in DCMP than in ICMP and was associated with further impairment of LV function. TVE is a valuable method to quantify CI, to assess LV function and to characterize patients with LBBB and DCMP or ICMP.

643 Dynamic changes of dyssynchrony induced by dobutamine are related with both resynchronization and left ventricular functional changes postbiventricular pacing

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Introduction: Evaluation of left ventricular (LV) dyssynchrony (DYS) is based upon consideration only of resting time delays. Changes of time delays and respective DYS post low dose dobutamine stress (DOS) provocation have not been studied.

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