HEART FAILURE – RESYNCHRONISATION

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Asynchrony parameters in patients with different activation ventricular patterns and preserved ejection fraction
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Objective: In common practice, mechanical asynchrony is only measured in patients with depressed ejection fraction. The aim of this study was to evaluate whether patients with normal systolic function and different electrocardiographic patterns fulfill asynchrony criteria.

Method: A total of 86 patients were studied from September 2005 to April 2006. All of them had an ejection fraction >50% (31 with normal ECG, 16 with RBBB, 8 with RBBB + left anterior fascicular block (LAFB) and 16 with LBBB) and 17 with depressed ejection fraction and LBBB. All of them were in sinus rhythm. Mean age was 58 years (15-89) and 46% (40) were women. Parameters were calculated as mean rate of two beats.

Results: The table shows the mean rate of the parameters in each group and percentage of patients that fulfill asynchrony criteria.

Conclusions: Results in our study show that patients with normal ejection fraction without LBBB fulfilled none of the asynchrony criteria tested in this study. Half of the patients with LBBB and normal ejection fraction had interventricular asynchrony and aortic pre-ejection delay longer than 140 ms (similar results were found in patients with LBBB with depressed ejection fraction), but they did not show any other parameter of asynchrony.

Table 1

<table>
<thead>
<tr>
<th>Normal</th>
<th>RBBB</th>
<th>RBBB + LAFB</th>
<th>LBBB</th>
<th>EF &lt;50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate/time (RR)</td>
<td>0.53±0.4</td>
<td>0.53±0.4</td>
<td>0.52±0.4</td>
<td>0.46±0.4</td>
</tr>
<tr>
<td>Rate/time &gt;30</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Aortic pre-ejection delay &gt;140 ms</td>
<td>103±94</td>
<td>119±146</td>
<td>162±146</td>
<td>162±146</td>
</tr>
<tr>
<td>Interventricular mechanical delay &gt;40 ms</td>
<td>-15.2±9.3</td>
<td>-43.3±46.2</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Septal to posterior wall delay (M mode) &gt;130 ms</td>
<td>47.5±63.1</td>
<td>67.9±62.4</td>
<td>152.5±62.4</td>
<td>152.5±62.4</td>
</tr>
<tr>
<td>Septal to L-V delay (M mode) &gt;130 ms</td>
<td>12.8±10.1</td>
<td>10.8±18</td>
<td>34.8±34.8</td>
<td>34.8±34.8</td>
</tr>
<tr>
<td>Lateral delay</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

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Sleep apnea in patients with cardiac resynchronization therapy - what role plays an echocardiography: background, equal or just a helping hand?
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Objective: Role of sleep apnea in heart failure patients. The potential benefit of echocardiographic assessment of the ventricular-systolic synchrony is expected, however its role is not clearly defined in clinical routine. The aim of this study is prospective to evaluate whether patients with sleep apnea and heart failure have and Asynchrony pattern as compared to the patients with heart failure receiving no treatment for sleep apnea.

Materials and methods: 27 patients that met the criteria of heart failure according to New York Heart Association (NYHA) class II or III, who were treated with CRT-D or CRT-P were included in the study. Three weeks before and three months after CRT implantation, patients underwent a polysomnography and echocardiography.

Conclusions: The presence of Asynchrony pattern in CRT patients with sleep apnea is more frequent than in those without sleep apnea (100% vs 67%). The presence of Asynchrony pattern in CRT patients with sleep apnea and heart failure is more frequent than in those without sleep apnea and heart failure (100% vs 30%).

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Resynchronization therapy attenuates functional mitral regurgitation by improving papillary muscle systolic deformation
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Aims: To find the echo parameters which are parallel to sleep disordered breathing (SDB) improvement and to evaluate whether patients with normal systolic function and different electrocardiogram patterns fulfill asynchrony criteria.

Methods: We studied by echocardiography 22 consecutive patients with moderate/severe FMR and a mean ejection fraction (EF) of 18±4% at baseline and following implantation of a CRT system. FMR quantification was performed by assessing the effective regurgitant orifice area (ERO) using the PISA technique. Tissue Doppler Imaging (TDI) was used to evaluate regional deformation profiles. PM systolic deformation was assessed by measuring negative strain (εss %) by placing the Doppler sample at the mid-portions of each one of the PM. Additionally, εss was obtained from myocardial sites adjacent to the anterolateral PM and to the posteromedial PM. The temporal differences in regional εss between the adjacent to PM walls segments (inter PM delay, Δ t εss, PM) were measured to quantify the effect of CRT on PM resynchronized contraction during systole.

Results: CRT improved the severity of FMR in patients with heart failure and this effect may be in part attributed beyond the already established improvement of systolic function and re-coordinated PM contraction, to augmented systolic deformation of PM or of the adjacent myocardial wall.

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Right ventricular failure is associated with right ventricular dysynchrony independently of the QRS duration
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Purpose: Left ventricular mechanical dysynchrony is of prognostic importance in patients with and without heart failure. Less is known about right ventricular (RV) dysynchrony in relation to RV systolic function. We tested the hypothesis that worsening RV systolic function is associated with RV mechanical dysynchrony.

Methods: Thirty patients (mean age 55±20 years) underwent standard echocardiography and pulsed wave TD imaging followed by cardiac magnetic resonance (CMR) imaging. Timing was measured from the onset of QRS to the onset of RV free wall systolic and images were used to assess regional RV systolic function.

Results: RV dysfunction was associated with prolongation of time to the onset of RV wave as well as with a decrease of RV wave amplitude on both sites. The delay was more important in the free wall, as a consequence free wall-septal dysynchrony increased with worsening RV function. (Table) RV dysynchrony did not correlate with QRS duration but correlated significantly with RVEF (r=-0.57, p<0.01). (Figure)

Conclusions: RV dysfunction is associated with RV dysynchrony. This finding has implications for optimization of cardiac resynchronization therapy.

Table 1

<table>
<thead>
<tr>
<th>Time to R wave onset in RVEF categories</th>
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<tbody>
<tr>
<td>RVEF &gt;50%</td>
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<tr>
<td>RVEF 30-50%</td>
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<tr>
<td>RVEF &lt;30%</td>
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SS (ms) | 112±10 | 121±18 | 139±20 | 0.02 |
St (ms) | 111±17 | 135±23 | 159±20 | 0.002 |
LV systolic delay (ms) | 5.10±14 | 10±0.9 | 20±0.9 | 0.017 |