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2D Strain demonstrates improved radial function after Cardiac Resynchronisation Therapy

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Introduction: 2D Strain imaging using speckle-tracking is a method allowing simultaneous analysis of myocardial strain in both the radial and circumferential dimensions. The values of strain and strain-rate of left ventricular (LV) segments using this technique pre and post CRT have not been reported. We compared the values before and after implantation of CRT.

Methods: Eighteen subjects who underwent successful CRT implantation were studied. Radial strain was assessed semi-quantitatively as regurgitant jet/left atrial area ratio (JA/LAA). Images were acquired using a Vivid 7 (GE Vingmed) ultrasound system and analyzed offline using dedicated 2D strain software. A parasternal short-axis view at papillary muscle level was used to assess circumferential (CS) and radial (RS) strain. The value of peak strain and both systolic and diastolic strain rates (SRs SRe) were measured in six segments of the LV (septal, lateral, inferior, anterior, anteroseptum and posterior segments).

Results: Mean values following CRT increased by 24% for CS (p<0.05) and 25% for RS (p<0.05), non-significant changes were seen with SR. Mean NYHA class was reduced from 3.5 to 2.4 (p<0.05) and NYHA class was improved in 13/18 patients (72%). Mitral regurgitation was also significantly reduced in these patients, from 3 to 2 (p<0.05). Radial and circumferential strain rates (SRs SRe) were measured in six segments of the LV (septal, lateral, inferior, anterior, anteroseptum and posterior segments).

Conclusion: This technique demonstrates that CRT has a positive effect on Radial and Circumferential Strain. CS correlates well with clinical response and is a valuable echocardiographic measure of response to CRT.

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Does Real-time 3D Echocardiography Demonstrate a Causative Role for Interpapillary Dyssynchrony in Functional Mitral Regurgitation in Severe Heart Failure?

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Background: Recent evidence suggests that dysynchronous papillary muscle activation may be a contributing factor in functional mitral regurgitation (FMR), which occurs in up to 30% of patients with severe heart failure.

Aims: Using real-time 3D echocardiography (RT3DE), we evaluated the contribution of dysynchronous interpapillary contraction to FMR improvement after CRT.

Methods: Thirty consecutive patients (23 male, ejection fraction 21±7%) undergoing CRT with at least mild FMR were studied. FMR severity was assessed semi-quantitatively as regurgitant jet/left atrial area ratio (JA/LAA). RT3DE was used to evaluate left ventricular (LV) volumes, ejection fraction, and indices of global and regional intraventricular dysynchrony, derived from the standard deviation, corrected for R-R interval, of time to minimum volume of each segment of the standard 16-segment LV model. Measurements were made at baseline pre-implant and at 6 months follow-up.

Results: Seventeen patients (ischaemic aetiology, n=8.47%) showed a response to CRT, with evidence of LV reverse remodelling, (LV end-systolic volume reduction 155±76 ml to 96±58 ml; p=0.0001) and improvement in ejection fraction (20%±6% to 34%±11% p<0.0001). There was no difference in CRT response between the ischaemic and non-ischaemic patients (p=0.9). Mitral regurgitation was also significantly reduced in these patients, JA/LAA ratio (18±16 to 6±2.9, p=0.006). Responders showed a reduction in 3D-derived assessment of global dysynchrony (14.3±5.3% to 7.5±4.4%, p<0.001). There was no significant correlation between FMR reduction and the degree of LV end-systolic reduction or global dysynchrony. In the remaining 13 patients, in whom there was no response to CRT (LV end-systolic volumes 163±63 ml to 174±59 ml; p=0.2; LV ejection fraction 22.6% to 22.7% ±6%, p=0.8), there was no reduction in global dysynchrony, (12.6±2% to 10.6±2%; p=0.1), nor improvement in FMR (17±15 to 25±13; p=0.1). In both responders and non-responders, there was no difference in interapapillary activation delay times after CRT (98±89 ms vs 100±107 ms respectively, p=0.9). In addition, no correlation between improvement in the regional dysynchrony in the mid LV at papillary muscle insertion sites and the degree of FMR improvement was noted in the responder group (r=0.04, p=0.8).

Conclusions: Cardiac resynchronisation therapy significantly reduces FMR. Regional dysynchrony involving the papillary muscle insertion sites however, is not a determinant of FMR reduction in CRT at 6 months follow-up.

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Impact of atrial fibrillation on response to cardiac resynchronisation therapy in patients with chronic heart failure

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Cardiac resynchronisation therapy (CRT) has shown a beneficial effect in patients with chronic heart failure (CHF). Atrial fibrillation (AF) has been implicated as one of the causes of non-response to this therapy. Therefore, we sought to determine the impact of AF in CHF patients with CRT.

Methods: We prospectively included 127 patients with CHF with a new CRT device. All patients were in sinus rhythm (SR) at the time of implantation. Patients regularly visited the consultation after implantation.

Results: After a mean follow-up of 20 months, 36 patients did not improve their NYHA class and were considered as non-responders. In the overall population, 6/127 (8%) patients were in permanent AF and 5 presented a PAF. The proportion of patients hospitalised was not different between both groups (15/21 [71%] vs 81/106 [76%] NS). Among the 24 patients who were hospitalised, 23 presented from CHF. From this latter group, 18 were in permanent AF and 5 presented a PAF. The proportion of patients hospitalised was not different in both groups (15/21 [71%] vs 81/106 [76%] NS). Among the 24 patients hospitalised for CHF, 9 were in AF compared to 11 in SR (p<0.02). There was no difference in left atrial area (LA) at baseline and follow-up. Hemodynamics at baseline and follow-up: table. Conclusions: In patients implanted according to current recommendations, the incidence of non-response to CRT is significantly higher in patients in whom AF was occurring compared to patients remaining in SR. Moreover, AF is responsible for more hospitalisations due to CHF. Therefore, strategies to prevent AF are required to decrease non-response to CRT.

<table>
<thead>
<tr>
<th>AF baseline</th>
<th>SR baseline</th>
<th>AF final</th>
<th>SR final</th>
</tr>
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<tbody>
<tr>
<td>LVEF (%)</td>
<td>31.68±1.53</td>
<td>27.81±0.65</td>
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<tr>
<td>EDV (ml)</td>
<td>237.5±14.82</td>
<td>237.0±7.76</td>
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<td>ESV (ml)</td>
<td>164.6±12.29</td>
<td>173.3±6.48</td>
<td>154.5±14.33</td>
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<td>TTG (mm Hg)</td>
<td>39.76±1.21</td>
<td>41.27±1.06</td>
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<tr>
<td>E/A</td>
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<td>1.536±0.09</td>
<td>1.251±0.30</td>
</tr>
<tr>
<td>DT (ms)</td>
<td>147.8±14.24</td>
<td>145.0±4.48</td>
<td>162.0±14.57</td>
</tr>
</tbody>
</table>

*indicates p<0.05 compared to baseline.1 compared to AF group. End-diastolic volume (EDV), end-systolic volume (ESV), left atrial area (LA), transthoracic pressure gradient (TTP), E/A ratio and E-deceleration time (DT)

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Does septal to posterior wall delay measured by M-mode really predict response to cardiac resynchronisation therapy?

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Background and aim: The utility of the septum to posterior wall delay (TTG) measurement to predict response to CRT is controversial, specially in patients (p) with ischemic cardiopathy (IC). The aim of this study was to analyze the utility of this measurement to predict response to CRT at 12 months follow-up according to the underlying etiology of the cardiopathy.

Methods: Sixty-four (p = 0.78 ± y.o. 52 (81%) males) with LV systolic dysfunction (LV FE 23 ± 6%) and LBBB treated with CRT and followed during 12 months were included. An echo scan was performed and s-pw was measured using RT3DE at 6 months...