CRT01
SYNCHRONIZED BIVENTRICULAR PACING AFTER AV NODE ABLATION IN CHF PATIENTS
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Background: atrioventricular junctional (AVJ) ablation with PM implantation has been shown to improve quality of life (QoL) in selected patients(pts) with drug resistant atrial fibrillation (AF). However, after the procedure, some pts worsen because of asynchronous ventricular stimulation.

History: during the last 9 years,among 1960 pts who referred to our Institution for AF, 28 pts underwent ablation and pace procedure by right ventricular single lead. The long term follow up(FU) of 36 months demonstrated an improvement of QoL in all but 4 pts who developed a progressive, irreversible heart failure.

Methods: from January 2001 to july 2002, 12 consecutive pts (6F/M of mean age of 70.2 years) with dilated cardiomyopathy and chronic, non controlled high rate AF were recruited. Eight pts had chronically pacemakers (PM) and 4 pts had chronic pacemakers(AF). After AVJ ablation, a biventricular device was implanted: Medtronic InSync in 9 pts and InSync biventricular ICD in 3 pts. The NYHA functional class, the QRS duration, the mean heart rate, left ventricular ejection fraction (LVEF) and LV end diastolic diameter (LVEDD) by 2D echocardiography; 6 minutes walking test(WT), the score of Minnesota questionnaire and the score of palpitation symptoms were evaluated at baseline and at 1, 3, 6 and 12 months FU in every pts.

Results: the mean FU was 7.2±4 months. The results have been quite terrific as shown as follows:

One pt,3 months after the procedure, in spite of wide clinical improvements, died suddenly on ECG Holter monitoring that demonstrated a ventricular fibrillation as the cause of death. In pts with pacemaker AF, a trend of reduction of numbers and duration of episodes of AF was observed.

Baseline FU p
NYHA 3.2±0.6 1.5±0.7 <0.0001
QRS (ms) 126±25 133±13 0.01
HR (ppm) 91±12 74±9 0.0001
LVEF 34±15 55±8 0.01
LVEDD (mm) 66±7 147±95 <0.0001
Minnesota Score 54±12 30±18 0.002
Palpitation Score 7.2±1.3 0.7±1.3 <0.0001

Conclusions: these results demonstrated that the AVJ ablation combined with biventricular pac- ing is an effective technique to improve QoL in AF in congestive heart failure pts, mostly by relief of symptoms of palpitations and by means of the resynchronization therapy. The clinical results are not correlated to the QRS duration and to the LVEDD. Also the number of episodes of paroxysmal AF seems to be lowered by the resynchronization therapy. However, life threatening ventricular arrhythmias have to be considered in pts without previous episodes.

CRT02
ESTIMATION OF LEFT VENTRICAL FUNCTION USING ECHOCARDIOGRAPHY AND CARDIAC MAGNETIC RESONANCE IMAGING: IMPLICATIONS FOR ICD THERAPY
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Background: Estimation of left ventricular (LV) ejection fraction (LVEF) is critical in deciding upon implantable cardioverter-defibrillator (ICD) therapy. We compared visually estimated and calculated LVEF from standard 2-dimensional (2D) echocardiographic (echo) and cardiac magnetic resonance (CMR) views.

Methods: 20 potential MAD-DVI candidates with a previous myocardial infarction and visually estimated LVEF<35% underwent transmural echocardiography (Vivid 5,GE) and CMR (1.5 Tesla,GE Signa). CMR-LVEF was calculated by planimetry of short axis cross-sections taken from base to apex; M-mode-LVEF from LV end-systolic and end-diastolic dimensions on the long axis parasternal view; and 2D-LVEF from planimetry of the LV from apical 4 chamber view. 6 observers with >3 yrs echo experience visually estimated LVEF from apical 4-chamber and 2-chamber LV views obtained both CMR and transthoracic echocardiography.

Results (Bland-Altman analysis)
Bias (95% limits)

<table>
<thead>
<tr>
<th>Observers</th>
<th>CMR estimation</th>
<th>ECHO estimation</th>
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<tbody>
<tr>
<td>1</td>
<td>-1.89 (-18.00, 14.23)</td>
<td>-2.84 (-23.29, 17.62)</td>
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<td>2</td>
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<td>3</td>
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<td>-3.9 (-32.17, 24.35)</td>
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<tr>
<td>4</td>
<td>-6.02 (-26.64, 14.61)</td>
<td>-3.98 (25.26, 17.29)</td>
</tr>
<tr>
<td>5</td>
<td>-5.36 (-25.47, 14.75)</td>
<td>-4.55 (-22.04, 12.93)</td>
</tr>
<tr>
<td>6</td>
<td>-5.98 (-23.22, 11.26)</td>
<td>-7.46 (-26.56, 11.65)</td>
</tr>
</tbody>
</table>

LVEF calculated from echo
M-mode 8.39 (-21.34, 30.24) 2D (planimetry) 5.15 (-11.03, 21.33)

Conclusion: Visual estimations of LVEF from CMR and echo as well as calculations of LVEF from M-mode and 2-dimensional echo are in poor agreement with CMR-derived values, even with experienced observers. Echocardiographically-derived LVEF is inadequate in the equate of appropriate standards for ICD therapy.

CRT03
LEFT VENTRICULAR DESYNCHRONIZATION ASSESSMENT USING GLOBAL MYOCARDIAL INDEX IN PATIENTS WITH DILATED CARDIOMYOPATHY
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Global myocardial index (GMI) is a sensitive indicator of overall cardiac function. Aim of study: to assess the relation between GMI and currently used echocardiographic parameters of ventricular desynchronization in order to predict the value in the assessment the severity of systolic asynchrony for biventricular pacing indication.

Methods: 47 patients (pts) aged 58.3±18.3 years with dilated cardiomyopathy (DCM) were analyzed. The following parameters were measured: QRS duration (QRSd); septal (S), posterior (P), lateral (L) and posterolateral (PL) wall delays, as the time from QRS onset to maximal wall contraction, and the derived parameters: left ventricular mechanical delays (LVD) as the time interval from maximal contraction between interventricular septum and posterior (LVPD), lateral (LVEDD) and posterolateral wall (LPLD), using parasternal; 4 chamber view and subcostal incidence both in time-movement and Tissue Doppler imaging (TDI). TDI measurements were performed using both color and pulsed TDI (from QRS onset to the end of S wave for each wall).

Results: 32 pts presented QRSd>120ms; evidence of significant left ventricular desynchronization with at least one LVD>70ms was found in 37 pts (7 pts with QRSd>120ms); in this group GMI was significantly higher than in the rest of the pts (1.99±0.27 vs 0.74±0.17, p<0.0001). LVD was significantly higher in QRSd>120ms pts (p<0.0001 in each LVPD,LPLd).

The multiple regression analysis demonstrated a statistically significant linear correlation between GMI and maximal LVD in each patient (r=0.53, p<0.0001). Using a GMI ≥ 0.87 (and QRSd>120ms) as cut point, left ventricular desynchronization can be detected with a sensitivity of 94% (81%) and specificity of 70% (80%); positive predictive value was 92% (93 %), and negative predictive value was 77% (53 %). A trend toward correlation was found between GMI and QRSd (r=0.31). There was no correlation between QRSd and timing echocardiographic parameters (r=0.3 each).

Conclusion: Regional ventricular delayed activation results in an uncoordinated and prolonged ventricular contraction with lengthening of the isovolumetric contraction and relaxation time and decrease of the time available for filling and ejection. GMI explore all this parameters and may be considered a global indicator of ventricular desynchronization.

CRT04
THE EFFECTS OF BIVENTRICULAR PACING ON MITRAL COAPTATION POINT DISPLACEMENT IN PATIENTS WITH HEART FAILURE
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Purpose: In recent years cardiac resynchronization therapy (CRT) is an established treatment in selected patients with heart failure. Furthermore it has been shown that the displacement of the mitral leaflet coaptation point (CPMA) towards the LV apex correlates with the degree of left ventricular (LV) dysfunction. The purpose of this study is to find the acute effects of biventricular pacing in the mitral apparatus and LV function in heart failure patients.

Methods: We studied 16 patients (pts) 15 men, 1 woman aged 56±25 years in NYHA class III or IV and left ventricular ejection fraction (LVEF) 22±4%. The etiology was coronary artery disease (CAD) in 7 pts and dilated cardiomyopathy (DCM) in 8 pts. All the patients received cardiac resynchronization therapy. An echocardiogram was performed within one week after implantation with biventricular pacing (CRT on) and without pacing (CRT off). The CPMA i.e. distance between coaptation point of mitral leaflets and annulus, was measured from the apical 4-chamber view in midystole and was evaluated with CRT on and CRT off. Echocardiographic indices such as LV end diastolic diameter (LVEDD), end systolic diameter (LVESD), ejection fraction (LVEF) and mitral annulus diameter (MAD) were also measured at CRT off and at CRT on.

Results: There was a non-significant increase in LVEF, and a non-significant decrease in LVEDD and LVESD with CRT on. CPMA decreased from 10.6±1.9mm at CRT off to 8.1±1.4 at CRT on and MAD decreased from 38.4±4.2 mm at CRT off to 37.7±3.7mm at CRT on (both p<0.05). Moreover the absolute change in CPMA was related to the LVEDD (r=0.74, p<0.05) and inversely related with the LVEF (r=-0.72, p<0.05).

Conclusion: In patients with severe LV systolic dysfunction and LV dilatation biventricular pacing led to an improvement in both CPMA and MAD. This finding underlines the acute effect of resynchronization therapy in the mitral apparatus in heart failure patients.