Cardiac Resynchronization Reverses Left Ventricular Remodeling and Reduces Cytokine Activation in Patients With Dilated Cardiomyopathy and Left Bundle Branch Block

Luigi Padeddu, Maria Cristina Porciani, Andrea Colella, Paolo Piazzagalli, Alessandra Sabini, Nichole Muli, Cristina Tosti Guerro, Susana Madeddu Vincieri, Kathryn E. Hilpisch, Francesco DeSeta, Michael R. Hill, Institute of Internal Medicine and Cardiology, University of Florence, Florence, Italy, Medtronic, Inc., Minneapolis, Minnesota.

In patients (pts.) with advanced heart failure (HF), dilated cardiomyopathy (DCM) and left bundle branch block, cardiac resynchronization (CR) and appropriate medical therapy improves HF patients’ symptoms, quality of life and ability to exercise. The purpose of this study was to evaluate the effect of CRT on cardiac structure, function and neuropeptides. METHODS: Pts. with HF (NYHA III/IV), DCM (left ventricular end diastolic dimension > 55 mm), and ventricular conduction abnormalities (QRS duration > 140 ms) were implanted with an atrio-synchronous, bi-ventricular pacing system. Ant-ventricular delay was optimised by Doppler echo (longest left ventricular filling time and greatest cardiac output). NYHA class, QRS duration, six minute hall walk distance, quality of life score, echocardiogram and plasma neuropeptides were evaluated at baseline and following 3 mos. of therapy. RESULTS: N=25 pts. (22m, 71 ± 9 yrs.).

Baseline 3 month p-value
Patient Outcomes NYHA 2.88 ± 0.75 2.08 ± 0.83 < 0.001
QRS duration (ms) 178 ± 29 148 ± 19 < 0.001
6-Minute Hall Walk (m) 232 ± 163 317 ± 117 0.009
Qol. 36 ± 20 18 ± 16 < 0.001
Echocardiography LVEF (%) 30.1 ± 7.6 37.1 ± 9.6 < 0.001
CI 2.03 ± 0.68 2.28 ± 0.56 0.012
IVM (ms) 41.2 ± 23.7 14.3 ± 10.9 0.001
LV MPI 1.07 ± 0.53 0.79 ± 0.51 0.007
Neurohormones sTNFR1 (ng/ml) 6.82 ± 2.65 5.98 ± 2.31 0.011
sTNFR2 (ng/ml) 6.82 ± 2.65 5.98 ± 2.31 0.011
P-values were found between soluble TNF-α R1 and Qol. (F = 0.166, p=0.049) and soluble TNF-α R1 and LVEF (F = 0.273, p=0.009). CONCLUSIONS: CRT improves pts. outcomes and appears to reverse some of the adverse effects of heart failure, related to cardiac structural changes and augmentation of the cytokine systems.

Reduction of Norepinephrine Levels With Biventricular Pacing but Recurrence of Arrhythmic Events in Patients With Biventricular-ICD and Cardiomyopathy

Domenico Spaziano, Massimino Pagani, Gianfranco del Rosso, Stefano De Servi, Guido Grassi, Giuseppe Manco, Legnaro Hospital - Cardiology - EP lab., Legnaro (Milan), Italy, University of Milan - Biocca, Monza (Milan), Italy.

It's known that CHF activates the sympathetic nervous system (NSNS) and increases serum norepinephrine (NE) and proportion to severity of the disease. Emerging data support the use of a biventricular pacing/BP that decreases serum norepinephrine (NE) in direct proportion to severity of the disease. Emerging data support the use of a biventricular pacing system. The AECD with an atrial-synchronous, DCM with mild-to-moderate heart failure was programmed with a detection rate that would result in this tachycardia being within the SVT zone. The advisory mode of the AECD was used to prevent actual therapy delivery. Bipolar right atrial pacing to mimic sinus tachycardia was also tested in an identical fashion in 50 pts.

Neurohormones

<table>
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<tr>
<th>Group</th>
<th>NE (Baseline)</th>
<th>NE (12 weeks)</th>
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<tbody>
<tr>
<td>I (28 pts BP)</td>
<td>600 ± 328 pg/ml</td>
<td>330 ± 130</td>
</tr>
<tr>
<td>I (15pts medical therapy)</td>
<td>570 ± 302 mg/L</td>
<td>N.S.</td>
</tr>
<tr>
<td>I (15pts)</td>
<td>605 ± 260 mg/L</td>
<td>AE (1-3m)</td>
</tr>
<tr>
<td>I (20pts BP)</td>
<td>6 V and 2 SD</td>
<td>4 SD (20%)</td>
</tr>
<tr>
<td>I (15pts BP)</td>
<td>1 SD and 2 VT (20%)</td>
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Group I (28 pts BP and ICD) 6 V and 2 SD (100%) and Group I (20pts BP) 4 SD (20%).

Correlations were found between soluble TNF-α R1 and Qol. (F = 0.166, p=0.049) and soluble TNF-α R1 and LVEF (F = 0.273, p=0.009). CONCLUSIONS: CRT improves pts. outcomes and appears to reverse some of the adverse effects of heart failure, related to cardiac structural changes and augmentation of the cytokine systems.

1018-107 Performance of a Supraventricular Tachycardia Discrimination Algorithm by an Automatic External Cardiodefibrillator in Response to Induced Tachycardia

Thomas A. Marzetti, David Riggio, Marwan Bahu, Sue Walsh, Amber Reese, Nabil Kanaan, Don Lin, Arizona Heart Institute, Phoenix, Arizona, CardioGen Science, Inc., Irvine, California.

Background: An algorithm with three features (Modulation Domain Function, Waveform Factor Analysis and Signal Variability Analysis) is used as a programmable option in an Automatic External Cardiodefibrillator (AEDC) (Powerheart) to differentiate Supraventricular Tachycardia (SVT) from ventricular tachycardia or ventricular fibrillation within a programmable SVT rate zone. The AEDC will withhold therapy delivery in response to tachycardia that is recognized as SVT within that zone and recommend ( advisory mode) or deliver therapy (active mode) for faster rates.

Methods: During routine diagnostic electrophysiology studies of 67 pts (Age: 61 yrs (Range: 21-92), LVEF: 41% ± 17%, Males: 38, Biventricular Branch Block (BBBV) 17). SVT was induced in 25 pts and the AEDC then programmed with a detection rate that would result in this tachycardia being within the SVT zone. The advisory mode of the AEDC was used to prevent actual therapy delivery. Bipolar right atrial pacing to mimic sinus tachycardia was also tested in an identical fashion in 50 pts.

Results: A total of 31 clinical SVTs were induced (Atrial Tachycardia 8, Atrial Fibrillation 5, AV Reentry 10 and AV Nodal Reentry 8). Rate detection was accurate in the following cases (Sensitivity 100%). The following 25 negative, 32 postive episodes occurred in the SVT zone, 3 False Positives (2 on BP-ICD) and 1 Inducible AV Nodal Reentry Tachycardia with ST segment elevation). Of the 55 right atrial pacing episodes there were 53 True Negatives and 2 False Positives (1 prolonged pacing PR interval with summation in the preceding QRS and 1 with BBB). (Specificity 94%).

Conclusions: This AEDC SVT discrimination algorithm functioned extremely well in response to a wide variety of tachycardia (particularly in the absence of BBB) and would be expected to very rarely result in inappropriate suppression of therapy delivery.

1018-108 The Utility of Dual Chamber Electrocardiogram Recordings for the Diagnosis of Clinical Tachycardias

Michael H. Kim, David Bruckman, Christian Stichelberger, Frank Pelosi, Bradley P. Knight, Hakain Orai, Bradly P. Joseph, Fred RBB, 1 Inducible AV Nodal Reentry Tachycardia with ST segment elevation). Of the 55 right atrial pacing episodes there were 53 True Negatives and 2 False Positives (1 prolonged pacing PR interval with summation in the preceding QRS and 1 with BBB). (Specificity 94%).

Background: The availability of the dual chamber defibrillator has allowed the assessment of device performance of various tachycardia discrimination algorithms. Very little data, however, exist about the clinical interpretation of a tachycardia episode on the clinician level in regard to the utility of an atrial electrogram recognition algorithm and its effect on the correct diagnosis and confidence of that diagnosis. Methods: Dual chamber defibrillator recordings (n=52) with a clear diagnosis were distributed in a blinded and randomized fashion to 5 electrophysiologists, initially with only the ventricular data (Test V) and later with both the atrial and ventricular data (Test AV). The 52 matched pairs of recordings were analyzed with a self-developed computer software package and evaluated for the accuracy of diagnosis. Reviewer confidence in the diagnosis via a 5-point Likert scale was assessed with an analysis of variance. Logistic regression determined the relationship of confidence and diagnostic accuracy. Results: Overall accuracy for the specific diagnosis in Test V was 60.8% and 79.2% in Test AV (p<0.001). Accuracy in defining the chamber of origin increased from 75.8% to 89.6% with the atrial data (p<0.001). Across all reviewers, confidence was significantly greater when the reviewer was correct. Overall mean confidence was greater in Test AV. The odds of a correct specific diagnosis were linearly related to greater confidence in both Test V and AV. Conclusions: The addition of the atrial electrogram allows for improved accuracy for both the specific tachycardia diagnosis and the chamber of origin. Clinician confidence was also enhanced and correlated with accuracy. Thus, the possibility of improved patient care through improved accuracy should be considered when evaluating a patient for a defibrillator.

1018-109 A Prospective Analysis of Changes Stored Intracardiac Electrogram Morphologies After Implantable Cardiodefibrillator Strokes

Frank Pelosi, Jr., William Hsu, Al McCauley, Radhima Greenstein, Aman Chugh, Sohail A. Hassan, Christoph Storch, Hakain Orai, Fred Morsy, Adam Stockberger, University of Michigan Health System, Ann Arbor, Michigan.

Background: It is believed that analysis of stored intracardiac electrograms after implantable cardioverter-defibrillator (ICD) shocks is unreliable because of distortions of the electrogram morphology, though the duration and nature of these distorutions is unknown. The objective of this study was to prospectively evaluate the effect of shocks on stored intracardiac electrogram morphology and identify variables that may affect these changes. Methods: Twenty-four patients (70%male, 30% female) age 55±12 years undergoing predischarge or outpatient defibrillator threshold determination received 4 synchronized ICD shocks of 1, 11, 21, 31 Joulcs (J) at 5-minute intervals. All intracardiac electrograms were recorded from the shocking coils of a dual-coil ICD lead with inte-
Background: We report an interim assessment of a "device-based" strategy for atrial rhythm control in patients with drug-refractory AF, chronic CHF and reduced left ventricular EF (<40%). Methods: Each patient underwent implantation of a Medtronic Jewel AF inhibitor therapy had less electrogram morphology distortions (16.7%) than those not taking ACE inhibitors (63.6%, p<0.003). Conclusions: Delivered shock energy and ACE inhibitor therapy can affect distortions in the stored intracardiac electrogram morphology after ICD shocks. This suggests that physiologic factors play a significant role in the observed changes of stored electrogram recordings.

1018-110 Outcome of a Device-Based Atrial Rhythm Control Strategy in Patients With Chronic Congestive Heart Failure and Diminished Ejection Fraction

David Schwartzman, Debra House, Srinivas Murali, Atrial Arrhythmia Center, University of Pittsburgh, Pittsburgh, Pennsylvania.

Background: We report on an interim assessment of a "device-based" strategy for atrial rhythm control in patients with drug-refractory AF, chronic CHF and reduced left ventricular EF (<40%). Methods: Each patient underwent implantation of a Medtronic Jewel AF (modeled after ICD) system device incorporating atrial proarrhythmia minimum pacing and shock therapies. The device also provides bradycardia pacing and VT/VF therapies. The cohort consists of 32 patients (30 men; mean age 58 yrs; cause of reduced EF: ischemic [18], idiopathic [10], other [4]) with symptomatic, drug refractory AF, who have been followed for 246 +/- 196 days. Successful AF suppression was defined as AF burden <10%, during followup. Results: Table shows mean(SD) values for new VT/VF and latest followup (post-implant) in pts with successful AF suppression, which was achieved in 27 pts (84%), necessitating adjuvant antiarrhythmic drug therapy in 24 of these pts. There have been 8 deaths (all attributable to pump failure; 7 of 8 patients experienced AF relapse within 6 months). Conclusions: Inappmpriate shock therapy occurs in 14% of pts receiving prophylactic ICDs; 46 pts presented with syncope and a dilated cardiomyopathy (67%). 1018-111 Importance of Avoiding Nominal Programming to Prevent Inappropriate Implantable Cardioverter Defibrillator Shocks


Prophylactic use of implantable cardioverter defibrillators (ICDs) raises awareness about the need to avoid inappropriate shocks for supraventricular arrhythmias (SVAs). Methods: Ninety-one pts without prior clinical sustained ventricular arrhythmias (VAs) were followed for 246 +/- 196 days. Successful AF suppression was defined as AF burden <10%, during followup. Results: Table shows mean(SD) values for new VT/VF and latest followup (post-implant) in pts with successful AF suppression, which was achieved in 27 pts (84%), necessitating adjuvant antiarrhythmic drug therapy in 24 of these pts. There have been 8 deaths (all attributable to pump failure; 7 of 8 patients experienced AF relapse within 6 months). Conclusions: In appmpratitude shock therapy occurs in 14% of pts receiving prophylactic ICDs; 46 pts presented with syncope and a dilated cardiomyopathy (67%).

1019-112 The Evolution of Serial P Wave Signal-Averaged Electrocardiograms Following Direct Current Cardioversion of Atrial Fibrillation: A Prospective Study

Xiao H. Guo, Jan Polonieki, Mark Gallagher, Mohammad S. Harold, Yi Gang, Marek Malik, A. John Camm, St George's Hospital Medical School, London, United Kingdom.

Background: The evolution of serial P wave signal-averaged ECG (P-SEACG) after DC cardioversion (DCC) of persistent atrial fibrillation (AF) was studied. Methods: 50 pts underwent P-SEACG at regular intervals, 5 times over 6 months. Filtered P wave duration (PD), root mean square voltage (RMS) of its terminal 40, 30, 20 ms, entire P wave and integral P wave were obtained using a FFT filter of 40-250 Hz with P wave triggered technique (GE, USA). Results: Of 60 pts (53 men, 66 ± 10 yrs); 31 (52%), 18 (23%), 2 (3%) pts returned to AF (RAF) in 5.2, 3, 0.6 months respectively. There were no significant differences in age, sex, cardiac disease, AF duration, left atrial size between pts with and without RAF at 6 months. General linear model regression showed RAF group had prolonged PD (157 ± 24 vs 143 ± 17ms, p<0.001) and lower RMS 40, 30, 20 when compared with pts who maintained sinus rhythm (SR) (5.3±2.0 vs 6.1 ± 3.4mV, p<0.0007; 4.3 ± 1.5 vs 5.7 ± 3.2mV, p<0.0001; 3.6 ± 1.4 vs 5.2 ± 3.0, p<0.0001 respectively), these measurements did not change significantly over time in each outcome group. Only RMS-P and integral P evolved against time (Fig). slopes. the RMS-P in SR pts increased (p=0.006), whilst a reduction was noted in RAF pts (p=0.023) (difference in slopes p=0.006). For integral-P, no change in SR group but in RAF slope was significantly decreased (p=0.0028), (difference in slopes p=0.0004). Conclusion: These differences in evolution suggest that returned AF is preceded by change in serial P-SEACG following DCC. 1019-113 Atrial Fibrillation Recurrence: The Roles of Hypertension, Duration Of Atrial Fibrillation, and Prolonged Signal-Averaged P Wave Duration

Ulf D. Olsen, Jan Pamer, Verner Rasmussen, Steen M. Pedersen, Gorm B. Jensen, The University Hospital of Hvidovre, Copenhagen, Denmark.

Background-Prolonged signal-averaged P wave duration (SAPD) has been established as a risk marker for atrial fibrillation (AF). We assessed the risk of hospitalization due to AF recurrence or transition to long-lasting AF in patients with earlier or present AF the SAPD was measured at inclusion, and the follow-up time was six months (median 184 days; range 171-437 days). Hospitalization due to AF recurrence or transition to long-lasting AF were regarded as endpoints. Results-During the follow-up period 33 patients were hospitalized due to AF, and nine patients developed long-lasting AF. History of hypertension, OR=3.87 (95% CI 1.61 to 9.37), duration of the AF disease longer than 2 years, OR=2.22 (95% CI 1.31 to 7.86), and non-significantly prolonged SAPD above 140 ms, OR=1.87 (95% CI 0.60 to 5.82) were related to an increased risk of hospitalization due to AF relapse or development of long-lasting AF. Conclusions-Hypertensive heart disease, duration of AF disease longer than 2 years, and prolonged SAPD above 140 ms were risk factors for AF relapse requiring hospitalization or transition to long-lasting AF. The probability of recurrence in patients without risk factors was 5%, with one risk factor 16.27%, with two risk factors 37.54%, and with all three risk factors 74% (Table 1).

### Table 1: Probabilities of hospitalization or transition to long-lasting AF from risk factors (%)

| SAPD | No hypert. | Hypertension
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<tr>
<td>&lt; 140 ms</td>
<td>&gt; 140 ms</td>
<td>&gt; 140 ms</td>
</tr>
<tr>
<td>Short duration of AF (&lt; 2 years)</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>Long duration of AF (&gt; 2 years)</td>
<td>24</td>
<td>37</td>
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