flow (PVF). Hemodynamics were compared during DOO pacing (90 bpm) from each site at AV delays of 90, 120, 150 and 180 ms following AV nodal ablation. Results: CO, dP/dt and LVEDP did not change with site or delay. CO decreased significantly (p<0.05) with AV delay at all lead locations. MAP depended on AV delay during RAA and DSRA, but not BB and CSO pacing. Minimum PVF following atrial contraction, an index of PV transport, depended significantly on both AV delay and atrial lead location (table). Combined BB pacing maintained PV transport during atrial contraction relative to RAA and DSRA pacing in anesthetized dogs with normal atrial conduction. Other hemodynamic parameters were unchanged. PV flow patterns may influence mechanical triggers of AF.

Minimum PVF (ml/min)

<table>
<thead>
<tr>
<th>AV Delay (ms)</th>
<th>90</th>
<th>120</th>
<th>150</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAA</td>
<td>2±1</td>
<td>4±6</td>
<td>5±7</td>
<td>6±7</td>
</tr>
<tr>
<td>BB</td>
<td>18±1</td>
<td>24±10</td>
<td>39±12</td>
<td>73±12</td>
</tr>
<tr>
<td>CSO</td>
<td>7±14</td>
<td>11±9</td>
<td>27±10</td>
<td>38±13</td>
</tr>
<tr>
<td>DSRA</td>
<td>8±12</td>
<td>6±13</td>
<td>24±9</td>
<td>69±13</td>
</tr>
</tbody>
</table>

A p<0.05 vs. 90ms, b p<0.05 vs. 120, c p<0.05 vs. 150, d p<0.05 vs BB

1017-6 Effects of Atrial Septal Lead Placement on Atrial Tachyarrhythmia Detection and Device Diagnostics in Bradycardia Patients
H. Pörzlerfitt, Reece Holbrook, Martin Young, Jaquelyn Kulinski, Jodi Koehler, Doug Hettick, A.O. Krankenhaus der Elisabethinen Linz, Linz, Austria, Medtronic, Minneapolis, MN

Background: The impact of atrial septal lead placement on the accuracy of atrial tachyarrhythmia (AT) detection is unknown.
Methods: Patients with a history of bradycardia and AT were randomized to atrial septal or non-septal lead placement and implanted with a DDDR pacemaker (AT500, Medtronic). Each stored episode was classified for appropriateness of AT detection (i.e. AT confirmed at episode onset) and termination (i.e. sinus or paced rhythm confirmed at device-classified episode termination). Positive predictive value (PPV) was adjusted for multiple episodes within a patient. AT episodes from septal patients were analyzed by lead position (low, mid, or high-septal).

Results: A total of 16,843 stored episodes were analyzed from 239 patients. PPV for episode detection was similar for both lead locations (Table). The PPV of episode termination was significantly lower for patients with septal leads. Most inappropriately terminated episodes were followed by appropriate w-detection within 1 minute. The PPV value of

1017-3 Three-Dimensional Noncontact Mapping Demonstrates Synergistic Electrophysiologic Effects of Multisite Atrial Pacing and Linear Atrial Ablation in Patients With Refractory Atrial Fibrillation
Artur Filipecki, Sanjeev Sakaria, Atul Prakash, George Philip, Atlantic Health System, Passaic, NJ

Background: While linear right atrial (RA) ablation has limited efficacy in atrial fibrillation (AF) & dual site RA pacing (DAP) can be efficacious, the electrophysiologic effects of combined therapy have not been studied using 3-D non-contact mapping (NCM).

Methods: We examined global atrial activation & RA activation before & after RA maze in pts with refractory AF & evaluated the impact of DAP after RA maze using NCM.

Results: 30 pts, mean age 69±10 yrs, mean LA size 42±9 mm, mean LVEF 43±12%.

<table>
<thead>
<tr>
<th>Av Delay (ms)</th>
<th>90</th>
<th>120</th>
<th>150</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>DODR</td>
<td>10±18</td>
<td>15±27</td>
<td>15±27</td>
<td>15±27</td>
</tr>
<tr>
<td>DODR+Prev</td>
<td>15±27</td>
<td>15±27</td>
<td>15±27</td>
<td>15±27</td>
</tr>
</tbody>
</table>

P<0.05 vs. 90ms, b p<0.05 vs. 120, c p<0.05 vs. 150, d p<0.05 vs BB

Conclusion: Patients with non-septal lead placement and high frequency PAC's may represent a responder group for atrial prevention pacing algorithms.

1017-5 Combined Atrial Pacing Prevention Algorithms Reduce Atrial Tachyarrhythmia Burden in Bradycardia Patients With Frequent Premature Atrial Contractions and Standard Atrial Lead Placement: ASPECT Trial Results
Mark Henegy, Reece Holbrook, Martin Young, Brent Sakowski, Andrew Mugglin, Doug Hettick, The Worldwide ASPECT Investigators, Presbyterian Hospital, Oklahoma City, OK, Medtronic, Minneapolis, MN

Background: Atrial prevention pacing algorithms (PPA) have previously been shown to reduce the frequency of premature atrial contractions (PAC) in bradycardia patients with a history of atrial tachyarrhythmias (AT).

Methods: 120 patients with a Class 1 pacing indication and a history of paroxysmal AF receiving a DDDR+P pacemaker with AT and PAC detection and enhanced far-field R-wave rejection (AT500, Medtronic) were randomized to 3 months of PPA programmed ON or OFF in a cross-over fashion. Patients were stratified into two groups based on whether their PAC frequency during the monitoring period was above or below the median PAC frequency in the overall group (284±day). Device classified AT burden was compared between PPA ON and OFF periods.

Results: High PAC frequency during the monitoring period was associated with burden reduction during the PPA ON period in patients with non-septal, but not with septal lead placement (Table). In the 60 patients with PAC frequency ≤ 284±day, no significant difference in burden between the PPA ON and OFF periods was observed, regardless of lead placement.

Patients with PAC
<table>
<thead>
<tr>
<th>Frequency≥284±day (on-off)</th>
<th>Median Burden Reduction (on-off)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td>0.04</td>
<td>0.0</td>
</tr>
<tr>
<td>Non-Septal</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Septal</td>
<td>0.01</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Conclusion: Patients with non-septal lead placement and high frequency PACs may represent a responder group for atrial prevention pacing algorithms.

1017-4 Bachmann's Bundle Region Pacing Maintains Pulmonary Venous Transport Compared to Right Atrial Appendage and Dual Site Right Atrial Pacing
Douglas A Hettick, Paul D. Ziegler, Jaquelyn Kulinski, Rahul Mehra, Medtronic, Inc., Minneapolis, MN

Background: Alternate atrial pacing lead locations including Bachmann's Bundle region (BB), the coronary sinus ostium (CSO), and dual site pacing from the right atrial appendage (RAA) and CSO (DSRA) have been proposed for prevention of atrial fibrillation (AF). These pacing sites may also affect AF indirectly by changing atrial contraction patterns and hence atrial and pulmonary venous transport function. We compared hemodynamic indices during dual chamber pacing from the RAA, BB, CSO and DSRA.

Methods: Anesthetized dogs (n=7, 27±2 kg) were instrumented for measurement of left atrial (L.A.), left ventricular end diastolic (LVEDP), and mean arterial pressure (MAP). dP/dt, LA volume, LV end-diastolic diameter (EDD), cardiac output (CO) and pulmonary venous
Methods: The study included 60 patients with bundle branch block and heart failure to 25 patients in sinus rhythm, based on age, gender, baseline EF and NYHA class. Patients in AF were followed for 12±5 months following implant and those with coronary embolization.

Background: Studies in papillary muscles and anesthetized animals have shown that the objective of this study was to examine the effects of these cardiac contractility modulating (CCM) signals on systemic hemodynamics and left ventricular (LV) function in conscious dogs with chronic heart failure (CHF). One proposed mechanism is that wavefronts from the fastest activating region spread out to maintain fibrillation in the remainder of the myocardium. If true, knowledge of the global distribution of activation rates across the fibrillating ventricles to identify the fastest ventricles would be invaluable since therapeutic modalities such as small shocks or overdrive pacing could then be focused on those regions to more efficiently halt VF.

Correlation: Atrial septal lead placement resulted in a lower PPV for AT episode termination, but not detection. Low septal placement tended to have lower PPV for termination than other septal sites. Accuracy of device detection should be evaluated before interpretation of device-stored diagnostic data.

Conclusions: Patients with AF had no or very few AF episodes during 6 months follow-up indicating that AF seems to decrease after the initiation of biventricular pacing. The increase of the atrial rates below 70 bpm in the SR and pAF group indicates a decrease of the sympathetic tone. This behavior was not observed for patients with unchanged new onset of AF.

Poster Session

1041 Cardiac Electrophysiology and Arrhythmias I

Sunday, March 30, 2003, Noon-2:00 p.m., McCormick Place, Hall A
Presentation Time: 1:00 p.m.-2:00 p.m.

1041-9 Estimated Activation Rate Distribution Across the Fibrillating Myocardial Walls of the Intact Swine Heart

Jonathan C. Newton, Raymond E. Ideker, University of Alabama at Birmingham, Birmingham, AL

Background: The mechanism responsible for maintaining VF is still actively related. One proposed mechanism is that wavefronts from the fastest activating region spread out to maintain fibrillation. If true, knowledge of the global distribution of activation rates across the fibrillating ventricles to identify the fastest ventricles would be invaluable since therapeutic modalities such as small shocks or overdrive pacing could then be focused on those regions to more efficiently halt VF. Therefore, we sought to quantify the transmural distribution of activation rate over both ventricles during VF.

Methods: Forty-two needles containing four electrodes throughout the right ventricle and 56 needles containing six electrodes throughout the left ventricle and septum were inserted into six pigs hearts in vivo. Five episodes of VF, each of 45 sec duration were initiated. Dominant frequencies (DFs) in the last Fourier transform power spectrum (a measure of activation rate) were calculated at each recording site and expressed in Hertz: Results: The transmural left ventricular DFs were always higher than the corresponding right ventricular DFs for each epoch. The DFs exhibited a gradient of decreasing DF from the epicardial levels to the endocardial levels in the left ventricular base (LVB) and left ventricular apex (LVA) and right ventricular base. The LVB endocardium DF was 8.5±1.0 Hz and LVB epicardium was 9.1±1.2 Hz and the LVA endocardium DF was 9.4±1.0 Hz and LVA epicardium was 9.1±1.1 Hz. In the right ventricular apex, this gradient of DFs was reversed until the 15-second epoch, after which the epicardial levels were higher than the endocardial levels and remained thus. The sites in the midst of the septum had higher DFs than those located adjacent the ventricular cavities. Conclusion: Estimated activation rates is not uniformly distributed across the myocardium. Nonrasteactiving LVA epicardial regions may be instrumental in the maintenance of fibrillation.

1041-10 Nonexcitatory Electric Signals Improve Systemic Hemodynamics and Cardiac Contractility in Conscious Dogs With Chronic Heart Failure

Kun-Lun He, Wallie Hadaef, Gang-Hua Yi, Hua Zhou, Satoshi Mohri, Jie Wang, Daniel Burkhoff, Columbia University, New York, NY

Background: Studies in papillary muscles and anesthetized animals have shown that application of electric currents during the refractory period can modulate myocardial contractility. Because patients with heart failure comprise a non-homogenous group, the objective of this study was to examine the effects of these cardiac contractility modulating (CCM) signals on systemic hemodynamics and left ventricular (LV) function in conscious dogs with chronic heart failure (CHF) due to either rapid ventricular pacing or repeated coronary embolization.

Methods: Six dogs were chronically instrumented to measure LV systolic pressure, mean aortic pressure, and LV dp/dt max, with the animals awake. CCM electrodes were placed on the LV aneurysm wall. LV wall thickness was induced by either rapid LV pacing (hype) or repeated coronary embolizations (n=4). For the 4 coronary embolized dogs, 12 screws were placed into the LV endocardium to ensure that the CCM electrodes were placed directly into the myocardium. Global and regional systolic work were also significantly increased (19%±8% and 27%±17% respectively) from the baseline value. Conclusions: Our data show that CCM significantly improves hemodynamics and LV contractility in dogs with mild heart failure. The effects of CCM on LV fibrillated function may results from the improvement of LV regional contractility. Future studies are aimed at determining the long term effects of CCM on patient hemodynamics, LV function, symptoms and exercise tolerance.