Abnormalities in Magnetocardiographic Atrial Signals in Patients With Focally Triggered Lateral Atrial Fibrillation

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Subtle abnormalities in atrial signal could serve as markers of foci or substrate for atrial fibrillation (AF). We applied high-resolution magnetocardiographic (MCG) mapping and signal-averaged electrocardiography (SAECG) to analyze atrial depolarization waves in 17 patients (age 25-59 years) who had focally triggered and in 18 healthy controls (age 22-50 years). During sinus rhythm, a 33-channel MCG over anterior chest and orthog- nal SAECG were recorded in a magnetically shielded room. Data was averaged using atrial wave template and high-pass filtered at 40 Hz. Onset and offset and root mean square amplitudes (RMS) of atrial signal (P) were determined automatically. Variation in atrial signal duration between channels was calculated as SD/P duration*100. In duplicate tests, coefficient of variation of P duration was 3% in MCG and 5% in SAECG. Results: P duration in MCG was similar in AF patients and controls, but variation in P duration was marked in AF patients (table). Also amplitude of the last 60 ms (RMS60) but not of the early part of atrial wave by MCG was reduced in AF patients. Similar determinations by SAECG did not reveal statistically significant differences between AF patients and controls. Conclusion: Magnetocardiographic mapping can reveal abnormalities within the later part of the atrial wave, where the left atrium is depolarized. These might indicate triggers or perpetuators of focally initiated paroxysmal AF.

Table

<table>
<thead>
<tr>
<th>MCG variables</th>
<th>AF patients</th>
<th>Controls</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>P duration (ms)</td>
<td>106±15</td>
<td>104±11</td>
<td>0.35</td>
</tr>
<tr>
<td>SD/P duration (%)</td>
<td>11.8±3.8</td>
<td>8.6±2.5</td>
<td>0.006</td>
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<tr>
<td>RMS60 (femtoT)</td>
<td>86±24</td>
<td>120±40</td>
<td>0.004</td>
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Safe Scanning, but Frequent Artifacts Mimicking Tachycardia During Magnetic Resonance Imaging in Patients With Inseparable Loop Records

J Rod Gimbel, Jamal Zarghami, Christian Machado, Parkwest Hospital, Knoxville, TN, Providence Hospital, Southfield, MI

Background: Patients (pts) with implantable devices are generally not permitted to undergo MRI because of potential deleterious interactions. While over 200 pacemaker pts and 6 ICD pts are reported to have undergone MRI, little has been reported regarding pts and 6 ICD pts are reported to have undergone MRI, little has been reported regarding

Methods: Eight pts underwent a total of 9 MRI scanning events. All patients had Reveal Plus ® (Medtronic, Minn, MN) ILRs. Seven cranial, one lumbar-spine, and one shoulder MRI were performed. All of the MRIs were performed with the understanding that the ILR was cleared moments before the scan and the integrity of the signal and the quality of the data recorded during the scan were of utmost importance. Each patient was questioned post MRI regarding any symptoms experienced during the scan.

Results: While no patient underwent monitoring during MRI, all patients denied experiencing any unusual cardiovascular or neurologic symptoms during MRI. Frequent wide and narrow complex tachycardias appeared as artifacts in the result of ILR exposure to the RF effects of MR scanning. Four of the 7 cranial scans produced an artifact mimicking tachycardia as did the lumbar spine and shoulder scan. None of the ILRs showed diminished signal integrity, altered programmed parameters, inability to communicate or be reprogrammed post MRI. No scanning artifacts compromising image interpretation were noted by the radiologists.

Conclusion: In this study, MRI was performed in ILR patients without harm to the patient or permanent damage to the ILR. MRI scanning of the Reveal appears safe. Artifact mimicking tachycardia was common, however, and must be excluded in any ILR patient undergoing MRI to avoid mistakenly attributing a supraventricular episode to the tachycardia artifacts produced from RF present in the MRI suite.

Reverse Left Ventricular Remodeling by Carvedilol Reduces the Spatial Dispersion of QRS Duration in Patients With Chronic Heart Failure: A Prospective Placebo-Controlled Study

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Background: Recent clinical trials have shown that carvedilol reduces the mortality in patients with chronic heart failure (CHF), while amiodipine has no effect on the mortality. However, the mechanism for these effects of carvedilol or amiodipine in patients with CHF remained to be fully clarified from the viewpoint of spatial dispersion of QRS dura- tion (S-QRSd), which we reported to be a prognostic marker of the mortality in CHF patients.

Methods: We prospectively studied 123 CHF patients with radiocnucleide left ventricular ejection fraction < 40% (29±7%), who were randomized to receive any of carvedilol (n=44), amiodipine (n=42) or placebo (n=37) in a double-blind fashion. Signal-averaged ECG and echocardiography were recorded before and one year after the entry. Sig- nal-averaged ECGs were recorded from the standard 12 leads and 10 extra-precordial leads (two intercostal spaces upper and lower V1, V2 and V4-6). Spatial dispersion of QRS duration (S-QRSd) was defined as the difference between the maximum and minimum of filtered QRS duration in all of the leads. Results: One year after the administration, carvedilol group had a significant decrease in S-QRSd (25.6±8.4 to 22.2±7.2 ms, p=0.0001), while there was no significant change in S-QRSd in amiodipine group (24.2±7.7 to 25.6±8.4 ms) but a significant increase in pla- cebo group (24.1±8.6 to 27.7±8.3 ms, p=0.009). In carvedilol group, left ventricular end- diastolic dimension (LVDd) significantly decreased (reverse remodeling) one year after the administration (62.3±8.7 to 59.5±7.7 mm, p=0.005), while there was no change in LVDd in amiodipine and placebo groups. There was a significant correlation between the changes of S-QRSd and LVDd (r=0.336, p=0.0002).

Conclusion: Carvedilol reduces S-QRSd in relation to left ventricular remodeling in patients with CHF, while amiodipine has no effect on S-QRSd, which might result in the different effects of these drugs on the mortality in patients with CHF.

The ECG and Heredity Arrhythmogenic Disorders

Tuesday, March 09, 2004, 2:00 p.m.-3:30 p.m.
Morial Convention Center, Room 254

2:15 p.m.

850-2 Value of Signal-Averaged ECG and Electrophysiological Testing in Identifying Arrhythmogenic Right Ventricular Dysplasia Patients Who Do Receive Implantable Cardioverter Defibrillator Therapy

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Background: Implantable cardioverter defibrillator (ICD) placement is commonly recommended for patients diagnosed with arrhythmogenic right ventricular dysplasia (ARVD). Although this approach protects against even a low risk of sudden cardiac death, the life- long implications of ICD in a young person are considerable. The aim of the study was to determine if the results of SAECG and electrophysiology study (EPS) are of value in identifying ARVD patients who are at particularly low risk of sudden cardiac death and whom may not benefit from ICD placement.

Methods & Results: The study population consisted of 42 ARVD patients (52% males, 41±12 yrs) implanted with an ICD and followed for 20±19 months. Among these patients, 11 (26%) did not receive ICD therapies i.e. no shocks and/or anti-tachycardia pacing. The mean filtered QRS duration (fQRSd) was 108±14 ms vs. 132±31 ms for the Therapy-Free group (p = 0.01). A higher proportion of Therapy-Free compared to therapy group had IQRsd<110 ms (61% vs. 15%, p=0.003) and a negative EPS (46% vs. 12%, p=0.01) respectively. In contrast, the therapy group was more likely to have IQRsd>110-120 ms (67% vs. 33%, p<0.001) and ≥120 ms (92% vs. 7%, p=0.01). A combined algorithm of IQRsd<110 ms and negative EPS was 100% predictive of a therapy free survival over a period of 67 months in these patients.

Conclusion: A simple algorithm that combines IQRsd with outcome of EPS is extremely predictive for identifying ICD therapy free survival in ARVD patients.