1018 Electrocardiography and Magnetocardiography

Wednesday, March 27, 1996, Noon–2:00 p.m.
Orange County Convention Center, Hall E
Presentation Hour: 1:00 p.m.–2:00 p.m.

1018-45 Identification of Patients With Sick Sinus Syndrome by Use of Atrial Early Potentials: A Prospective Study

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To evaluate whether low amplitude potentials early in filtered P wave, "atrial early potential", on the signal-averaged ECG (SAE) would be useful for identifying patients with sick sinus syndrome (SSS), we performed a prospective study in which consecutive 44 patients were enrolled. SAE was recorded through a band pass filter of 40–300 Hz with the P wave-triggering technique. The root mean square voltage for the initial 30 ms (EP30) and the duration of initial low amplitude signals < 4 μV (ED4) of filtered P wave were measured in the vector magnitude. The criteria of atrial early potential (EP) was defined as "EP30 < 3.0 μV and ED4 > 22 ms." SSS was diagnosed using the recordings of the conventional ECG, ambulatory 24 hour Holter monitoring, bedside monitorings with continuous ECG telemetry for at least 2 days or electrophysiological study. Patients were considered to have SSS if they had episodes of sinus arrest or sinoatrial block (with a pause > 2 sec), persistent and unexplained sinus bradycardia (< 40 beats/min), prolonged corrected sinus recovery time (> 600 ms) or sinoatrial conduction time (> 150 ms). Ten of 44 patients had EP on the SAE. EP30 was significantly lower (2.09 ± 0.57 vs. 4.21 ± 1.75 μV, $p < 0.0005$) and ED4 was longer (40 ± 21.4 vs. 12.7 ± 5.6 ms, $p < 0.0001$) in patients with than without EP. Seven of 44 patients had SSS. EP30 was significantly lower (1.87 ± 0.80 vs. 4.08 ± 1.81 μV, $p < 0.0005$) and ED4 was longer (51.8 ± 24.6 vs. 14.1 ± 6.8 ms, $p < 0.0001$) in patients with than without SSS. Six (60%) of ten patients with EP had SSS, while only one (3%) of the other 34 patients without EP had SSS. EP gave a sensitivity of 85%, a specificity of 89%, a positive predictive value of 60% and a negative predictive value of 97 % for the detection of patients with SSS. Thus, this prospective study demonstrated that atrial early potential could be a potent and accurate marker to detect patients with SSS.

1018-46 Computer-Aided 12-Lead ECG Analysis of P-Wave for Localization of Atrial Pacing Site

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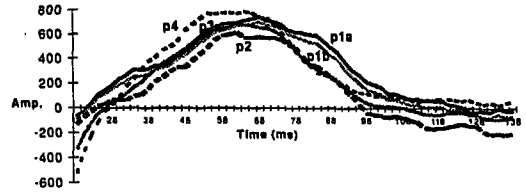
The analysis of the 12-lead ECG P-wave morphology during atrial pacing may be used to identify the pacing site. We hypothesized that a computerized ECG algorithm may make pace-mapping in the atrium more accurate and provide a quantitative method of comparison. We acquired on a BARD EP LAB system a digitized 12-lead ECG during unipolar high right atrial pacing using 5 mm spaced quadripolar catheter from poles p1 (p1a), p2, p3, p4, and then again at p1 (p1b). P-wave data were analyzed from 18 ms to 138 ms (120 ms total) post pacing stimulation. Averaged P-wave data are shown below:



Results of mean correlation values for each lead are shown:

	I	II	III	avR	avL	avF	V1	V2	V3	V4	V5	V6
p1b	0.98	0.96	0.94	0.99	0.98	0.96	0.95	0.98	0.97	0.96	0.94	0.91
p2	0.85	0.96	0.68	0.85	0.25	0.92	0.92	0.97	0.98	0.98	0.89	0.82
p3	0.63	0.56	0.50	0.55	0.15	0.51	0.63	0.62	0.65	0.43	0.72	0.24
p4	0.27	0.59	0.40	0.50	0.10	0.50	0.51	0.34	0.18	0.21	0.32	0.43

We conclude that this computer algorithm permits rapid identification of ECG differences during pacing from sites in the atrium about 5 mm apart, and this technique may be used to localize the site of pacing in relation to an atrial tachycardia "site of origin."

1018-47 Analysis of Activation-Recovery Intervals From Body Surface Maps After Radiofrequency Catheter Ablation in Patients With Wolff-Parkinson-White Syndrome

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To clarify changes in repolarization properties of periablation period, we analyzed activation-recovery interval (ARI) from body surface maps and relationship between activation time (AT) and ARI after radiofrequency catheter ablation (CA) in 24 patients with manifest WPW syndrome (Group A: 18 patients with left-sided; Group B: 6 with right-sided). AT and ARI were respectively defined as the duration between the QRS onset and the minimum dV/dt of the QRS and the interval between the minimum dV/dt of the QRS and the maximum dV/dt of the T wave. ARI and QRST time-integral values (QRST values) were measured on 87 body surface electrocardiograms, and the corrected ARI (ARIc) was calculated by Bazett's method. There were no significant differences in ARIc over the left anterior chest, where we found no significant changes in QRST values. However, ARIc significantly decreased 1 week after CA as compared with those 1 day after CA over the preexcited area, where QRST values were abnormally low (the back and right lower chest in Groups A and B, respectively). Correlation coefficients between AT and ARIc from 87 leads showed a significantly ($p < 0.0001$) stronger inverse correlation 1 week after CA (r = 0.64) than 1 day after CA (r = 0.46).

	1 day after CA	1 week after CA
ARIc (back) in Group A	346.7 ± 40.2	289.4 ± 55.0**
ARIc (right chest) in Group B	336.8 ± 16.9	291.8 ± 49.6*
ARIc (left anterior chest)	223.3 ± 26.4	221.5 ± 21.0

*$p < 0.005$ and **$p < 0.0001$ vs 1 day after CA, Values are mean ± SD (ms).

These findings suggest the prolongation of action potential duration (APD) near the connection site of the accessory pathway just after CA and the gradual recovery of the inverse correlation between AT and APD after CA in patients with manifest WPW syndrome.

1018-48 Electrocardiographic Criteria for Detecting Left Ventricular Hypertrophy in Patients With Combined Right Bundle Branch Block and Left Anterior Fascicular Block

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RBBB pattern on ECG can mask LVH, while LAFB can mimic it. Conventional 12-lead ECG criteria are therefore poorly predictive of LVH in patients with RBBB and LAFB. We sought improved ECG criteria for LVH in this group of patients. Accordingly, we reviewed echocardiograms of 48 patients who had RBBB and LAFB without ECG evidence for infarction. ECGs and echocardiograms were obtained within 4 weeks of each other. LVH was present in 28 of 48 patients by echocardiography. Correlative analyses were used to identify ECG parameters predictive of LVH.

When compared with conventional criteria, three new ECG criteria (boldface in Table) provided better *overall* sensitivity (SENS), specificity (SPEC), and positive and negative predictive value (PPV, NPV) for presence of LVH: (1) sum of R wave in lead I and R wave in avL (RI + RavL) > 13 mV; (2) R wave in lead avL (RavL) > 7 mV; and (3) R wave in lead I (RI) > 7 mV.

Criteria (mV)	SENS %	SPEC %	PPV %	NPV %
RI + RavL > 13	**81**	**68**	**75**	**75**
RavL > 7	**73**	**73**	**76**	**70**
RI > 7	**46**	**82**	**75**	**44**
RavL > 11	15	86	57	46
any R > 20	15	95	80	49
(R + S) V lead > 45	0	100	–	46
RV1orV2 + SV5orV6 > 35	4	95	50	45

Conclusion: RI + RavL > 13 mV, RavL > 7 mV, and RI > 7 mV offer improved ECG criteria for LVH in patients with RBBB and LAFB.

1018-49 Dispersion of the Repolarization Can Be Quantified by Magnetocardiographic Mapping in Patients With Malignant Tachyarrhythmias

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Dispersion of repolarization indicates abnormal spatial differences in ventricular activation and is related to malignant tachyarrhythmias. However, analysis is performed using the 12 standard ECG leads or less which may