Assessment of Microvolt T Wave Alternans on and off Beta-Blocker Therapy

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Background: Microvolt level T-wave alternans (MTWA) is increasingly used for arrhythmia risk stratification in patients prone to malignant ventricular tachyarrhythmias and sudden cardiac death; Antiadrenergic therapy by means of beta blocker (BB) administration may influence MTWA assessment using exercise testing, mainly because patients may not achieve a sufficient increase in heart rate. However the effects of BB on MTWA assessment have not been prospectively studied.

Methods: Consecutive patients scheduled for ICD implantation underwent noninvasive MTWA assessment using bicycle exercise testing (spectral method; CH2000, Cambridge Heart Inc) on and off BB treatment in random order. Antiadrenergic therapy was withheld for at least 5 half lives prior to the test off BB. Results of MTWA tests were compared using Fisher's exact test. Separate analysis was performed in a subgroup of patients who were on chronic amiodarone treatment.

Results: Twenty-two patients were included in the protocol. Of these, 17 were treated with amiodarone. Patients on BB had a resting heart rate of 71±10 bpm compared to 79±10 bpm of BB (p<0.05). The maximal exercise heart rate averaged 102±13 bpm to 107±13 bpm of BB (p=0.05). Whereas 13 pts (27%) tested MTWA positive on BB, the positivity rate was 47% (23/49) off BB (p<0.05).89% of an indeterminate test result decreased from 41% to 24% (p=0.09). In the subgroup of patients with amiodarone, no patient tested MTWA positive, irrespective of the status of BB therapy. The proportion of indeterminate tests was 88% on and 82% off BB therapy exclusively due to chronotropic incompetence during testing.

Conclusion: MTWA assessment is facilitated by withholding BB prior to testing by reducing the prevalence of indeterminate tests as a consequence of insufficient heart rate increase. Chronic amiodarone therapy results in chronotropic incompetence in almost all patients which precludes exercise-based MTWA assessment.

Hypertensive Stress Enhances Repolarization Heterogeneity

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Purpose: Several electrocardiographic indexes for heterogeneity of cardiac repolarization have been put forward: the QT interval, the QT-dispersion, the Tapex-Tend interval and singular value decomposition as a measure of the complexity of the T wave. Some postulate that the duration of longest action potential sizes are measured in the U wave. We studied the behavior of these alternative indexes under three different conditions: rest (R), normotensive gravitational stress (NORM) and hypertensive isometric stress (HYP).

Methods: Fifty-one healthy volunteers participated. A continuous 12 lead ECG and blood pressure were recorded while sitting (sitting with horizontal legs), NORM (sitting with lowered legs at increasing angles) and HYP (sitting with horizontal legs while performing a 3-minute handgrip at 30% of the maximal force). In each volunteer a leg-towing angle was determined at which the heart rate differed less than 10% from the heart rate during handgrip. This succeeded in 41 subjects, who constituted the final study group.

Results: Heart rate increased from 63 ± 9 during R to 71 ± 11 bpm during both NORM and HYP. Systolic blood pressure was 122 ± 15 in R, remianed 121 ±15 during NORM and increased to 151 ± 17 mmHg during HYP. QT and QTc were larger during HYP (405 ± 27 and 433 ± 17 ms) than during NORM (389 ± 26 and 421 ± 18 ms, P<0.001). QT dispersion did not differ significantly between HYP (51 ± 26 ms) and NORM (45 ± 22 ms, NS). The Tapex-Tend interval in V2 was larger during HYP (125 ± 16 ms) than during NORM (117 ± 15 ms, P<0.001). The distance between the apices of the T and the U wave was significantly larger during HYP (191 ± 44 ms) than during NORM (156 ± 36, P<0.001). Fixed and moving window singular value decomposition indexes were larger during HYP (0.14 ± 0.071 and 0.075 ± 0.032) than during NORM (0.089 ± 0.053 and 0.048 ± 0.022, P<0.001).

Conclusion: Most measures put forward as indexes of repolarization heterogeneity were larger during hypertensive stress than during normotensive stress. Hypertensive stresses, like mental stress, are associated with arrhythmogenicity in vulnerable hearts. Our study provides one possible explanation for this, because hypertensive stress enhances repolarization heterogeneity.

Optimal Prognostication From the 12-Lead ECG: Spatial Angle Between the QRs and T Wave Complexes

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Objective: To evaluate the prognostic value of a new criterion that combines measures from repolarization and depolarization by considering the orientation of the QRs and T axis.

Methods: Analyses were performed on the first ECG digitally recorded on 46,950 consecutive patients at the Palo Alto Veterans Affairs Medical Center since 1987. Females and patients with paced rhythms, WPW, BBs, IVC, LVH, atrial fibrillation and diagnostic Q waves were excluded from all analysis, leaving 31,074 patients with a mean age of 56 years. Using computerized trigonometric algorithms, spatial QRs, T axis and T lambda (the spatial Taxis deviation from normal reference direction) were synthesized by deriving X/Y2 leads from the 12 leads using the inverse Dower weighting matrix and similarly by using the unadjusted amplitudes from leads I, aVF and V2. Spatial QRs-T angle was categorized into three groups: normal (0 to 50º), borderline (50 to 100º) and abnor-

Management of Atrial Fibrillation

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Background: Dense spontaneous echo contrast (SEC) in left atrial appendage is associated with increased risk of thrombus formation. The risk of thromboembolism (TE) following electrical cardioversion is yet to be determined.

Methods: 133 patients (pts) mean age 72 ± 10 years, male 76.7% with non rheumatic atrial fibrillation (AF) 74% or atrial flutter (FL) 26%, without mural valve disease scheduled for Transesophageal Echocardiogram guided cardioversion between May 2000 to May 2003, were noted to have SEC. The SEC was categorized into 3 as less than mild in 75 pts (group 1), severe in 58 pts (44.6%) group 2, and those with TE (group 3). The success and complication rates following cardioversion were analyzed.

Results: Both groups were similar with respect to age, gender, diabetes, hypertension and rhythm. Univariate comparative analysis is summarized in the table below.

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