11:15 a.m.

814-2 Optimal Electrocardiographic Prediction of Cardiovascular Mortality

Kelly R. Richardson, Sung Chun, Victor Froelicher, Palo Alto Veterans Affairs Healthcare System, Palo Alto, CA, Stanford University Medical Center, Stanford, CA

Background: Multiple electrocardiographic (ECG) classification systems have been developed to assess cardiac injury, infarct size, LV function, hypertrophy and prognosis. Previous studies have been limited by inadequacies in size and follow up and have not provided comparison of multiple ECG criteria. **Methods:** Analyses were performed on the first ECG digitally recorded on 47,000 consecutive patients at the Palo Alto Veterans Affairs Medical Center since 1987. Paced rhythms were excluded from all analysis. Using computerized algorithms, the simplified Selvester Score, the Cardiac Infarction Injury Score (CIIS), and the Rhomhilt-Estes classification for LVH were calculated. In addition, Q waves and bundle branch block were coded. The main outcome measure was cardiovascular (CV) mortality; during a mean follow-up of 6 years there were 4,145 CV deaths. **Results:** The CIIS score ranged from -15 to 60 and the Simplified Selvester Score ranged from 0 to 15. Using Cox Hazard Function analysis, CIIS outperformed all other ECG classifications including Q waves, LVH, bundle branch block and the Selvester Score. Using a cut point of >30, the age and heart rate adjusted hazard ratio for CIIS was 2.4. The annual mortality for patients exceeding this cut point was 4.2% (CI 4-4.6) versus 1.2% (CI 1.1-1.3) for those who did not. After excluding ECG abnormalities excluded in prior studies (bundle branch block and LVH) similar results were obtained. **Conclusion:** The CIIS outperformed standard ECG criteria and the Selvester Score for predicting cardiovascular mortality. The CIIS should be calculated as part of all computerized ECG interpretations.

11:30 a.m.

814-3 Prognostic Significance of Quantitative QRS Duration

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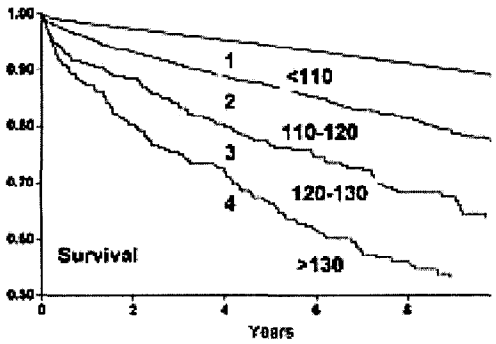
Background: QRS duration is an independent predictor of mortality in patients with left ventricular dysfunction. It has not been studied quantitatively in a general medical population.
Methods: Analyses were performed on the first electrocardiogram (ECG) digitally recorded on 47,000 consecutive patients at the Palo Alto Veterans Affairs Medical Center since 1987. ECGs exhibiting bundle branch block (BBB), electronic pacing, or Wolff-Parkinson-White were excluded leaving 44,290 patients (mean age 56±7 yrs, 90% males). There were 3,629 cardiovascular (CV) deaths during a mean follow-up of 6 years. Patients were classified according to a QRS duration score (QRSdursc). QRSdursc was also tested in a normal ECG subgroup likely to have normal ventricular function (n=31,858). Patients with BBB and paced rhythms were separately analyzed (n=2,623).
Results: A survival plot showed significant separation according to the QRSdursc.



After adjustment in the Cox model for age and heart rate, QRSdursc was a strong independent predictor of CV mortality. The hazard ratio for a score of 4 (>130 ms) was 2.6 (CI 2.5 to 2.7) with an annual mortality of 6% (CI 5 to 7%). The results were similar in patients with a normal ECG who were likely to have normal ventricular function. The relationship to CV mortality was also significant in patients with BBB and paced rhythms.
Conclusion: Quantitative QRS duration was a significant and independent predictor of time until CV mortality in a general population of patients.

11:45 a.m.

814-4 Turbulence Slope After Atrial Premature Complexes Is Significant Mortality Predictor in Patients After Myocardial Infarction

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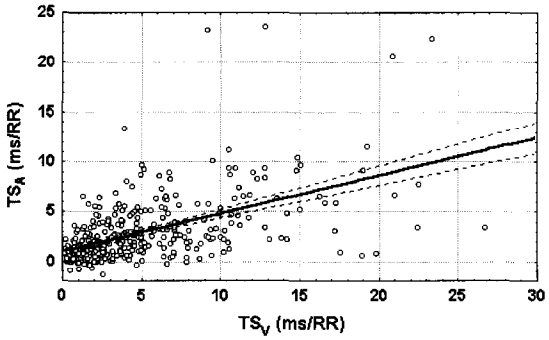
Background: Using atrial stimulation protocol we have shown that Heart Rate Turbulence is present after atrial premature complexes (APCs) and that indices of Turbulence Slope (TS) after ventricular premature complexes (VPCs) and APCs are significantly correlated. The aim of this study was to investigate whether TS after APCs (TS_A) may serve as a predictor of all-cause mortality in the placebo population of EMIAT trial.
Methods: TS after VPCs (TS_V) was quantified by standard method from baseline Holter recordings. The similar approach was used for determining TS_A. Population was dichotomised using TS_A cut-off point of 1.6 ms/RR.
Results: Both TS_V and TS_A were available in 364 patients and correlated moderately ($r = 0.54$, $p < 0.00001$, Figure). TS_A was 3.0 ± 3.3 and 2.0 ± 2.7 ms/RR ($p=0.014$) in survivors and non survivors within mean 614 days follow-up, respectively. $TS_A \leq 1.6$ ms/RR had a sensitivity of 39% and a positive predictive accuracy of 21% for total mortality. Univariate Cox's regression analysis showed that $TS_A \leq 1.6$ ms was associated with relative risk (RR) for all-cause mortality of 1.88 (95% CI 1.20 - 2.93, $p = 0.006$), but was considerably weaker than TS_V. In a multivariate Cox's regression model including TS_A and LVEF (dichotomised at 30%), TS_A remained a significant predictor of all-cause mortality in post MI patients - RR 1.74 (95% CI 1.11 - 2.71, $p = 0.02$).
Conclusion: In the placebo population of EMIAT trial, TS_A is a statistically significant predictor of all-cause mortality independent of LVEF.



Noon.

814-5 Natural History of New Left Bundle Branch Block in 134 Apparently Healthy Males: Mean Follow-Up of 16 Years

Ants Palm-Leis, Patrick J. Fitzsimmons, William B. Kruyer, US Air Force School of Aerospace Medicine, Brooks Air Force Base, TX

Background: The natural history of asymptomatic left bundle branch block (LBBB) is not well documented.
Methods: From 1957 to 2000, 205 asymptomatic male military aviators were evaluated at a central facility for new LBBB. Retrospective records review was performed for demographics and results of available noninvasive and invasive cardiac testing. Follow-up surveys were distributed. Clinical endpoints considered were significant coronary artery disease (CAD, maximum lesion ≥ 50%), idiopathic dilated cardiomyopathy (DCM) and permanent pacemaker implantation.
Results: *Initial Evaluation* Mean age of the 205 was 40.4 (+/- 6.2, range 25-59) years at the time of LBBB diagnosis. Of the 205, 135 (66%) had coronary angiography for occupational indications. Seventeen of 135 (13%) had clinical endpoints. Thirteen of 135 (10%) had significant CAD. Three (2%) had DCM (normal coronary angiography) and one (1%) required a permanent pacemaker. *Follow-up* Thus, 118/135 (87%) had no clinical endpoint initially. Follow-up of 1489 patient years (mean 16.2 years) was obtained on 92/118 (79%). An additional 18/118 (15%) developed a new clinical endpoint. Ten of 118 (8.5%) developed significant CAD (mean age 57.2 years, mean time to development 18.0 years). One with significant CAD also developed ischemic CM. Six of 118 (5%) developed DCM (mean age 44.6 years, mean time to development 6.8 years). Two of 118 (2%) died prematurely (ages 40 and 45 years) of unknown cause; both had normal coronary angiography initially. None required permanent pacemaker. Of the initial 135 patients, 8 (6%) died prior to age 60 from cardiac causes (mean age 47.1 years) and 4 (3%) from noncardiac causes (mean age 51.8 years).
Conclusion: In this population of asymptomatic, apparently healthy males with new LBBB, prevalence of significant CAD was low (10%). However, it was twice the estimated background prevalence in the overall military aviator population, suggesting a relationship between LBBB and CAD. DCM was rare (2%) upon initial evaluation. An additional 5% developed DCM within ten years and at relatively young ages. LBBB thus may be an early indicator of a myopathic process, suggesting a possible role for echocardiographic follow-up.