Nonspecific ST and T wave abnormalities on Resting ECG and Prediction of Cardiovascular Events and Detection of Ischemia in Asymptomatic Diabetics

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Background: Nonspecific ST and T wave abnormalities (NSSTTA) on resting ECGs are associated with increased cardiovascular risk, and portend similar hazard ratios to traditional risk factors, such as dyslipidemia, hypertension, and diabetes mellitus (DM). Although NSSTTA are often neglected, they could potentially enhance cardiovascular risk stratification. With contemporary treatment, the rate of cardiac outcomes in patients with DM has improved but these individuals remain at risk for myocardial infarction and cardiac death. There remains a need to identify a sub-group of patients with DM at high risk for cardiovascular events. The aim of this study was to evaluate the role of the baseline ECG in predicting myocardial perfusion defects and cardiac events in asymptomatic diabetics.

Methods: This was a secondary analysis of the Detection of Ischemia in Asymptomatic Diabetics (DIAD) study (Clinical trials # NCT00769275). A total of 1,123 patients with type 2 diabetes, free of symptoms of cardiac disease, were randomly assigned to screening screening (or no screening) with adenosine-stress myocardial perfusion and routine care by the patients’ primary provider. All participants of the DIAD study received a resting 12-lead ECG; 4 patients were excluded due to incomplete outcomes data. The Minnesota Code (MC) Manual of ECG Findings was utilized. Statistical analysis was conducted with Microsoft Excel and Statistical Analysis Software. The primary endpoints were myocardial infarction (MI) and cardiac death, and secondary endpoints were unstable angina and heart failure. The mean follow up was 4.8 years.

Results: The prevalence of NSSTTA on baseline ECGs was 18.2% (204/1,119). Of the 204 patients with NSSTTA, 93 had been randomized to MPI screening and 111 had not. Patients with NSSTTA versus those without NSSTTA had a higher incidence of abnormal stress (31% vs. 20%; \( \chi^2 = 4.7, df = 1, p = 0.03 \)), primary endpoints (6.4% vs. 2.1%; \( \chi^2 = 11, df = 1, p < 0.01 \)), and all-cause mortality (5.9% vs 2.3%; \( \chi^2 = 7.5, df = 1, p < 0.01 \)); NSSTTA also tended to be associated with a higher incidence of secondary events (2.9% vs 1.5%; \( \chi^2 = 1.9, df = 1, p = 0.17 \)). Patients with NSSTTA who were screened versus those not screened had a decrease in primary endpoints during follow up (4.3% vs. 8.1%; \( \chi^2 = 14, df = 3, p < 0.01 \)).

Conclusions: Among the participants in the DIAD study, NSSTTA were associated with 1) an abnormal stress test, 2) primary endpoints (MI and cardiac death), and 3) all-cause mortality, compared with those without NSSTTA. Patients with NSSTTA who were screened with MPI had a decreased incidence of primary endpoints. Diabetics with NSSTTA on baseline ECGs constitute a higher risk sub-group of patients without symptomatic cardiovascular disease. Further prospective studies are needed to determine whether screening patients with DM with NSSTTA improves cardiovascular outcomes and might represent an effective strategy in the treatment of DM patients.