

Improved Detection of Ischemic Heart Disease by Combining High-Frequency ECG Analysis with Stress Echocardiography

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Background: Analysis of high-frequency QRS components (HFQRS) were recently reported to improve the diagnostic accuracy of ECG treadmill test (ETT). We sought to evaluate the clinical usefulness of HFQRS analysis during exercise echocardiography (echoCG) in detecting ischemic heart disease (IHD).

Methods: We evaluated 156 pts (age 58±10, 103 men) who performed stress echoCG and either invasive angiography (n=57) or CT angiography (CTA, n=99), which were used as the gold standard for comparison. Exclusion criteria included indeterminate CTA, QRS>120ms, significant valve disease, resting wall motion abnormalities, previous cardiac surgery and insufficient maximal HR. ETT was performed using the HyperQ System (BSP Ltd, Tel-Aviv, Israel) that enables automatic ST-segment analysis and measures changes in HFQRS intensity during exercise. Pts with HFQRS intensity reduction of 50% or more in at least 3 leads were considered ischemic.

Results: Significant IHD was found in 48 pts (31%). HFQRS was significantly more sensitive than ST segment analysis, with similar specificity (Table 1). Stress echoCG combined with HFQRS was more sensitive than the conventional combination with ETT. HFQRS provided an incremental diagnostic value (p<0.001) over pre-test, ETT and echoCG parameters (Figure 1). Using optimized cut-off points, the combined model achieved sensitivity and specificity of 86% and 80%, respectively.

Conclusions: HFQRS analysis during stress echoCG is feasible and may provide additional information for the detection of significant IHD.