

**High-frequency QRS analysis compared to conventional ST-segment analysis in patients with chest pain after percutaneous coronary intervention referred for exercise tolerance test - a pilot study**

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**Background:** Exercise ECG testing in patients already treated with percutaneous coronary intervention (PCI) for the diagnosis of coronary artery disease (CAD) has a higher false-positive rate compared to men. In patients with chest pain (CP) submitted to exercise tolerance test (ex-ECG), the novel high-frequency QRS components (HFQRS-analysis) shows incremental diagnostic value over ST-segment-analysis. The aim of the present study was to prospectively test the diagnostic performance of ex-ECG with ex-HFQRS-analysis in patients already treated with percutaneous coronary intervention (PCI) referred to angiography again because of the CP.

**Methods:** The study included 43 patients (age 61±14 years) with CP, documented coronary artery disease already treated with PCI. They had normal conventional ECG at rest and troponin. Patients performed symptom-limited exercise test on recumbent bicycle prior to angiography. High-resolution ECG was acquired during the test and used for both HFQRS and conventional ST-segment analyses. HFQRS diagnosis was determined by computerized analysis, measuring the stress-induced reduction in HFQRS intensity. A decrease ≥50% of the signal of HFQRS intensity recorded in two contiguous leads, at least, was considered as index of ischaemia, as ST-segment depression ≥2 mm or ≥1 mm and CP on ex-ECG. Exclusion criteria were QRS duration ≥120 msec and inability to exercise. The diagnostic performance of HFQRS, ST-segment analysis and clinical interpretation of the exercise test were compared, using angiography as a gold standard.

**Results:** HFQRS provided sensitivity of 75% and specificity of 74% for detection of angiographically significant coronary obstruction (≥70% stenosis in a single vessel or ≥50% in the left main artery). HFQRS was more specific than exercise ECG test (74% vs. 50%, P<0.005), as well as more accurate (72% vs. 58%, P<0.01). The number of ECG leads with ischemic HFQRS response correlated with the severity of CAD.

**Conclusions:** In patients with CP after PCI submitted to ex-ECG, the novel ex-HFQRS-analysis shows a valuable incremental diagnostic performance over ST-segment-analysis. HFQRS analysis, as an adjunct technology to exercise stress testing, may improve the diagnostic value of the ECG, and reduce the number of unnecessary imaging and invasive procedures.