

High Frequency QRS Analysis - An Effective Technique for the Diagnosis of Stress Induced Ischemia?

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Background: Conventional 12-lead ECG is a widely used method for the diagnosis of ischemia caused by coronary heart disease. Stress ECG effectively combines time saving, device cost and cost of exam. Nevertheless, it shows wide variations in sensitivity and specificity. A new method for the diagnosis of ischemia, the high frequency QRS ECG, is essentially more sensitive than the conventional ST segment analysis. The aim of this study was to examine the diagnostic potential of the High Frequency ECG for the diagnosis of ischemia in patients with known coronary heart disease.

Methods: 25 patients (62 ± 11 years) with an anamnesis of coronary heart disease were included in this study. All of the patients performed a symptom-limited Stress ECG test. High frequency 12 lead ECG was obtained using the HyperQ™ System (BSP Biological Signal Processing LTD, Tel Aviv, Israel). The index for ischemia was the relative change in intensity of the high frequency QRS components (HyperQ™) during the stress test. Conventional 12 lead ECG was acquired simultaneously. The sensitivity of both high frequency ECG and conventional ECG was determined by comparison with coronary angiography and intravascular ultrasound. Results of the stress tests were analyzed blindly to the outcome of coronary angiography.

Results: 18 out of 25 patients (72%) with known coronary heart disease showed a significant coronary stenosis in one (72%) or two (28%) arteries. The HyperQ™ system detected 11 out of these 18 patients with a hemodynamic relevant stenosis. In contrast, conventional ST-T changes indicating ischemia were detected in 5 out of these 18 patients. The HyperQ™ showed a clear increase in sensitivity relative to conventional 12-lead stress ECG (72% vs. 27%). The specificity of the HyperQ™ was approximately 85%.

Conclusions: These results show that the high frequency ECG analysis is clearly a more sensitive technique for the detection of myocardial ischemia in patients with known coronary heart disease than conventional 12 lead analysis. Studies involving a larger patient population are required to establish the reliability of this technique. Other studies should examine the clinical usability of this technique in evaluating the severity of myocardial ischemia.

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