

High Frequency ECG in Detecting Ischemia in Patients with Chest Pain

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Background: Continuous monitoring of ST-segment changes from 12-lead ECG has been proposed to assist in the evaluation of pts with chest pain and acute coronary syndrome (ACS). We introduce a novel technology for detecting ischemia by analysis of high-frequency QRS (HFQRS) components. The aim of this study was to evaluate the usefulness of HFQRS for early diagnosis of ischemic episodes in pts hospitalized due to chest pain.

Methods: 43 pts (56±10 yo, 31 men) admitted to a chest pain unit for observation, ST monitoring, biomarker retesting and cardiac imaging (SPECT, CCT, Echo and PCI) were continuously monitored by high-resolution 12-lead ECG (12.5±3 hours). Pts were stratified by the likelihood of experiencing ischemic events: high (positive imaging test), medium (negative imaging with high risk of ACS by the ACC/AHA guidelines) and low (negative imaging with low or intermediate risk of ACS). Morphological HFQRS indices and conventional ST levels were extracted from the signal-averaged ECG. Receiver operating characteristics was used to determine cut-off values for HFQRS indices.

Results: ST-segment analysis was negative for ischemic events in all 43 patients. Positive HFQRS indices were obtained in 5 of 10 patients with high likelihood of ischemia (Fig A). HFQRS indices were negative in 7 of 9 pts with medium and 22 of 24 pts with low likelihood of ischemia. The number of positive HFQRS leads was directly related to the likelihood of ischemic events, increasing from 1.5±0.8 for the low-likelihood group to 2.6±1.3 for the high-likelihood group (p<0.005, Fig B).

Conclusions: HFQRS indices are superior to conventional ST monitoring in detecting ischemic episodes, in patients hospitalized with chest pain. HFQRS analysis is a promising technology for early diagnosis and management of ACS patients.

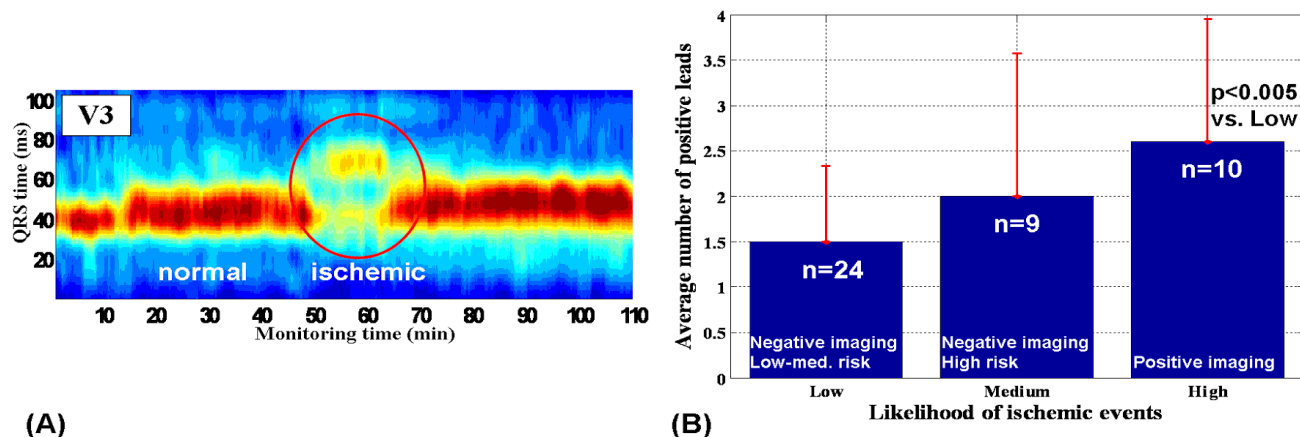


Figure 1: A HFQRS morphological change during suspected ischemic episode (A), and the average number of positive HFQRS leads vs. the likelihood of ischemic events (B).