Changes in Intra-QRS Frequency Distribution Induced by Exercise Stress Test and Percutaneous Coronary Intervention in Patients with Coronary Heart Disease

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Purposes: The aim of this study was to investigate the intra-QRS frequency distribution induced by transient myocardial ischemia. Methods: Sixty patients undergoing the exercise stress (TI201scintigraphy) and ten patients undergoing percutaneous coronary intervention (PCI) were subjects in this study. ECGs were recorded before and after TI201scintigraphy or PCI. The wavelet transform using Gabor function was applied to time-frequency analysis of ECGs. The frequency power during QRS was integrated every 80 scale bands, ranged from 1 to 150 Hz, (ITFP; integrated time frequency powers) by which an intra-QRS frequency distribution was represented. Results: The ITFP was changed in 47.5% cases with positive TI201scintigraphy. In 11 cases, the ITFP was significantly increased in the average frequency range from 72.2 to 90.3 Hz, and significantly decreased from 20.5 to 39.0 Hz in 8 cases after TI201scintigraphy. The similar changes in the ITFP induced by transient myocardial ischemia were observed during the time course of PCI. Conclusions: These results suggested that exercise-induced ischemia affects the distribution of frequency power within QRS complex. This analysis may offer a new information about invisible QRS changes by exercise-induced ischemia. Keywords: time-frequency analysis, myocardial ischemia, QRS complex