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QUANTITATIVE EVALUATION OF ASYNCHRONIZATION OF THE LEFT VENTRICLE USING PHASE ANALYSIS. N. Tamaki, A. Yoshida, H. Kadota, H. Kambara, and C. Kawai. Department of Radiology and Nuclear Medicine, 3rd Division, Department of Internal Medicine, Kyoto University Hospital.

Clinical evaluation of regional wall motion abnormality has been performed by submitting an equilibrium gated blood pool study to a pixel by pixel temporal Fourier analysis. In an attempt to evaluate asynchrony of regional wall motion quantitatively, a new method was developed. Temporal and spatial Fourier analysis allows the study of regional wall motion and quantification of regional wall motion abnormalities.

The phase analysis was utilized during coronary angiography and stress intervention study. The SD significantly elevated in 10 cases with myocardial infarction, while it was not changed in normal persons.

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Clinical evaluation of regional wall motion (normal, dyskinesis, akinesis and dyskinesis) was assessed by following three methods in 7 normals and 35 patients with transmural MI, undergoing contrast ventriculography. R.I. methods were consisted of wall analysis of end-diastolic and end-systolic image, movie format, and phase analysis. Phase analysis was the most useful method among three, and its sensitivity and specificity were 88% and 86%, respectively. Multistage supine and exercise blood pool scintigraphy was performed in 10 normals and 40 patients with documented coronary artery disease. New or further regional wall motion abnormalities by phase analysis was 3(27.4%) in 1 vessel disease (OMI, 11, angina 1, 9(64.3)) in 2 vessel disease (OMI, 13, angina 1) and 11(84.6) in 3 vessel disease (OMI, 11, angina 2).

We conclude phase analysis was the most appropriate method to evaluate regional wall motion analysis both at rest and during exercise.

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PHASE ANALYSIS OF EXERCISE BLOOD POOL SCINTIGRAPHY IN PATIENTS WITH CARDIOMYOPATHY. T. Konishi, M. Fujii, N. Horayama, N. Yamauchi and H. Masui. The First Department of Internal Medicine, *Department of Radiology, Mie University Hospital, Tsu. **Toshiba Nasu.

The left ventricular response to multistage supine ergometer exercise was evaluated in 7 patients with hypertrophic cardiomyopathy (HCM), 7 patients with hypertrophic obstructive cardiomyopathy (HOCM), and 7 normals (N). The left ventricular ejection fraction (LVEF) was calculated as an index of LV global function. For evaluation of LV regional wall motion abnormalities, Fourier analysis was applied to pixel time activity curve up to third harmonics, and then cardiac functions were assessed with phase, amplitude, peak negative dV/dt, peak positive dV/dt and regional EF. In N group, LVEF increased from 62.8% per cent at rest to 77.7% per cent with exercise. Similarly, in HCM group, LVEF increased from 74.2% per cent at rest to 79.2% per cent with exercise. In contrast, in HOCM group, LVEF decreased from 75.7% per cent at rest to 70.4% per cent with exercise. No regional motion abnormalities were not detected in both N group and HCM group. However, in 5 of 7 patients with HOCM, exercise-induced regional wall motion abnormalities were found in high pressure chamber which seems to be main factor of decreased LVEF during exercise.

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Temporal Fourier analysis was applied to the processing of equilibrium gated blood-pool studies on a pixel-by-pixel basis, to obtain information about the pattern of ventricular motion and co-ordination in normal hearts and in others with myocardial infarction and conduction abnormalities (RBBB and pacing implantation).

In order to evaluate them quantitatively, we have constructed a distribution histogram of the LV & RV phase in radian versus activity weighted pixel and calculated the delay of phase between both ventricles.

The phase image indicated almost synchronous contraction of the both ventricles with a narrow peak in their histogram in the normal cases.

On the contrary, in the cases of myocardial infarction and conduction abnormalities, their phase image indicated regional wall motion abnormalities and asynchrony and asynchrony of the both ventricles with broader peak in their histogram, so that the delay of phase between two ventricles was remarkable.

In conclusion, our study indicates that cardiac functional imaging by phase analysis provides an accurate, non-invasive visual means of detecting and localizing abnormalities of ventricular contraction.