EVALUATION OF LV CONTRACTION AND RELAXATION ABNORMALITY IN THE PATIENTS WITH MI

Department of Nuclear Medicine and Radiological Sciences, Tokyo Metropolitan Geriatric Hospital, Tokyo

In order to evaluate the regional contraction and relaxation abnormalities of LV, we performed Fourier approximation to regional volume curve using first and second harmonics and calculated multiple parameters as follows: amplitude (Amp), phase, regional ejection fraction (REF) and ejection time (RET), peak ejection rate (PER) and filling rate (PFR), peak ejection time (PFT) and filling time (PFT). Detectability for abnormality of each parameter was compared in 30 cases with myocardial infarction (MI). All cases with MI had regional wall motion abnormality by LGV. In comparison on color functional images, conventional Amp & phase images showed no abnormality in 10 out of 30 cases with MI. However, by adding the new parameters all abnormalities were detected except one case. Mean values were calculated using Histogram. PER & PFR showed good correlation with LVEF, however PFT showed no correlation with LVEF. Decreased PER & PFR and delayed PFT were noted at the hypokinesia, akinetic and dyskinetic areas compared with the normokinetic areas. Multi-parameter analysis was more useful to detect the wall motion abnormality than conventional Amp & phase analysis only.


Fourier analysis is a useful method to detect regional left ventricular (LV) wall motion abnormality. A multi-gated pool image (MGPI) was attempted in 33 patients with and without post-infarction LV aneurysms and 7 with angiina pectoris. RI MGPI was performed by equilibrium method at the LAO projection. The value of SD, as a fluctuation of phase was computed from the histogram of phase distribution by using temporal Fourier analysis. The determination of ejection fraction (EF) using RI MGPI was found to be more accurate than that of patients without CHF. Thus, we concluded that the value of SD was considered as a useful indicator for non-invasive quantitative evaluation in the cases with post-infarction aneurysm.


For the more quantitative evaluation of post-infarction left ventricular (LV) aneurysm, temporal Fourier analysis using RI multigate pool images (MGPI) was attempted in 33 patients with and without post-infarction LV aneurysms and 7 with angina pectoris. RI MGPI was performed by equilibrium method at the LAO projection. The value of SD, as a fluctuation of phase was computed from the histogram of phase distribution by using temporal Fourier analysis. The determination of ejection fraction (EF) using RI MGPI was more accurate than that of patients without CHF. Thus, we concluded that the value of SD was considered as a useful indicator for non-invasive quantitative evaluation in the cases with post-infarction aneurysm.


The ventricular emptying performance in patients of congenital heart disease (CHD) with left to right (L-to-R) shunt was studied by Fourier analysis of multi-gated cardiac blood-pool data. Using global ventricular time-activity curves, phase angle and amplitude at fundamental frequency of left and right ventricles (LV and RV) were computed. Values of interventricular phase difference [D(phase)] and amplitude ratio of RV to LV [R(amp)] were calculated. In 10 non-cardiac subjects, mean (standard deviation) value of D(phase) was 1.7 ± 0.5 degrees (d) and that of R(amp) was 0.5 ± 0.20. In 19 patients of ventricular septal defect (VSD), D(phase) increased in proportion to the ratio of pulmonary to systemic blood flow (Qp/Qs) (r = 0.903, p = 0.001). Especially, those with large L-to-R shunt (Qp/Qs > 2.0) showed significant RV phase lag over 18 d. In 9 patients of patent ductus arteriosus (PDA), no RV phase delay was seen. Mean values of R(amp) were considerably decreased in cases with PDA and significantly increased in 11 patients with atrial septal defect. Values in cases with VSD, however, were distributed within normal range. This method is highly valuable for pathophysiologic investigation and differential diagnosis of CHD with L-to-R shunt.

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