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THE NEW ANALYSIS OF ENDOSYSTOLIC TIMING BY QUADRATIC APPROXIMATION OF THE VOLUME CURVE. (COMPARISON WITH THE FIRST FOURIER ANALYSIS) K.Takahashi, A.Komatani, K.Yamaguchi, T.Kanaya, Yamagata University School of Medicine.

Phase analysis by the first Fourier approximation of the volume curve will not represent an accurate timing of endodiastolic point, especially in case of longer diastolic period than systolic one. We propose the new method of phase analysis using the method of least squares.

In this new method the regional volume curve was approximated to quadratic equation ($y=ax^2+bx+c$) in the half range of one beat about the center of the minimum point of the volume curve. Endosystolic phase was calculated to $-b/2a$. Functional image of the distribution of endosystolic timing was displayed based on the shift time (msec) from the firstest pixel of the ventricle.

In the comparison of the first Fourier analysis, our method was much superior in the detection of ischemic portions and have good relation with the severity of coronary artery stenosis.

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ASSESSMENT OF HIGHER HARMONICS OF LEFT VENTRICULAR VOLUME CURVE. S.Natsuzumi, K.Matsumoto, T.Shiraishi, Y.Tanaka, H.Koito, H.Yoshioka, T.Iwasaka, A.Sakai and M.Inada. Kansai Medical University. Osaka.

We assessed higher harmonics of left ventricular volume curve obtained by radio-nuclide angiocardiology with Fourier analysis. Though there were statistical fluctuations in the measured value, we could approximate left ventricular volume curve with 2 or 3 harmonics approximation of Fourier series. In amplitude, 2nd harmonic could be representative of higher harmonics. Left ventricular ejection fraction had no relation with the amplitude or phase of 2nd harmonic. So we made a resurge curve to assess the amplitude and the phase simultaneously. The resurge curves showed representative three patterns with left ventricular function.

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1ST PASS LEFT VENTRICULAR PHASE ANALYSIS BY A MULTICRYSTAL GAMMA CAMERA. R.Futatsuya, H.Seto, T.Kamei, N.Furumoto, Y.Ishizaki, M.Hada, M.Kakishita, T.Sugimoto and J.Yamanishi. Toyama Med. and Pharm. University Faculty of Medicine, Toyama University. Toyama.

Left ventricular phase analysis (LVPA) to the data by 1st pass angiocardiology with a multicrystal camera was performed in 22 patients with coronary arterial disease (CAD) and 15 normal controls. Sensitivity, specificity and accuracy of the amplitude image for wall motion abnormality (WMA) by contrast ventriculography (LVG) were 86.7, 100.0 and 93.5% respectively, which were very high and equivalent to those of the regional ejection fraction image. Sensitivity, specificity and accuracy of the phase image were 60.0, 100.0 and 80.6% respectively. All dyskinetic regions (4/4) show a delay in the phase value. In 3 of 7 patients with CAD and normokinesia by LVG, the phase images show delays in the phase value in the territory of the stenotic vessels without the amplitude image abnormality. The standard deviation of the left ventricular phase distribution (SDLVDP) in dyskinetic patients ($22.58 \pm 4.38^\circ$) was significantly higher than in normal controls ($5.60 \pm 0.84^\circ$). ($p < 0.001$) From these results, amplitude image is accurate to detect WMA generally, and the phase image and SDLVDP are accurate to detect the dyskinetic region. In conclusion, 1st pass LVPA by a multicrystal camera is useful to assess WMA in CAD.

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DIAGNOSTIC VALUE OF PHASE ANALYSIS IN PATIENTS WITH OLD MYOCARDIAL INFARCTION. Y.Koga, H.Shinohara, S.Masumi, K.Harumi. Showa University, Fujigaoka Hospital. Yokohama.

Phase analysis is a sensitive method for detecting and characterizing of global and regional wall motion abnormalities in myocardial ischemia. In order to assess its value rest equilibrium blood pool images was recorded in the modified LAO projection in 36 pts (22 with old myocardial infarction (OMI), 14 without cardiac disease and normal EKG (NOR)). The standard deviation of the left ventricular peak in the phase distribution histogram (SDP) is 8.5 ± 4.1 degree in NOR. The OMI were divided into four groups according to the defect size in rest Tl-201 myocardial scan: in group 1 minimal defect size to group 4 large defect size. Good correlation was seen between SDP and defect size of rest Tl-201 myocardial scan. (19.5, 17.5, 27.8 and 52.8 respectively). And good negative correlation was also seen between global left ventricular ejection fraction (EF) and SDP. ($Y=80.9-2.13X$, $r=-0.814$, $p=0.01$) 6 pts with ventricular aneurysm in OMI group showed higher SDP/EF ratio than the pts without aneurysm. The results indicate phase analysis of left ventricular multigated study is a valuable diagnostic method in old myocardial infarction.