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ASSESSMENT OF LEFT VENTRICULAR DIASTOLIC PROPERTIES IN ISCHEMIC HEART DISEASE. H. Koito, Iwasaka, H. Yoshioka, S. Natsumuzi, K. Matsumoto, T. Shiraishi, A. Sakai and M. Inada. Kansai Medical University. Osaka.

To assess the resting left ventricular diastolic properties in 47 patients with angina pectoris (A.P.) and 119 patients with old myocardial infarction (OMI-1:EF  $\geq$  55% 55 cases, OMI-2:EF < 55% 64 cases), we analyzed global left ventricular volume curve obtained by radionuclide angiocardiology with Fourier analysis, and we made a resurge curve with the value of first harmonic longitudinally and 2 harmonics approximation horizontally. There are no significant differences in EDV and CO between A.P. and OMI-1. But there are significant differences in  $D_E$  and  $D_L$ , expressed as the tangential slope at mid-point of the early and late half diastolic phase respectively, among three groups. We concluded that the old myocardial infarction with normal EF, CO and EDV has changes in diastolic properties.

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EFFECT OF LEFT VENTRICULAR (LV) ASYNERGY ON LV PUMP FUNCTION IN PATIENTS WITH MYOCARDIAL INFARCTION: ESTIMATION BY PHASE ANALYSIS OF RADIONUCLIDE VENTRICULOGRAPHY. Y. Tsuneoka, Y. Ishida, K. Yamamoto, B.H. Kim, T. Hiraoka, M. Fukushima, M. Matsumoto, M. Inoue, H. Abe, K. Kimura\*, K. Kusumi\* and Y. Nakamura\*. 1st Dept. of Med. & Div. of Nucl. Med\*, Osaka Univ. Med. School, Osaka.

We estimated the effect of LV asynergy (AS N) on LV pump function in patients (pts) with prior myocardial infarction (MI) at rest (R) and during exercise (EX) using Fourier phase analysis of radionuclide ventriculography (RV G). RVG was performed in 12 normals (NL) and 24 pts with MI at R and during symptom-limited maximal EX. LV ejection fraction (LV EF) was calculated by the variable ROI method. LV ASN was estimated by the standard deviation (SD) of phase distribution within LV-ROI in each phase images. Results: The SD at rest showed larger value in MI ( $17.3 \pm 6.8^\circ$ ) than in NL ( $7.9 \pm 1.5^\circ$ ), and it correlated well with LVEF in total subjects ( $r = -0.85, p < 0.01$ ). During EX, the SD showed a significant increase in MI ( $21.3 \pm 7.0^\circ$ ) but no remarkable change in NL ( $7.7 \pm 1.3^\circ$ ). The EX-SD also correlated well with EX-LVEF ( $r = -0.86, p < 0.01$ ) in all subjects. In addition, a significant correlation was observed ( $r = -0.66, p < 0.01$ ) between increases in SD ( $\Delta$ SD) and LVEF ( $\Delta$ EF) during EX. These results suggest that LV ASN has an important effect on LV pump function at R and during EX.

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USEFULNESS OF PHASE ANALYSIS FOR ESTIMATION OF LEFT VENTRICULAR FUNCTION IN ISCHEMIC HEART DISEASE. T. Kanaya, Y. Watanabe, I. Tonooka, S. Sato, K. Tsuiki, S. Yasui, K. Takahashi, A. Komatani, and K. Yamaguchi. Yamagata University School of Medicine. Yamagata.

We evaluated left ventricular function by using phase analysis of stress radionuclide angiocardiology in 7 normal subjects and 35 patients (angina pectoris: AP, n=15; myocardial infarction: MI, n=20). Upright graded bicycle ergometer exercise was performed on the subjects. Phase analysis was performed on first-pass scintigrams acquired in  $30^\circ$  RAO projection. Phase and amplitude image analysis was performed using the first harmonic of the Fourier transform (F method) and quadratic spline fitting method (E-S method). In an attempt to evaluate asynchronous contraction quantitatively, maximal phase delay (MPD) and standard deviation (SD) of the phase histograms distributed within left ventricle were calculated. In AP group, phase delay in an abnormal segment at peak exercise differed from that at rest ( $p < 0.01$ ) whereas SD at exercise did not differ from that at rest. In MI group, coronary score was correlated with MPD (F method:  $r = 0.59$ , E-S method:  $r = 0.82$ ) and LVEF was correlated with MPD (F method:  $r = -0.50$ , E-S method:  $r = -0.70$ ). We conclude that phase analysis by E-S method provides a more reliable quantitative assessment of left ventricular performance than that by F method.

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A STUDY ON ABNORMAL MOVEMENTS OF THE CARDIAC WALL IN MYOCARDIAL INFARCTION. APPLICATION OF THE REGIONAL PHASE MAPPING TECHNIQUE. S. Hayashi, T. Tsuda, Y. Yazawa, Y. Arai, T. Ozawa and A. Shibata. First Department of Internal Medicine, University of Niigata. S. Hama and T. Mitani. Kido Clinic. Niigata.

In 22 cases of myocardial infarction and eight controls, existence of abnormal movements of the cardiac wall was examined by means of the Fourier analysis of gated radionuclide angiography. The end-diastolic phase count (EDC), end-systolic phase count (ESC), maximum count (MAXC) and minimum count (MINC) were determined from respective Pixel count curves of the image of LAO  $45^\circ$ , and 1)  $EF_1 = 100 \times (1 - ESC/EDC)$ , 2)  $EF_2 = 100 \times (1 - MINC/MAXC)$ , and 3) phase characteristics were calculated. The circular volume was partitioned from the center into eight sections. On each section, mean values 1) - 3) and their standard deviations were calculated in order to compare each section with regard to the control. The following conclusion could be reached from the result.

There are three forms of hypokinesia as classified according to typical wall movements as follows:

- I. The absolute amount of wall movements decreases, but phase delay are small.
- II. The decrease of absolute amount of wall movements is small, but phase delay are great.
- III. The absolute amount of wall movements decreases, and phase delay are great.