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DETECTION OF MULTI-VESSEL DISEASE IN PATIENTS WITH OLD MYOCARDIAL INFARCTION BY EXERCISE STRESS GATED CARDIAC BLOOD POOL IMAGING.

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The ability of exercise gated cardiac blood pool imaging to detect multi-vessel coronary artery disease in patients with old myocardial infarction was assessed.

Fifteen of twenty (75%) patients with multi-vessel disease (MVD) but none of eighteen patients with single vessel disease (SVD) had a decrease in ejection fraction (EF) at least 5 percent units from rest to exercise ($p < 0.001$). The change of end-systolic volume (ESV) with exercise was inversely correlated with the change of EF ($r = -0.82$, $p < 0.001$), and the increase in ESV more than 15% was noted in eleven patients with MVD (55%) but only in one in SVD (6%, $p < 0.001$). A new wall motion abnormality developed in eleven patients with MVD (55%) only.

In patients with myocardial infarction, exercise induced reduction of EF was highly sensitive (sensitivity 75%) and specific (specificity 100%) in detection of MVD, and no further improvement in sensitivity was resulted including the increase in ESV and newly developed wall motion abnormality.

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RADIONUCLEAR OBSERVATION ON SYSTEMIC HEMODYNAMICS IN PATIENTS WITH MYOCARDIAL INFARCTION DURING EXERCISE TEST (PART 2).

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In order to evaluate the changes of cardiac function after acute myocardical infarction (AMI), we studied systemic hemodynamics during exercise in 12 controls and 14 patients with AMI 38±12 days (mean±SD) after the onset by the radionuclear method (multigate). 0.5 Watt/kg and 1.0 Watt/kg of dynamic exercise were given by supine ergometer. According to the changes in left ventricular ejection fraction (EF) during exercise, the patients were divided into the 2 groups, group I (n=10; age, 61±7 yrs) and group II (n=4; 52±8 yrs). Group I showed increased EF during exercise while group II showed reductions or no changes in EF. The same protocol was repeated 17±12 months after the first examination. In group I, EF increased significantly at rest and during exercise comparing with that at the first examination. As a result, no difference was observed in EF between controls and group I at rest or during exercise at the second examination. On the other hand, group II showed markedly reduced EF during exercise at the second examination.

In summary, the observation of EF during exercise seems to be important to predict the recovery of cardiac function in patients with AMI.

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MANIFACTURE AND EVALUATION OF A DYNAMIC CARDIAC PHANTOM FOR ECG GATED BLOOD-POOL SCINTIGRAPHY.

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The purpose of this study is to manufacture and evaluate a dynamic cardiac phantom simulating the pumping ventricle for the standardization and quality control of MUGA method. The phantom consists of a buffer tank, the rubber cardiac section, the acrylic chest section, the drive unit whichincludes a stepping motor. The trigger signals simulating R waves were produced by the drive unit to be fed into the computer system simultaneously with the image data. MUGA images were recorded for the evaluation of the dynamic cardiac phantom.

The ventricular volume curves obtained from the phantom model comprised of 5 successive phases as observed in physiologic volume curves. With respect to the reproducibility, both the intra-day and inter day variances for the ejection fraction obtained by MUGA method were very small(CV: 0.81% and 1.48% respectively). The abnormal regional wall motion was simulated by attaching the hard rubber sheet on the cardiac section. SPECT images could be taken by rotating a gamma camera around the cardiac section of the phantom.

The dynamic cardiac phantom should prove useful for the standization and quality control of MUGA method.

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A NEW METHOD TO ELIMINATE BACKGROUND COUNT FROM GATED CARDIAC POOL IMAGE (ITERATIVE CONSTANT SUBTRACTION METHOD).

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To obtain left ventricle volume curve and ejection fraction with multi-gated pool image,it is important that background is accurately subtracted from each image. We devised new method to eliminate background exactly. A constant image of approximatly 5% of maximum counts in left ventricle ragion was created with computer,then N kind of multi-subtraction pool images were created by iterative subtraction of on time of constant image (n=0,1,2•••N). Creating time activity curves (TACs) of these image by setting ROI on left ventricle,pattern of these TACs were analyzed. Each TAC was normalized by parallel shifting to the starting point of TAC of non subtracted(original) image(n=0). The TACs subtracted insufficiently are completely overlapped by normalized one,however,along with oversubtraction,these TACs leaves by degrees from the overlapped curve. Therefore,there is critical point of leaving from it and subtraction count to obtain TAC of the critical point corresponds to the true background count. For searching critical point,a curve was created from each fixed ROI count in each ES frame of N kind of subtracted images. Critical point was determined by intersection of straight line and curved line of this curve.