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ANALYSIS OF LEFT VENTRICULAR FILLING IN PATIENTS WITH CORONARY ARTERY DISEASE: ASSESSMENT BY RADIONUCLIDE VENTRICULOGRAPHY USING FORWARD AND BACKWARD ECG GATING TECHNIQUE.

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We have evaluated left ventricular filling during supine bicycle exercise(Ex) in patients(pts) with coronary artery disease(CAD) by radionuclide ventriculography using forward and backward ECG gating technique. Seven normal subjects(N), eight pts(MI) with myocardial infarction and 15 pts(EA) with effort angina were studied. Peak filling rate(PFR) and filling fraction(FF) at the first third of diastole were employed as indicies for diastolic filling. In N PFR increased from 2.6 ±0.4 at rest(R) to 4.7±1.0 EDV/sec during Ex ($p<0.001$). There was no significant difference between FF at R and during Ex(48±8 vs 49±10%,NS). In MI PFR increased from 1.7±0.6 to 3.6±1.0 EDV/sec during Ex($p<0.001$). FF in MI were 31±12 at R and 29±14% during Ex(NS). In EA PFR also increased during Ex(2.0±0.5 vs 3.4±0.8 EDV/sec,$p<0.001$) but the extent of increase in PFR was smaller than that in N. During Ex, FF in EA decreased from 38±9 to 31±9% before the development of chest pain and further decreased to 27±7% during angina.

These results indicate that left ventricular diastolic filling seems to be impaired before the appearance of clinical evidence of ischemia.

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EVALUATION OF LEFT VENTRICULAR FUNCTIONAL RESERVE BY MULTIGATED BLOOD POOL IMAGING DURING NITROGLYCERIN DRIP INFUSION.

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To evaluate LV functional reserve, we applied nitroglycerin(NTG) drip infusion(DIV) instead of NTG tablet or bolus injection as unloading agent for obtaining a well spatial-resolution image in multigated blood pool imaging. NTG(16.7-100μg/min) has been injected by DIV to 31 patients, which inciude coronary artery disease(CAD), hypertensive heart disease(HHD), congestive cardiomyopathy(CCM), until the heart rate was increased by at least 5 beats a minute without elevation of their blood pressures, and sublingual tablets were given to the another three cases. Standard deviation of heart rate measured each minute during imaging in sublingual method was significantly larger than that in DIV method(4.9±1.4/min and 2.2±1.3/min,respectively,$p<0.005$). In 8 patients with CAD,3 with HHD and 2 with CCM, of which we evaluated LV functional reserve, NTG increased global LV ejection fraction from 51.6±13.2% to 56.6±12.9%($p<0.05$) and also significantly improved regional wall motion and radial chord shortening in posterolateral segment. These results suggested that the drip infusion method could be a better approach of NTG unloading rather than the sublingual one for equilibrium multigated blood pool imaging.

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EVALUATION OF LEFT VENTRICULAR FUNCTION TO EXERCISE IN PATIENTS WITH CORONARY ARTERY DISEASE BY GATED BLOOD POOL IMAGING.

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With the purpose to evaluate the response of left ventricular ejection fraction to exercise,ECG gated equilibrium cardiac blood pool scintigraphy was performed in LAO projection. The global EF (GEF) and regional EF (REF) were obtained at rest and on exercise in 5 normal subjects (NS), 13 cases of myocardial infarction (MI), 8 cases of angina pectoris (AP). REF calculated by Maxi Star program was compaired with the redistribution of 201-Tl SPECT short axis image.
GEF increased in NS,anterior MI and inferior MI,but reduced in AP.(NS 73±3% to 83±4%, anterior MI 43±11% to 46±11%, inferior MI 63±7% to 69±9%, AP 66±8% to 62±8%)
REF at rest was prominently decreased in basal septal region and apical septal one in anterior MI,but characteristic localization was not observed in inferior MI. REF onexertion constantly increased in NS on each region,but no similar pattern was observed in infarction cases.
In AP REF decreased on exertion in the region which the redistribution of 201-Tl scintigram was seen.

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ASSESSMENT OF REGIONAL LVEF AND ASYNCHRONOUS CONTRACTION IN ISCHEMIC HEART DISEASE BY REST/EXERCISE BLOOD-POOL STUDY.

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This study is undertaken to assess regional left ventricular(LV) function in relation to LV asynchronous contraction during exercise(Ex).

Rest and serial Ex(25w-75w) gated blood-pool study(Tc-99m) of 6 patients with LV aneurysm(LVan), 4 with stable angina pectoris(AP) and 4 normals(N) were evaluated in LV regional ejection fraction (REF) and phase analysis.

1)In LVan, global LVEF increased with Ex significantly and REF showed various responses to EX. Global LVEF in AP indicated similar change with N during Ex and REF declined slightly in antero-apical segment, corresponding to stenotic left anterior descending coronary artery.

2)The ventricular phase distribution histogram was made to calculate the standard deviation(SD) as an asynchronous parameter. LVSD was higher in LVan than N and AP at rest, suggesting asynchronous contraciton, and it declined to near the normal range during Ex, to related with the improvement of RVEF/LVEF ratio in LVan.