intervention study such as exercise loading, and it was substantiated that this type of approach could surely potentiate the regional information, if a pertinent analysis is applied as we did here.

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NONINVASIVE DETECTION OF MYOCARDIAL ISCHEMIA FROM MYOCARDIAL SCINTIGRAPHY IN COMPARISON WITH CORONARY ANGIOGRAPHY

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To evaluate the size and location of myocardial ischemia quantitatively, myocardial perfusion imagings were studied clinically in the patients with coronary artery diseases.

(1). Clinical evaluation of various radiopharmaceuticals for myocardial imaging

Myocardial scintigraphies were performed in 185 cases of ischemic heart diseases using the potassum analog agalog agents (131-Cs, 81-Rb, 201-Tl). In the present study, thallium is most suitable for the detection of the perfusion defect, which has adequent gamma-energies and half lives. And the perfusion defects correlated best in thallium images in comparison with 81-Rb, 131-Cs, where the decay of 81-Rb to the noble gas, 81m-Kr would be applied to the measurement of regional myocardial blood flow in addition to the imaging. However, additional lead shielding was required for imaging because of abundant high energy gamma emissions.

(2). The location of myocardial infarction from thallium scintigraphy

Thallium myocardial imagings were performed in 44 cases of myocardial infarction. In 42 of all, the location determined from conventional ECG was coincided with that of image defect on a scintigram except the subendocardial infarction. Posterior defects were shown in 9 of 15 cases of inferior infarction and in the cases of pure posterior infarctions, the defects were detected clearly by the perfusion imaging. Therefore, this method is useful to detect the posterior infarction as well as anterior infarction. In comparison with angiographic findings, the location of defect area was correspond to the abnormally contracted region demonstrated on LVG. And findings of stenosis or obstruction in CAG did not show close correlation to the image abnormalities. In 3 cases of infarction, image defects were shown despite of under 50% stenosis of coronary arteries. And 7 cases of angina pectoris which had complete obstruction of coronary artery showed no defect on a scintigram. From these data, thallium perfusion images provide precise location of infarct and reflect the extent of necrotic mass, which show the viability of myocardium.

(3). The size of myocardial infarction from thallium scintigraphy

The size of infarction from thallium scintigraphy was determined by computer processings of schematic drawings in digitalized image. This calculated scitigraphic size (%)(ratio of infarction/myocardium) showed good agreement with that estimated from the serial measurements of serum enzyme(ΣCPK) and precordial ST mapping(ΣST) for anterior infarction. correlation coefficients were 0.86 and 0.82 respectively. However, the estimated defect size was thought to be difficult for inferior infarction from the collimation and position. The calculated scintigraphic size was compatible with non-contracted segment(NCS) in LVG. Ejection fraction estimated from LVG were correlated with scintigraphic sizes(r=-0.78). These data showed that thallium scintigraphy reflected the infarct size simply and easily. And estimation of necrotic masses is useful for the follow up of the infarct patients.

(4). Extents of ischemia from thallium stress myocardial scintigraphy

Myocardial imagings were performed at rest and exercise in 23 patients of angina pectoris. In comparison with coronary angiography, 16 patients with 75% narrowing of coronary artery showed the new defect in stress myocardial imagings, while remaining 7 cases showed no defect after exercise. There were 4 patients with less than 75% narrowing of one coronary artery, 3 patients with complete obstructed LAD supplied with good collaterals. Our results showed high sensitivity(84%) and specificity(97%) of the stress images to evaluate the coronary lesion in the patient with suspected coronary diseases and this is superior to the excecise ECG which permits the substsntially large number of positive patients. And regional uptake ratios (exercise/rest) also reflected the myocardial blood flow.

In conclusion, in comparison with angiographic findings, myocardial perfusion imaging revealed the viability of myocardium, which is functioning and detected the extent of necrotic mass and the exercise induced ischemia noninvasively.

Evaluation of Thallium-20I stress myocardial perfusion imaging in detection of coronary artery diseases,and the clinical application of20I-Tl total -body imaging.

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I). Thallium-20I myocardial perfusion imaging was performed in 30 patients with effort angina investigated by selective coronary angiography. The images collected in anterior,left anterior oblique views (30°,45°,and 60°),left lateral views, at rest and during exercise were analysed in seven segments : apical,anterior,anteroseptal,antero - lateral,posterolateral,posteroinferior,and postero-septal.

A technique for quantifying segmental regional myocardial Tl-20I activity was developed in our laboratory. The segmental perfusion ratio (SPR) was calculated from the computer processed data.

In normal subjects,the value for SPR was I.0I+0.I0 (n=67). The transient perfusion defects on stress scintigrams were revealed in patients with coronary artery diseases. The SPR of hypoperfused segments was 0.76+0.I (n=I7).

The segmental perfusion ratio was independent of the dose administered,the contrast setting of the recording instrument,and the observer threshold for diagnosing the lesion.

Using selected segments,we were able to identify the presence of coronary lesion revealing a 75% or greater area of stenosis,with 79% sensitivity,and 95% specificity.

Correlation of segmental hypoperfusion with angiographically proven significant coronary stenosis was good for the left anterior descending arteries (92% sensitivity,88% specificity,fig.I),and the right coronary arteries (with 90% sensitivity,I00% specificity,fig.2), but not as good for the left circum flex arteries (55% sensitivity,95% specificity,fig. 3). By this objective means with additional visual inspection of the scintigrams,the site and the severity of the coronary arterial lesions could be evaluated non-invasively.

II). By Thallium-20I total-body imaging,noninvasive visualization of the regional distribution of cardiac cardiac output was studied in 6 healthy volunteers. In addition, the changes of the total body distribution of Tl-20I at rest and during exercise were evaluated.