

Myocardial Nuclear Medicine

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(1) Tl-201 myocardium scintigraphy

EVALUATION OF HYPERTROPHIC CARDIOMYOPATHY BY THALLIUM SCAN.

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Thallium scan was performed in 95 cases of hypertrophic cardiomyopathy (HCM). Then, HCM was divided into 71 typical and 24 atypical HCM by perfusion defect (PD). Typical HCM had no PD at resting thallium scan. There were 20 cases of obstructive type (HOCM), 37 cases of asymmetric hypertrophy (ASH) and 14 cases of apical hypertrophy (APH). All patients had echocardiographic findings of HCM. In 31 cases of all, SPECT was also performed to evaluate myocardial hypertrophy precisely. By SPECT, ASH and APH was assessed more clearly by short and long axial views respectively. And, myocardial hypertrophy was also assessed semi-quantitatively by circumferential profile analysis at the slice of apex, center and base in short axial view. However, thallium scan was not superior than echocardiographic findings as for the evaluation of wall thickness except global visualization of myocardial shape and structure. In addition to typical case, 24 (25%) cases of HCM had PD at the septal, apical and lateral wall. There were (A) 9 patients with familiar HCM, (B) 8 patients with dilated left ventricle (LV) and (C) 7 patients without dilated LV. Group A had dilated LV volume ($93-220 \text{ ml/m}^2$), lower LVEF ($35 \pm 10\%$), elevation of CPK and LDH, and abnormal histological findings such as disorganization, fibrosis, disarray, degeneration and lipid infiltration. These

findings support PD as scar formation in familiar HCM. Group B had also dilated LV and similar to group A except family history. They had dilated LV volume ($95-120 \text{ ml/m}^2$) and lower LVEF ($42 \pm 10\%$). On the other hand, group C had normal LV size and LVEF was similar as typical HCM. Furthermore, stress thallium scan was performed in 28 cases of typical HCM. 14 (50%) of all had transient defect at septal, apical area in spite of normal coronary artery. These findings may be caused by relative ischemia due to myocardial hypertrophy, narrowing of intramural coronary artery or small vessel disease. And, if these transient defects reflect reversible ischemia, PD might be equivalent to irreversible ischemia or scar formation. Then, PD in HCM was accompanied by LV dilatation and extended to the infero-postero or lateral walls. Although extension of myocardial hypertrophy was not known, these observation from thallium scan was very useful approach to the assessment of pathophysiology of HCM. Further study including metabolic tracer will be needed in the near future.

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QUANTITATIVE ESTIMATION OF DILATED CARDIOMYOPATHY BY THALLIUM-201 MYOCARDIAL SCINTIGRAPHY. Kenji Owada and Shigeo Kariyone First Dept of Internal Medicine, Fukushima Medical College, Fukushima.

We attempted to the differential diagnosis of dilated left ventricle and to estimate the severity of DCM using four parameters in thallium-201 scintigraphy.

The study groups were composed of 27 cases with DCM, 14 with valvular disease (AR or MR), 8 with severe coronary artery disease (LVEF $< 30\%$) and 10 without any cardiac disease as the control.

METHOD: Four parameters were calculated from LAO view of thallium-201 images in each cases. 1) Left ventricular area (LVA) was the number of matrices, which had the counts up to 55% of the peak counts in the myocardium. 2) Left ventricular uptake index (LVUI) was the radioactivity ratio of all counts in LVA to total injected dose, which was expressed as all counts in the first pass following the injection of thallium-201. 3) LVUI/LVA was used for a parameter of myocardial mass per matrix. 4) Wall uptake ratio (WUR) was the ratio of mean counts per matrix in septal, inferior and lateral wall to total injected dose.

RESULT: 1) In the control group, mean values of LVA, LVUI, LVUI/LVA and WUR were 137 ± 10 matrices, $2.64 \pm 0.16\%$, 0.19 ± 0.02 and 0.24 ± 0.02 , respectively. Mean values of LVA, LVUI of the valvular disease and DCM were significantly higher than those of the control group ($p < 0.001$), but these values of DCM were significantly lower than the valvular

disease ($p < 0.01$). Therefore, mean values of LVUI/LVA and WUR of DCM were significantly lower than those of the other two groups. 2) In the DCM, the perfusion defect group included 17 cases and the negative group included 10. Mean values of LVUI, LVUI/LVA and WUR of the positive group were significantly lower than those of the negative group. In many cases of DCM with low values of LVUI/LVA or WUR, cardiac index were lower than 2.5 l/min/mm , LVEF were lower than 30% and LVEDP were higher than 15 mmHg , respectively. 3) There were no differences between the DCM with perfusion defect and severe coronary artery disease (CAD) in the mean values of four parameters in scintigram. Then the regional uptake ratio (UR) was calculated as the other parameter, which was the ratio of counts per 10 matrix in regional wall to total injected dose. Minimal value or minimum/maximum value of UR of CAD was significantly lower than those of DCM.

DCM had the enlargement of left ventricle and the increment of total myocardial mass, but it showed the decrement of myocardial mass per unit area. And, also the cases with the perfusion defect or the low value of WUR showed the reduction of cardiac function. It was suggested that these conditions reflect the progressive states of DCM. On the other hand, it was possible that DCM with perfusion defect and CAD can be differentiated by using the radioactivity ratio of regional myocardium. We concluded that the quantitative analysis of thallium-201 scintigraphy were useful for the diagnosis and the evaluation of DCM.