Clinical implication of reverse redistribution on ^{99m}Tc-sestamibi images for evaluating ischemic heart disease

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Objective: The purpose of this study was to clarify the usefulness of ^{99m}Tc-sestamibi (MIBI) delayed imaging in the assessment of the severity of myocardial ischemia in patients with coronary artery stenosis. **Methods:** Forty-three angina pectoris with coronary stenosis of greater than 75% were enrolled in this study. Myocardial perfusion SPECT images were obtained 1 and 6 hours after an intravenous injection of MIBI at rest. Stress myocardial perfusion SPECT images were also acquired after the injection of MIBI. And myocardial fatty acid metabolism images were obtained 30 minutes after the injection of BMIPP at rest. Myocardial perfusion SPECT images were divided into 20 segments which were semiquantitatively assessed according to a 4-level defect score scale: score 0 (normal) to score 3 (severely); then the extent score (ES) and severity score (SS) were calculated. **Results:** The sensitivity for myocardial ischemia showed the highest rate at 88.3% with MIBI delayed SPECT. According to the coronary angiography findings, MIBI stress SPECT and MIBI delayed SPECT detected the severity and extent of ischemia with more sensitivity than MIBI early SPECT in 12 patients (group A) with stenosis of more than 75% but less than 90% (p < 0.01). Even though MIBI stress SPECT detected the severity and extent of ischemia in 31 patients (group B) with stenosis of more than 90% but less than 100%, there was no significant difference between MIBI stress SPECT and MIBI delayed SPECT. BMIPP SPECT revealed significant differences between group A and group B regarding the severity of myocardial ischemia. MIBI reverse redistribution was observed in 33 patients and no significant difference existed between groups A and B. **Conclusions:** Myocardial washout of MIBI was frequently observed in patients with angina pectoris and the detection accuracy for ischemia was high. MIBI imaging is considered useful for assessment not only of myocardial perfusion but also mitochondrial function. The imagings with BMIPP and delayed MIBI could serve to determine the severity of myocardial ischemia more accurately.

Key words: reverse redistribution, ischemic heart disease, sestamibi, BMIPP