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Comparative study of ^{201}Tl-scintigraphic image and myocardial pathologic findings in patients with dilated cardiomyopathy

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The objective of the present study was to characterize the production of ^{201}Tl myocardial perfusion defects, the relation between the ^{201}Tl multiple small defects and the myocardial damage indicated by myocardial fibrosis shown histopathologically in patients with dilated cardiomyopathy (DCM).

Rest ^{201}Tl scintigraphy was performed in thirty-seven patients with myocardial tissue fibrosis by endomyocardial biopsy, and without stenosis of the coronary artery. ^{201}Tl myocardial SPECT images were visually classified into 4 grades according to the severity of inhomogeneous perfusion defects (IPD), 0: none, 1: slight, 2: moderate, 3: severe. ^{201}Tl uptake, defect regions (DR), and coefficient of variation % (CV%) were also quantified by Bull's eye quantification in nineteen patients. During cardiac catheterization, three biopsy specimens were obtained from the lateral wall to the apical region of the left ventricle and the amount of fibrosis was assessed by means of light microscopic morphometry. The myocardial fibrosis was also classified into 4 grades by a point-counting method. Autopsy study was also assessed in six patients. ^{201}Tl perfusion defects were observed in 35 (94.6%) patients, of whom 29 (78.4%) showed inhomogeneous perfusion defects. Twenty-four (64.9%) showed Stage 0 and 1 ^{201}Tl findings, and 21 (62.2%) had myocardial fibrosis in stage 1. Clinically, the correlation between the grades of the IPD, % ^{201}Tl uptake, DR and CV% of myocardial uptake, which were calculated semiquantitatively by Bull's eye image, and the histological grades of fibrosis were also good (IPD vs. fibrosis: $r = 0.7014$; % ^{201}Tl uptake vs. fibrosis: $r = -0.6542$; DR vs. fibrosis: $r = 0.7027$; CV% vs. fibrosis: $r = 0.6985$). The ^{201}Tl SPECT findings were in close agreement with the severity of myocardial fibrosis confirmed by autopsy, but the grading of the IPD was not related to the ejection fraction or left ventricular diameter.

It showed a higher rate of inhomogeneous ^{201}Tl myocardial perfusion defects (78.4%) in patients with DCM. This result may contribute to the clinical evaluation of DCM or differentiation from other diseases. Furthermore, the grading of ^{201}Tl inhomogeneous perfusion defects related to the myocardial fibrosis of left ventricular myocardium may contribute to speculation of the myocardial degenerative stage in clinical settings.

Key words: dilated cardiomyopathy (DCM), ^{201}Tl-SPECT, myocardial fibrosis.