

Clinical usefulness of ECG-gated ^{18}F -FDG PET combined with $^{99\text{m}}\text{Tc}$ -MIBI gated SPECT for evaluating myocardial viability and function

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Objectives: This study sought to evaluate an imaging approach using gated $^{99\text{m}}\text{Tc}$ -MIBI (MIBI) SPECT and gated ^{18}F -FDG (FDG) PET for assessment of myocardial viability and cardiac function. **Methods:** Forty-eight patients (38 men, mean age 68.1 ± 9.6 years) underwent ECG-gated FDG PET and MIBI SPECT within a week. The baseline diagnoses were coronary artery disease (31), mitral regurgitation (1), paroxysmal arrhythmia (10), and dilated cardiomyopathy (6). The gated FDG PET data were analyzed using pFAST software, and the gated MIBI SPECT data were analyzed using QGS software. Fifteen patients were diagnosed with myocardial infarction, and follow-up study was performed to assess the functional outcome four months later. An improvement in LVEF of $>5\%$ was defined as significant. The LV myocardium was divided into 17 segments, and regional defect scores were visually assessed using a 4-point scale for each segment (0 = normal, 1 = mildly reduced, 2 = moderately reduced, 3 = absent). A segment with a greater defect score on MIBI SPECT than on FDG PET was defined as a mismatch. The patients were divided into two groups: those with at least two mismatched segments (MM-group), and those with none or one (M-group). **Results:** LVEF, EDV and ESV measured by gated FDG PET were highly correlated with those obtained by gated MIBI SPECT ($r = 0.848, 0.855$ and $0.911, p < 0.0001$, respectively). The mean values of LVEF did not differ significantly, but EDV and ESV obtained by gated FDG PET were significantly greater than those obtained by gated MIBI SPECT ($p < 0.0001$). In 15 patients diagnosed with myocardial infarction, a significant association ($p < 0.05$) was found between the relative uptake of FDG PET and MIBI SPECT and the functional outcome 4 months later. Global LV function improved in 6 of the 8 patients showing mismatch but in only 1 of the 7 patients with matched defects, resulting in a sensitivity of 86% and specificity of 75%. The overall accuracy to predict global functional outcome was high (80%). **Conclusion:** This imaging approach allows accurate evaluation of myocardial viability. Furthermore, the high correlations of gated FDG PET and gated MIBI SPECT measurements hold promise for the assessment of left ventricular function using gated FDG PET.

Key words: gated FDG PET, gated MIBI SPECT, myocardial viability, myocardial function