

“W-shaped” volume curve with gated myocardial perfusion single photon emission computed tomography

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Objectives: Gating errors (GEs) with ECG gated myocardial SPECT (G-SPECT) may occur irrespective of the presence or absence of arrhythmias. We evaluated the impact of GEs on both reconstructed tomograms and left ventricular ejection fraction (LVEF) derived from G-SPECT, and searched for clues to identify these errors. **Methods:** We studied 2 GE patients, 10 normal subjects (NLs), and 10 atrial fibrillation patients. Stress technetium-99m sestamibi G-SPECT was performed. Left ventricular (LV) contraction was evaluated in the beating slices. LVEF was calculated with G-SPECT using QGS (Cedars-Sinai, Los Angeles) and p-FAST (Sapporo Medical University, Japan), and compared with that obtained by echocardiography (ECHO). LV volume curves were created by QGS and p-FAST. The heart rates (HRs) were calculated from the acquired images, and compared with their resting HRs. The mean count density of the myocardium was measured and time-activity curves were created. **Results:** In patients with GEs, bi-phasic LV contraction was demonstrated with fading-out towards end-diastole. G-SPECT underestimated LVEF compared to ECHO by 10% or more. The volume curves appeared “W-shaped.” The HRs from the images were slower than the resting HRs. The count density decrement from frame #1 to #8 was larger than that of NLs. The time-activity curves were different in shape from those of NLs. **Conclusions:** G-SPECT underestimates LVEF in patients with GEs. These errors can be identified with a combination of visual inspection of beating slices, time-volume curves, and time-activity curves. Monitoring the HR is a clue for anticipating and avoiding these errors.

Key words: gating errors, myocardial SPECT, left ventricular function, volume curve, time-activity curve