

Comparison of Diastolic Function Parameter Estimates from Planar and SPECT Blood Pool Imaging.

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Objectives: Assessments of cardiac function in patients with systolic and diastolic dysfunction include the peak rates of ventricular emptying and filling and the timing of these events. Although gated SPECT is widely used for the assessments of ejection fraction and regional wall function, little has been done with the assessments of emptying and filling parameters using SPECT. In this study we compared the estimated diastolic parameters from planar and gated blood pool SPECT (GBPS).

Methods: Forty-one consecutive patients (13F, 28M, age=56±13 yo) were studied. An average dose of 1.3GBq Tc-99m RBCs was administered for gated bloodpool imaging. Gated planar LAO data was acquired for 5M counts for 16 framing intervals on the multihead SPECT system. Sixteen frame gated SPECT data sets were acquired after the LAO images. The diastolic parameters peak filling rate (PFR), time to PFR, peak emptying rate (PER) and the time to PER were estimated. For the planar studies, commercial Odyssey multigated software was employed. For GBPS studies the 4D-MSPECT software was employed using a 4th order harmonic analysis to the LV volume curve. Two blinded observers processed the planar and GBPS data in batch mode in separate sessions. The planar and GBPS results were correlated for both observers and between the observers for the GBPS estimates.

Results: For PER, the planar and GBPS correlation was $y=1.15x-0.90$, $r=0.80$. The inter-observer reproducibility for GBPS was $y=1.02x-0.01$, $r=0.94$. For PFR, the planar and GBPS correlation was $y=0.98x-0.56$, $r=0.82$. The inter-observer reproducibility for GBPS was $y=1.01x-0.10$, $r=0.89$. The correlations for the time to peak for both PEF and PFR were fair. Since the LV volume curve is dependent on basal motion, it is believed that even small adjustments to basal plane location at end-diastole and end-systole can have a significant effect on the time to peak values and the interobserver variability in PER and PFR.

Conclusions: The diastolic parameters PER and PFR, correlated well between planar and SPECT blood pool imaging and expand the clinical utility of GBPS for the assessment of patients with heart failure.