

Wide Beam Reconstruction for Gated-SPECT: Going Toward Optimization of Resources and Reduction in Radiation Exposure

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Background: An iterative algorithm (Wide Beam Reconstruction, WBR) has been recently proposed to analyse SPECT studies with reduced count statistic; this allows for half-time (HT) cardiac SPECT with image quality and quantitative data comparable to standard time (ST) SPECT.

Aim: To evaluate the WBR performance in both HT gated-SPECT acquisitions and in pts injected with half-dose (HD) of tracer.

Methods: 73 pts scheduled for a stress-rest gated-SPECT, were studied: 52 pts (group A) were injected with a standard dose (SD) of tracer and underwent both ST and HT SPECT; 21 pts (Group B) were injected with HD of tracer and underwent a ST SPECT and immediately after an additional SPECT at double time/frame (DT), to compensate for the low count statistic. A two-day ^{99m}TcSestamibi protocol was used in all pts. ST/SD and HD/DT SPECT were reconstructed with a conventional filtered backprojection (FBP); SD/HT and HD/ST SPECT were reconstructed with WBR. Summed stress (SSS) and summed rest scores (SRS) were calculated; LVEF were automatically derived with QGS.

Results: In Group A, no significant differences were observed between HT and ST SPECT in SSS (11.1 and 11.7, respectively) and SRS (9.4, and 10.3, respectively, NS). LVEF on rest acquisition was also comparable (44% on ST SPECT vs. 44% on HT). LVEF on post-stress studies in HT SPECT (40%) was slightly lower than ST SPECT (46%, NS). In Group B, SSS (6.2 in ST and 5.3 in DT) and SRS (4.0 in ST and 3.3 in DT) were also comparable. No differences were documented between ST and DT SPECT in rest (47% and 48%, respectively) and stress (48% and 50%, respectively) LVEF.

Conclusions: In this preliminary report, WBR performance was comparable to that of conventional FBP SPECT, allowing for either half-time or half-dose studies. The former allows for an increased patient throughput and optimization of resources. The latter modality would allow for a significant reduction in both patients' and operators' exposure. Further studies are needed to validate the clinical use of this method.