

A CLINICAL EVALUATION OF A WIDE BEAM RECONSTRUCTION METHOD FOR SHORTENING SCAN TIME OF GATED CARDIAC REST/STRESS SPECT

D. Basso, G. Passmore. M. Holman, W. Rogers, L. Walters; Cardiac Imaging of Augusta, Medical College of Georgia, Augusta, GA.

Objective: Myocardial perfusion SPECT studies have an average scan time between 12 and 25 minutes. This often results in patient motion with image artifacts as well as throughput limitations. The most commonly used method of image reconstruction is the filtered back projection (FBP). This study evaluates potential clinical utility of the UltraSPECT Wide Beam Reconstruction method (WBR™) on rest / gated stress myocardial perfusion SPECT protocols, where gated stress scan time was reduced by one-half and the data reconstructed using the Wide Beam Reconstruction method (WBR™).

Research questions:

- 1) Were there any significant differences in perceived image quality, myocardial normality, lesion reversibility, and treatment recommendation between the FBP and WBR reconstruction methods?
- 2) Was there an association between the perceived image quality for the FBP and WBR reconstruction methods and the levels of normality, reversibility, and treatment?

Methods: 47 patient studies were reconstructed using both WBR and FBP SPECT protocols in clinical conditions. Each study was scanned twice. The first scan used the FBP reconstruction method, where the full scan time images were acquired and reconstructed. The data were then reacquired at half scan times and reconstructed using WBR. Each set of images was blinded to a group of 3 physicians who rated the images for image quality, myocardial normality, lesion reversibility, and treatment recommendation.

Results:

- 1) Descriptive statistics for each of the 8 variables are tabulated below (Table 1).
- 2) Wilcoxon Signed-rank test indicated that image quality for the WBR reconstruction method was rated as significantly better than the image quality for the FBP reconstruction method ($z=3.1059$; $p=.0009$). No significant differences between the reconstruction methods were noted for the outcomes variables of normality, reversibility, and treatment recommendation.
- 3) Chi-square test indicated that the image quality was associated with lesion reversibility for WBR, but not for FBP ($X^2 = 19.6$; 12df; $p= 0.0733$). All other comparisons indicated that image quality was associated with the levels of normality and treatment recommendation for both methods ($p<.05$).

Conclusions: The WBR™ method demonstrates superior image quality, and more consistently estimates of reversibility when compared to FBP reconstruction methods. Overall, the WBR™ method proved to have no significant differences with FBR among physicians for myocardial normality, lesion reversibility detection and treatment recommendation. Further, this method appears to have clinical benefits by potentially allowing for reduction of stress SPECT scan time to 50% of the typical clinical values, without introducing artifacts or deleting useful information.

Table 1.

	Image Quality		Normality		Reversibility		Recommendation	
	FBP	WBR	FBP	WBR	FBP	WBR	FBP	WBR
Range	0-3	0-3	0-4	0-4	0-4	0-4	0-2	0-2
Mean of Ranks (sd)	1.021 (0.822)	0.844 (0.824)	1.121 (1.365)	1.184 (1.334)	0.851 (1.298)	1.028 (1.444)	0.624 (0.815)	0.674 (0.824)
Median	1	1	0	1	0	0	0	0