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Comparison between Filtered Back Projection SPECT Reconstruction and a New Iterative Reconstruction Algorithm: Preliminary Clinical Evaluation

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Background. A new iterative reconstruction algorithm (WBR™) has been recently proposed for cardiac SPECT. The WBR™ technology, based on accurate modelling of the emission-detection process, was designed to reduce noise improving lesion detectability without affecting the image resolution. Few data exist on the comparison between filtered back-projection (FBP) and this new algorithm in a clinical setting.
Aim. The aim of this study was to compare the performance of FBP and WBR™ in the clinical arena.
Methods. A group of 18 pts, with different cardiac pathology, scheduled for a stress-rest SPECT were studied. A two-day 99mTc-Sestamibi protocol was used. All pts performed standard ECG-gated SPECT acquisitions with a dual-head@90° camera, with a time/frame of 20 sec. Immediately after the conclusion of the acquisition, a second ECG-gated acquisition was performed at half-time/frame (10sec). Standard-time SPECT was reconstructed with a conventional FBP (Butterworth, 0.4, 10); half-time SPECT was reconstructed with WBR™. Tracer uptake was blinded evaluated by two experienced observers in 17 segments with a 4-point scoring system (from 0=normal to 4=absent). Discrepancies were resolved by consensus. Summed stress scores (SSS) and summed rest scores (SRS) were calculated. LV EF were automatically calculated with QGS.
Results. No significant differences were observed in SSS and SRS between half-time WBR™ SPECT (21.5 and 21.0, respectively) and standard-time FBP SPECT (22.1, and 20.7, respectively, NS). LV EF on rest acquisitions was also comparable (43.6% on half-time SPECT vs. 44.2% on standard-time SPECT, NS). LV EF on post-stress studies in half-time SPECT (40.3%) was lower than standard-time SPECT (46.7%), although not statistically significant.
Conclusions. Visual analysis of half-time/frame SPECT reconstructed with the new algorithm WBR™, was comparable to that of a standard time/frame SPECT acquisition reconstructed with conventional FBP. Differences in the time elapsed from the end of the stress test and the SPECT acquisition could be involved to explain the differences of LVEF between the two post-stress studies. Results from the present study do not necessarily apply to SPECT studies employing reduced activity of injected tracer, and further studies are needed.