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HALF-TIME GATED SPECT WITH WIDE BEAM RECONSTRUCTION

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Abstract:

Background:

The Wide Beam Reconstruction (WBR™) technology (UltraSPECT, Ltd.) is an iterative reconstruction method for resolution recovery, designed to simultaneously suppress noise and improve image resolution and is optimised specifically for short gated cardiac scans.

Our aim was to compare the conventional acquisition and Filtered back projection (FBP) with a shorter acquisition and WBR, in terms of image quality, as well as perfusion and functional diagnostic results.

Methods:

We evaluated 100 patients (pts), 29 female and 71 male, mean age 62±11, 51 with previous myocardial infarction (AMI). Pts performed two sets of acquisitions in dual head gamma camera. Conventional protocol (FBP): 40 sec/view, 30 views followed by the new method (WBR): 10 sec/view, 60 views.

The 200 acquired studies were processed by the same operator with Cedars-Sinai software, to determine LVEF, EDV, ESV, SSS, SDS, SMS and STS.

Two independent observers (O) classified the images quality: very good (VG), good (G) and sufficient (S). Reports of the two sets of studies were also done independently and blindly.

Paired Student t test (TT) and coefficient correlation (CC) between FBP and WBR were calculated for scores analysis, consideration all the pts and separately pts with body mass index > 25 and AMI pts.

Results:

The sample size of 200 studies presents a statistical power of 0.99 (effect size: 0.3; alpha-level: 0.05).

Image quality: In WBR, >75% studies were VG, none S. In FBP, 52% G, 27% S. The agreement inter-O increased in 13% when using WBR.

Final report: Intra-O concordance was 93% and 88%. The inter-O discordance was 17% (FBP) and 16% (WBR). 90% of the discordances were in small ischaemic lesions (<5% of the LV area).

LVEF and volumes of the two paired groups show no statistically significant difference (SSD) and a very strong correlation. Summed scores show a SSD in Student t test, but with a strong CC.

Score analysis - [table1].

Conclusions:

There is a good correlation and concordance FBP/WBR in perfusion analysis. The inter-O discordance is persistent, not dependent on the method, but on the pts characteristics (breasts/obesity). The weak correlation of the scores system adds to the difficulty of detecting viability or small ischaemic areas in AMI pts, independently of the reconstruction method. However, the WBR increased in 1%, the inter-O concordance in the final report.
The main functional parameters (LVEF and volumes) aren't influenced by this new technology. Motion and thickening scores are strongly correlated, with no interference in interpretation. Patient comfort is undeniable.

FBP vs. WBR- Score Analysis and Functional Parameters- All Pts(n=95)/ Fat Pts(n=56) /AMI Pts(n=40)		
	t-Test	CC
SSS SDS	<0.0005(All) <0.05(Fat) <0.05(AMI) 0.24(All) 0.25(Fat) 0.45(AMI)	97%(All) 96%(Fat) 94%(AMI) 61%(All) 60%(Fat) 56%(AMI)
SMS STS	0.19(All) 0.96(All)	0.96(All) 0.95(All)
FEVE VTD VTS	<0.05(All) <0.0005(All) <0.005(All)	0.96(All) 0.97(All) 0.98(All)

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