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Abstract
TITLE: OSEM and WBR half-time gated myocardial perfusion SPECT: a comparison to filtered backprojection

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ABSTRACT BODY:
Objectives: Compared to filtered back projection (FBP), OSEM with resolution recovery (OSEM-RR) and wide beam reconstruction (WBR) (UltraSPECT Ltd.), which resolve resolution and suppress noise simultaneously during reconstruction, have been shown to maintain/improve myocardial perfusion SPECT quality, even with low count density half-time acquisitions. We postulated that their characteristics would be advantageous for gated SPECT, where each frame is only 1/8th the count density of the summed perfusion images.

Methods: An 8 mCi rest/32 mCi stress Tc⁹⁹m sestamibi protocol was used. 15-min FBP, and additional 7-min OSEM-RR and WBR post-stress 8-frame/cardiac cycle SPECT scans were acquired with 90°-angled dual-headed detectors equipped with high resolution collimators in 82 patients (48F, 34M)(123-252 lbs). Gated image quality was graded visually: 1 (poor) – 4 (excellent). In 42 patients with perfusion defects regional LV wall motion (WM) was scored: 0 (normal)- 4 (dyskinesis) in a total of 50 vascular territories with defects. Using Myometrix software (GE Healthcare), post-stress EDV, ESV, and EF were calculated for each method.

Results: [table]
Despite half-time acquisitions, compared to FBP, image quality increased marginally with OSEM-RR (p=0.09) but very significantly with WBR (p=1.9x10⁻²¹). The WM score was greater only for WBR (p=4.8x10⁻⁸). Although quantitative parameters correlated well with those determined by FBP (all EF r's > 0.85; all volume r's > 0.94), EFs were significantly lower (p=0.0001 for OSEM-RR, 3.4x10⁻¹⁴ for WBR), primarily due to a decrease in EDV with OSEM-RR (p=7.3x10⁻¹³) and an increase in ESV with WBR (p=9.2x10⁻⁵).
**Conclusions**: Half-time OSEM-RR and particularly WBR improve gated SPECT diagnostic quality compared to FBP due to increased resolution and reduced noise. However, these attributes, which affect endocardial edge detection, result in a systematic offset in EDV, ESV, and EF.

<table>
<thead>
<tr>
<th></th>
<th>FBP</th>
<th>OSEM-RR</th>
<th>WBR</th>
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</thead>
<tbody>
<tr>
<td>Image Quality</td>
<td>3.7±0.8</td>
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<td>WM score</td>
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<td>EF</td>
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<td>EDV</td>
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<td>ESV</td>
<td>53.4±38.0</td>
<td>49.5±36.7</td>
<td>58.4±37.5</td>
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