

Incremental Diagnostic Value of Serial Dual Radiopharmaceutical Metabolism and Perfusion CZT SPECT Imaging of Cardiac Amyloidosis

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Introduction:

Cardiac SPECT imaging of Tc-99m bone radiopharmaceuticals with CT or simultaneous dual isotope imaging is reported to enhance diagnostic accuracy of cardiac ATTR amyloidosis (ATTR-CM). An alternative serial dual radiopharmaceutical (SDR) method using Tc-99m hydroxymethylene diphosphate (HMDP) followed by injection and rapid imaging (MPI) of Tc-99m sestamibi (MIBI) may also enhance diagnostic value, but effects on patient motion, image quality and diagnostic accuracy are unknown.

Methods:

Resting MIBI (8.0 – 9.9 mCi) MPI was acquired (5 min) shortly after 60-minute image acquisition of HMDP (8.0 – 9.9 mCi) with the D-SPECT CZT camera, (Spectrum Dynamics, Sarasota, FL). Two imaging experts by consensus assessed diagnosis, image quality, patient motion, and incremental diagnostic value of SDR compared to HMDP images alone in 101 consecutive patients referred for clinical evaluation of ATTR-CM. Axial SPECT images were compared, as were orthogonal plane VLA, HLA and SAX SPECT HMDP images using spatially cloned MPI derived LV myocardial region of interest.

Results:

Study quality was excellent or good in 95 and fair in 6 patients. Patient motion was absent in 85 and minor without diagnostic effect in 16 patients. HMDP identified ATTR-CM in 20 patients, was equivocal in 23, and negative in 58 patients. Adding resting MPI (SDR) reclassified 14 of 23 (60.9%) equivocal HMDP cases, increased sensitivity by 10%, and identified additional normal cases in 21% ($P < 0.0001$, Figure 1, Table 1).

Conclusions:

1. CZT SPECT high resolution perfusion metabolism SDR imaging compared to HMDP imaging in clinically referred patients with suspected ATTR-CM provides incremental diagnostic value rapidly (<90 min) unaffected by patient motion with ultra-low dose (<5 mSv) radiation exposure.
2. Prospective evaluation of comparative diagnostic value and cost effectiveness of CZT SPECT SDR and SPECT CT appears warranted.