The use of SPECT quantification of 99mTc-PYP uptake in evaluation of cardiac amyloid

Authors:
S Saucier¹, G Pershwitz¹, S Memahon¹, WL Duvall¹, ¹Hartford Hospital, Cardiology - Hartford - United States of America,

Topic(s):
Single Photon Emission Computed Tomography (SPECT)

Citation:

Background

Cardiac amyloidosis imaging with technetium-phosphate derivatives have come to the forefront in non-invasive diagnosis of ATTR amyloid now that effective therapies for the condition are emerging. Current diagnostic techniques involve a semi-quantitative visual score and a planar uptake ratio of > 1.5 with excellent sensitivity and specificity for identifying ATTR. Occasionally sternal and rib uptake can confound the assessment of these parameters leading to equivocal studies. It is possible that SPECT image acquisition would allow for accurate diagnosis in these cases when planar data analysis is non-diagnostic.

Purpose

The purpose of this study is to investigate the utility of using SPECT volume assessment of 99mTc-PYP uptake to calculate the heart to contralateral lung ratio.

Methods

We retrospectively reviewed patients who underwent 99mTc-PYP planar cardiac imaging along with SPECT acquisition for the evaluation of cardiac amyloidosis. Standard evaluation using semiquantitative visual score (Grade 0 to 3) and quantitative analysis using heart to contralateral lung ratio in planar imaging was used. Each study was then analyzed using total volume assessment of the SPECT data to calculate a heart to contralateral lung ratio. The patient charts were reviewed for demographics and the final clinical diagnosis.

Results

A total of 18 patients (Average age 76.6 +/- 14.5 years and 77.8% male) were reviewed. Eleven (61.1%) of studies were consistent with amyloid based on visual and quantitative planar imaging, with 8 (44.4%) being positive based on ratio alone. The SPECT ratio was > 1.5 in 12 patients including one study that was interpreted as equivocal based on the planar data. There were three patients with planar ratios between 1.39 and 1.44 which all had positive SPECT ratios. Overall, the correlation between the ratios was good with an r of 0.88 (p < 0.0001). The difference between SPECT and planar ratio for the visual grade 0 patients was -0.05 +/- 0.12, for all other patients with visual grade 1 to 3 the difference was 0.45 +/- 0.35.

Conclusions

To our knowledge SPECT quantification of 99mTc-PYP uptake for the evaluation of cardiac amyloid has not been studied. In select cases with equivocal planar imaging findings; which would include borderline H/CL ratios or significant bony uptake, the use of SPECT volumetric heart to contralateral lung ratio improved our diagnostic certainty in this small test population.
Abstract:
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