

The role of PET/CT amyloid Imaging compared with Tc99m-HMPAO SPECT imaging for diagnosing Alzheimer's disease

ABSTRACT

Background: Imaging such as Tc99m-HMPAO single photon emission computed tomography (SPECT), and positron emission tomography/ computed tomography (PET/CT) amyloid scans are used to aid the diagnosis of Alzheimer's disease (AD). Objective: We aimed to correlate the ability of these modalities to differentiate Probable AD and Possible AD using the clinical diagnosis as a gold standard. We also investigated the correlation of severity of amyloid deposit in the brain with the diagnosis of AD. Methods: A retrospective study of 47 subjects (17 Probable AD and 30 Possible AD) who were referred for PET/CT amyloid scans to our centre was conducted. Hypoperfusion in the temporo-parietal lobes on Tc99m-HMPAO SPECT and loss of grey-white matter contrast in cortical regions on PET/CT Amyloid scans indicating the presence of amyloid β deposit were qualitatively interpreted as positive for AD. SPECT and PET/CT were also read in combination (Combo reading). The severity of amyloid β deposit was semiquantitatively assessed in a visual binary method using a scale of Grade 0-4. The severity of amyloid β deposit was assessed in a visual binary method and a semi-quantitative method using a scale of Grade 0-4. Results: There was significant correlation of Tc99m-HMPAO SPECT, PET/CT amyloid findings and Combo reading with AD. The sensitivity, specificity, PPV and NPV were 87.5%, 73.7%, 58.3% and 93.3% (SPECT); 62.5%, 77.4%, 58.8% and 80.0% (PET/CT) and 87.5%, 84.2%, 70.0% and 30.0% (Combo reading) respectively. The grade of amyloid deposition was not significantly correlated with AD (Spearman's correlation, $p=0.687$). Conclusion: There is an incremental benefit in utilizing PET/CT amyloid imaging in cases with atypical presentation and indeterminate findings on conventional imaging of Alzheimer's disease.

Keyword: F18-Florbetapir; Neurocognitive deficit; Molecular imaging; Semiquantitative assessment; Binary visual assessment