FDG PET-positive, MRI-negative Patients with Temporal Lobe Epilepsy: Etiology and Outcomes Compared to Patients with Hippocampal Sclerosis

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Rationale

FDG PET hypometabolism is important for surgical planning in patients with temporal lobe epilepsy (TLE), but its significance remains unclear in patients who do not have evidence of Hippocampal Sclerosis (HS) on MRI. One group found that few such cases had HS on histopathological examination (1). Another series from our center, excluding patients with intracranial electrode monitoring, found that 62% of patients with negative MRI and a positive PET had HS on pathology (2). We have extended this study to examine etiology and surgical outcomes in a larger group of PET-positive, MRI-negative patients, including those who underwent intracranial electrode monitoring, and to compare features and historical outcomes in this group with those of patients who have HS apparent on MRI.

Methods

We queried the Thomas Jefferson University Surgical Epilepsy Database for patients who underwent anterior temporal lobectomy (ATL) from 1991-2009 and who had unilateral temporal PET hypometabolism with no epileptogenic lesion on MRI (PET+/MRI-). Patients with discordant EEG findings were excluded. We compared this group to the group of patients who underwent ATL and who had HS on MRI without discordant data. Surgical outcome was measured using a modification of the Engel scale.

Results

There were 46 PET+/MRI- patients (of whom 38 had 2-year surgical outcome available) and 144 HS patients. Gender, surgical side and family history did not differ significantly between groups. Mean age at first seizure was higher in PET+/MRI- patients (19±13 vs. 14±13 years, Student’s t-test, p=0.029). Febrile convulsions were less frequent in PET+/MRI- patients, though this was not statistically significant (14/44 vs. 63/143, p=0.1648).

Histopathologic HS was found in 21 out of 42 PET+/MRI- patients (50%); 17 had other pathologies and 4 were normal. PET+/MRI- patients with Class I Outcomes were 77%, 76%, 71% and 75%, while in the HS patients these numbers were 69%, 71%, 68% and 78%, respectively. A subcategory of 7 PET+/MRI- patients who had undergone intracranial monitoring was compared to 39 PET+/MRI- patients who went directly to ATL. Class I outcomes did not differ significantly (71%, 71%, 71%, 67% for those implanted, 78%, 77%, 71%, 78% for non-implanted patients at 1, 2, 3 and 5 years follow up, respectively).

Conclusions

PET-positive, MRI-negative TLE patients in our study had disease onset at a later age, and half had pathologic evidence of HS despite a normal MRI. Outcomes in these patients after ATL are as good as those in patients with MRI-positive HS whether or not they undergo intracranial monitoring, suggesting that implantation of these patients may be unnecessary in some cases.

References