Relationship between bilateral temporal hypometabolism and EEG findings in mesial temporal lobe epilepsy: Analysis of 18F-FDG PET using statistical parametric mapping

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Objective: To investigate the clinical significance of bilateral temporal hypometabolism in patients with mesial temporal lobe epilepsy using statistical parametric mapping (SPM).

Methods: Interictal 18F-FDG PET scans were performed on 29 patients with surgically treated mesial temporal lobe epilepsy. Cinical data, interictal epileptiform discharges, ictal scalp EEG, and intracarotid amobarbital test were analysed. To assess an 18F-FDG PET image, statistical parametric mapping analysis as well as visual interpretation was applied.

Results: In 9 of 29 patients, the 18F-FDG PET scan revealed bilateral temporal hypometabolism by statistical parametric mapping analysis, while only 3 patients showed bilateral temporal hypometabolism by visual assessment. When the patients were classified into the unilateral temporal hypometabolism and bilateral temporal hypometabolism groups based on the statistical parametric mapping results, bitemporal interictal epileptiform discharges occurred significantly more frequently in the bilateral temporal hypometabolism group than in the unilateral temporal hypometabolism group (66.7% versus 22.2%). Bilateral independent seizure onset in scalp EEG and bitemporal epilepsy were present only in the bilateral temporal hypometabolism group. Lateralised ictal onset was present less frequently in the bilateral temporal hypometabolism group than in the unilateral temporal hypometabolism group (44.4% versus 83.3%). There was no statistically significant difference in age at onset, duration of epilepsy, generalised seizures, history of febrile convulsions and central nervous system infection, lateralisation throughout the whole tracing and lateralisation in intracarotid amobarbital test between the unilateral temporal hypometabolism and bilateral temporal hypometabolism groups.

Conclusion: Bilaterality of EEG findings correlated with bilateral temporal hypometabolism on 18F-FDG PET by the statistical parametric mapping method. Our results suggest that analysis of 18F-FDG PET using statistical parametric mapping may have a role in predicting patients with bitemporal excitability or bitemporal independent epileptogenicity, who should be monitored carefully.