

Summary

Title: The influence of a slight damage to the mesial temporal lobe visible on positron emission tomography on severity of cognitive impairment and course of epilepsy.

Aim: The study on the influence of minor lesions of the mesial temporal lobe visible on positron emission tomography on the severity of cognitive disorders and the course of epilepsy.

Introduction

The study group included 31 patients with mesial temporal lobe epilepsy with a low frequency of seizures. The qualified patients had been suffering from epilepsy for many years, each of them for more than one year. The patients took antiepileptic drugs in moderate doses, which were quite effective in reducing the frequency of seizures. The examined patients did not have any obvious focal lesions found on magnetic resonance imaging in mesial temporal lobe. In the positron emission tomography examination performed, some patients had reduced uptake of the tracer 18 fluorodeoxyglucose in these brain structures. In the examined patients, no cause of epilepsy was found and no other causes of cognitive disorders apart from epilepsy were detected. Patients from the study group did not have any diagnosed depression.

Methods

MRI of the head excluded patients with clear focal lesions in the mesial temporal lobe. Each patient was then subjected to positron emission tomography of the head in the interictal phase using an 18 fluorodesoxyglucose marker, electroencephalography at rest and after a sleepless night, detailed examination of individual cognitive functions using various neuropsychological tests. The age of onset, the patients' education and the frequency of epileptic seizures in the last year before the examination were determined.

The result of MRI and PET/CT of the head have been summed up. Five patients had slight sclerosis visible on MRI in the mesial temporal lobe. Each of these five patient had reduced 18F-FDG hypometabolism on the head PET/CT, which covered a slightly larger area in the mesial temporal lobe than the previously faint sclerosis found on head MRI. Ten other patients had decreased 18F-FDG tracer uptake in the mesial temporal lobe. Based on the results of the PET/CT scan of the head, the examined patients were divided into two further groups; 15 patients had decreased 18F-FDG metabolism, which probably corresponded to slight sclerosis with concomitant focal cortical dysplasia or only sclerosis without this dysplasia, and 16 patients had no

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noticeable reduction in 18F-FDG tracer metabolism in the mesial temporal lobe and may have had very mild focal cortical dysplasia.

In the next part of the study, both subgroups of patients were compared in terms of the severity of cognitive disorders and then the severity of epilepsy. A group of 15 people with reduced uptake of the 18F- FDG marker in mesial temporal lobe was further divided into a subgroup of patients in which there was slight sclerosis already visible in the MRI of the head and the second group in which changes were visible only in the next PET/CT examination of the head. Separated subgroups of patients were compared with each other in terms of cognitive impairment and severity of the course of epilepsy.

Results

In the group of patients with slight hypometabolism of the 18F-FDG tracer found in the PET/CT scan of the head in the mesial part of the temporal lobe, significantly bigger cognitive disorders in the field of memory and learning were revealed compared to the group of patients without disorders of the uptake of 18F-FDG tracer in these brain structures. In terms of attention and the summed result of the individual cognitive functions tested, some statistically significant differences were obtained. In the same group of patients, the severity of epilepsy was almost imperceptible and statistically insignificant.

In the subgroup of patients with already visible slight sclerosis of the mesial temporal lobe on MRI of the head, cognitive impairments were also much bigger. Statistically significant differences were achieved for the comparison of verbal memory, the overall BADS test consisting of subtests examining the processes of planning, organization of action, attention processes and problem –solving, as well as the extended study of executive functions obtained through the combined study of verbal fluency and BADS tests. In another comparison, no trend was found in the severity of epilepsy in this subgroup of patients.

Conclusions and interpretations

The analyses carried out in the current study showed that a slight damage to the mesial temporal lobe visible in PET/CT or a slightly larger damage to these brain structures causes significantly greater cognitive disorders without affecting the significantly greater severity of epilepsy. The obtained result contradicts the characteristics of benign mesial temporal lobe, because 40% of BMTLE patients with marked sclerosis in the mesial temporal lobe on MRI do not have any cognitive impairment. This study emphasizes the importance of a comprehensive cognitive assessment in patients with mesial temporal lobe epilepsy, challenging previous notions about the absence of cognitive impairment in milder forms of this condition.