

Is mesial temporal lobe epilepsy a progressive disorder? Evidence from proton magnetic resonance spectroscopy

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Background and objective: Proton magnetic resonance spectroscopy (¹HMRS) is an important non-invasive technique for exploring the neurochemical changes of the brain in vivo. Mesial temporal lobe epilepsy (MTLE) is the most common type of localization-related epilepsy. Whether MTLE is the result of an early injury or there is ongoing neuronal dysfunction or loss is still debated.^{1,2} The objective of present study is to investigate whether MTLE is a progressive entity by using ¹HMRS.

Methods: We performed ¹HMRS in 63 patients with MTLE and 16 healthy volunteers. The diagnosis of MTLE was established through comprehensive evaluation including detailed history, clinical semiology, magnetic resonance imaging (MRI) scans and EEG. The duration of epilepsy varied from 3 months to 28 years. Duration of epilepsy was defined as the interval in years between the age of onset of epilepsy and the time of the ¹HMRS examination. Patients were classified into hippocampal sclerosis (HS) positive group and HS negative group according to the MRI findings, and divided into unilateral HS or bilateral HS. In ¹HMRS examination, the volume of interest (VOI) was placed over the medial temporal lobes (axial), including most of the head and body of the hippocampus, a part of the amygdale and the parahippocampal gyrus bilaterally. The NAA/Cr+Cho ratio was calculated. NAA/Cr+Cho ratio was used for analysis as its validity in estimating neuronal loss or dysfunction in epilepsy has been established. The results of ¹HMRS were compared with MRI findings and duration of epilepsy.

Results: The NAA/Cr+Cho ratio of 0.69 or less in the mesial structure of temporal lobe was defined as abnormal on the basis of data obtained from the healthy volunteers. HS was found in 36 patients (57%), 27 with unilateral HS and 9 with bilateral HS. Previous studies suggested the temporal lobe with lower metabolite ratio was strongly indicative of seizure origin in patient with MTLE³, so we considered this side as probable seizure focus. For the 63 patients with MTLE, there was no significant correlation of NAA/Cr+Cho (ipsilateral to the temporal lobe with lower NAA/Cr+Cho) or NAA/Cr+Cho (contralateral to the temporal lobe with lower NAA/Cr+Cho) with duration of epilepsy. We then explored the relation between duration of epilepsy and metabolite ratio in the 27 patients with unilateral HS. In the ¹HMRS contralateral to HS, there was a statistically significant negative correlation between the duration of epilepsy and NAA/ Cho+Cr ($r = -0.73$; $p = 0.014$). However, this correlation was not present in the ¹HMRS ipsilateral to HS.

Conclusion: The results suggest that in MTLE with unilateral HS, the damage in ipsilateral temporal lobe may be early, fixed and stable, but contralateral temporal lobe may have progressive damage. In MTLE with intractable seizures, early surgical intervention may be indicated to prevent pathological progression.

References

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