

PROLONGED FEBRILE CONVULSIONS PRODUCE MORE SEVERE MESIAL TEMPORAL SCLEROSIS

Quantitative Magnetic Resonance Characterization of Mesial Temporal Sclerosis in Childhood

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OBJECTIVE: To investigate whether quantitative magnetic resonance (MR) techniques can be used to distinguish between mesial temporal sclerosis in patients with a history of prolonged febrile convulsion and in patients without such a history.

METHODS: Quantitative hippocampal T_2 relaxometry, hippocampal volumetry, and single-voxel ^1H -magnetic resonance spectroscopy (MRS) data were acquired from 16 children who subsequently underwent temporal lobe resections for intractable temporal lobe epilepsy and histologically were shown to have sclerosis of the horn of Ammon. Eight children had a history of prolonged febrile convulsion in early childhood, and eight children had other or no associations.

RESULTS: Patients with a history of prolonged febrile convulsion had smaller hippocampi ($p = 0.02$) and prolonged T_2 relaxation time ($p = 0.03$) ipsilateral to the seizure focus when compared with patients without such a history. There was also more side-to-side asymmetry of T_2 relaxation time ($p = 0.004$) and hippocampal volume ($p = 0.02$) in the patients with a history of prolonged febrile convulsion than in those with other or no associations. No differences between the groups were identified by using ^1H -MRS

CONCLUSIONS: These data support the view that there are at least two types of mesial temporal sclerosis. There may be several pathogenetic pathways from initial insult to later mesial temporal sclerosis, and these pathways are, at least in part, dependent on the initial insult.

COMMENTARY

Mesial temporal sclerosis (MTS) is found in $\sim 50\%$ of patients with complex partial seizures of temporal lobe origin. Previous magnetic resonance imaging (MRI) studies have established that patients with a history of febrile seizures, particularly complex febrile seizures, are more likely to have MTS, detected on MRI, using either T_2 -weighted or T_1 -weighted sequences. However, the etiology of MTS is unknown, and it may not be related to a single underlying pathologic process. In this study, Scott et al. demonstrated that MTS is more severe, when measured by quantitative MRI techniques, in children with a history of prolonged febrile seizures (PFCs), lasting >30 min, than in those with other histories, including head injury, simple febrile seizures, or status epilepticus. Both hippocampal volume and T_2 relaxation time were measured in their study. However, they found no difference in NAA/Cr values on magnetic resonance spectroscopy. Although all the patients had surgery, the authors did not comment on the patterns of hippocampal damage found. One possible confounding variable is the longer duration of epilepsy among patients with PFC, 9.6 versus 6 years. Increasing epilepsy duration has been associated with increasing severity of hippocampal sclerosis in several studies, although it is unlikely that such a small increment would be significant. It also is important to note that definitions of prolonged or complex febrile seizures vary, and that 15 min is used as a cut-off by many investigators. Of course, reports of febrile seizure duration are rough estimates at best.

The authors suggested that patients with PFCs may have a genetic predisposition to hippocampal injury during prolonged seizures, as well as to febrile seizures themselves. Their data are consistent with previous studies that have shown differing patterns of hippocampal pathology depending on seizure etiology. In future investigations, biochemical and neurotransmitter alterations may provide additional clues to the origins of MTS.

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