

MIDLINE SPIKES ASSOCIATED WITH FOCAL EPILEPSY

Seizure Semiology and Neuroimaging Findings in Patients with Midline Spikes

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PURPOSE: Midline epileptiform discharges are rare compared with discharges at other scalp locations. Neuroimaging results and semiologic seizure characteristics of patients with midline spikes are not adequately described. The aim of this study was to describe the neuroimaging findings and detailed seizure semiologies in patients with midline spikes.

METHODS: We reviewed the EEG database of the University of Michigan Medical Center and identified 35 patients with midline spikes. Information about seizure types and neuroimaging results was obtained from a review of medical records. The seizures were classified according to the International League Against Epilepsy (ILAE) criteria and semiologic classification.

RESULTS: Twenty-nine (83%) patients had a history of seizures. Complex partial seizures and simple partial seizures were the most common seizure types, experienced by 66% of patients. The age at seizure onset was within the first 10 years in 90% of patients. According to the semiologic seizure classification, automotor seizures and tonic seizures were the most common seizure types. Neuroimaging studies were abnormal in 45% of patients. When focal abnormalities were detected, they were lateralized to one of the frontal lobes in all cases.

CONCLUSIONS: Our results indicate that in the majority of patients, midline spikes represent focal epileptiform activity rather than fragments of generalized discharges, and are most commonly associated with seizures of partial onset. Automotor seizures and tonic seizures are the most common semiologies. Focal radiologic abnormalities tend to be lateralized to one of the frontal lobes.

COMMENTARY

The electroclinical correlation and pathological findings underlying the epileptogenic zone in patients with midline spikes has not been well studied. Interictal vertex (Fz, Cz, or Pz) spike discharges are relatively uncommon and may be present in individuals with partial or generalized seizure disorders. These epileptiform alterations may represent fragments of generalized discharges or occur in association with independent focal spikes. The epileptogenic potential of midline spikes in a consecutive series of patients undergoing routine EEG recordings is unknown.

Kutluay et al. identified 35 individuals with midline spikes from approximately 20,000 EEG recordings performed at one institution during a 10-year period. The rationale for this investigation was to evaluate the seizure semiology and neuroimaging findings in patients with these epileptiform discharges. The semiologic seizure classification was made by the observation of the patient or an appropriate observer. The midline spikes were “localized to, or of highest amplitude at one of the vertex scalp electrodes.” The paroxysmal alterations were most common in the younger patients. The mean age at the time of the EEG recording was 5.1 years (range, birth to 37 years). In most patients the vertex spikes were maximal at the Cz electrode position. All 35 individuals had midline spikes during wakefulness. Thirteen of the patients had “mild to moderate mental retardation.” Twenty-nine (83%) of the 35 patients had seizure disorders. The age of seizure onset was in the first five years of life in 76% of the patients. In 90% of patients the age of seizure onset was in the first decade of life. The most common seizure disorder in this group was a localization-related epileptic syndrome. Two thirds of the patients experienced simple or complex partial seizures, or both. Patients with partial epilepsy often exhibited tonic or clonic seizures. Seven patients (24%) had generalized seizure disorders. Twenty-eight patients had a MRI head study. The findings were abnormal in 13 patients (45%). All of the seven patients with a localized neuroimaging abnormality had frontal lobe pathology. The pathological substrates included encephalomalacia or probable malformations of cortical development.

This study provides evidence of the high epileptogenic potential of midline spikes in patients undergoing EEG record-



ings. These epileptiform discharges may indicate the diagnosis of partial seizure disorder with the region of seizure onset usually involving the frontal lobe. There also appears to be an important relationship between the age of seizure onset and the presence of midline spikes. Most individuals with these interictal epileptiform discharges were young children.

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