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ELECTROENCEPHALOGRAPHY

EEG AFTER FEBRILE SEIZURE IS PREDICTIVE OF EPILEPSY

Researchers in pediatric neurology and electroencephalography at the University of Yamanashi, Japan, studied the EEG in children referred within 7-20 days after a febrile seizure (FS), and determined the utility of localization of paroxysmal discharges as a predictor for subsequent epilepsy. Of 119 patients with FS, 26 (21.8%) had paroxysmal abnormalities in the EEG and 9 (7.6%) patients developed epilepsy. Patients with complex FS (n=20, 17%) had a significantly higher risk of development of epilepsy than those with simple FS (n=99, 83%); $p<0.05$; they also had a higher incidence of abnormal EEGs (9/20, [45%], vs 17/99, [17%]; $p<0.05$). Patients with EEG abnormality had a significantly higher risk of development of epilepsy than those without EEG abnormality ($p<0.01$). Risk of epilepsy varied with the localization of paroxysmal discharge: 10% in children with generalized paroxysmal spike and wave activity; 28.5% with rolandic discharges; 75% with frontal paroxysms; and none with occipital paroxysmal discharges. Compared with generalized EEG foci, the relative risk for development of epilepsy in children presenting with frontal foci was 27.0, and significantly higher than those with paroxysms in other regions ($p<0.035$). Serial EEG is recommended in FS patients showing frontal paroxysmal EEG abnormalities. (Kanemura H, Mizorogi S, Aoyagi K, Sugita K, Aihara M. EEG characteristics predict subsequent epilepsy in children with febrile seizure. **Brain Dev** April 2012;34:302-307). (Respond: Hideaki Kanemura MD, Department of Pediatrics, University of Yamanashi, 1110 Chuo, Yamanashi 409-3898, Japan. E-mail: ykimu@yamanashi.ac.jp).

COMMENT. The electroencephalogram is not included in the American Academy of Pediatrics guidelines for the neurodiagnostic evaluation of the child with a first simple FS (AAP. **Pediatrics** 1996;97:769-775). In contrast, several reports have documented the value of the EEG in prediction of the development of recurrent afebrile

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seizures and epilepsy following a complex FS (see **Pediatr Neurol Briefs** August 2011;25(8):59). The risk of epilepsy following a simple FS is about 2% (Nelson KB, Ellenberg JH. **N Engl J Med** 1976;295:1029-1033) whereas the risk following a complex FS in a child with developmental delay is 9.2% (Hesdorffer DC et al. **Ann Neurol** 2011;70(1):93-100). In children with normal development and simple FS, the risk is only 1.1% but significantly greater than for healthy children with no FS (0.5%; p=0.027). In a prospective study of 428 children with a first FS followed for 2 years or more, unprovoked seizures occurred in 26 (6%). Risk factors for unprovoked seizures included neurodevelopmental abnormalities, complex FS, a family history of epilepsy, recurrent FS, and brief duration of fever before initial FS. (Berg AT, Shinnar S. **Neurology** 1996;47(2):562-568).

A review of the literature from 1947 to 1964 uncovered 36 publications in which the EEG findings were reported in relation to FS and 23 included number and percent with paroxysmal discharges (mean 25%). (Millichap JG. **Febrile Convulsions**. New York, Macmillan, 1968). In our prospective 2-year follow-up study of 76 FS patients with EEGs, paroxysmal discharges were recorded in 18 (24%); they were more frequent in patients who developed non-FS (61%) than in those with FS alone (12%). The discharges were generalized in 11 patients and focal in 7 (Millichap JG et al. **Neurology** 1960;10:643-653). Age was a significant factor in relation to the incidence of abnormal EEGs; patients with abnormal records were 3-10 years (mean 7 years) old and those with normal records were 1-7 years (mean 3 years) old. In her extensive investigations of the EEG and FS, Lennox MA also reported that paroxysmal records occurred mainly in children 5 years or older (**Amer J Dis Child** 1949;78:868-882). Repeated EEGs at follow-up subsequent to a FS were recommended to determine prognosis and risk of nonfebrile seizures. The present study concludes with a similar recommendation, but more specifically in patients with EEG showing frontal paroxysmal foci.

NONCONVULSIVE ELECTROGRAPHIC STATUS EPILEPTICUS

Researchers at the University of Cincinnati, OH, examined medical records of 75 children, aged 3 months to 21 years (mean age 7.8 years), for prevalence of nonconvulsive status epilepticus (NCSE) by searching a clinical EEG database (n=18) or consecutive inpatient EEG referrals for NCSE over an 8-month period (n=57). NCSE was identified in 26 patients (35%) and in 8 of 57 (14%) patients referred for possible NCSE (>50% from outside the ICU). An acute etiology for encephalopathy was determined in 31 of 75 (41%) patients; it was an extra CNS infection and fever in 12, CNS infection in 8, and hypoxia in 12. Less than half the patients with NCSE were critically ill; 4 NCSE patients (15%) died, and 8 (31%) had significant neurologic morbidity on discharge. Compared to patients identified with NCSE, of the 49 patients without NCSE, 4 (8%) died and 2 (4%) had neurologic morbidity. The majority of patients (15 of 26, 58%) identified with NCSE were in the neurology service. A clinical seizure was witnessed in 24 (92%) patients with NCSE. Of 57 patients with acute neuroimaging within 24 hours of EEG, 20 showed abnormalities including multifocal cortical edema and acute hydrocephalus. Clinical seizures and acute neuroimaging abnormality were associated with an 82% probability of NCSE. NCSE was accompanied by electrographic or electroclinical seizures within the first hour of monitoring; the median duration of