Initial evaluation and management of the child with seizures

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THE ONSET of seizures in a child represents a major event in the life of that child and the child's family. The impact of seizures can be significant medically, socially, psychologically, and even financially. The approach by the physician must be sensitive to each aspect of the situation, and care must be taken to deal with psychosocial as well as medical aspects of the disorder.

HISTORY

The most important aspect of the initial evaluation is the history of the events in question. Children may have paroxysmal events which do not represent epileptic seizures. Examples of nonepileptic, paroxysmal events include breath-holding spells, syncope, migraine disorders, sleep disorders, involuntary movements, hyperventilation syndrome, or behavioral outbursts. It is imperative that episodes be described in great detail, including such possible features as the presence of an aura, onset of abnormal movements in one part of the body, or the possibility that this was a generalized convulsion from the onset. Other important historical information includes the frequency and duration of the spells, possible precipitating factors, exact times of occurrence, a complete description of all ictal events, and the postictal state.

The second part of the history includes a search for factors in the child's background which might predispose the child to epileptic seizures. The medical history begins with a review of the birth process. The duration of the pregnancy and any complications which might have taken place, birth weight, and complications of labor and delivery must be elucidated. Many children with subsequent neurologic problems will have abnormalities in the newborn nursery; and it is important to know the Apgar scores, care received in the nursery, and any special problems such as intraventricular hemorrhage, exchange transfusion, and intensive respiratory care. The child's postnatal health might include clues as to events which have altered the central nervous system (CNS). Important events could include meningitis, encephalitis, severe head trauma, lead poisoning, or hydrocephalus. Even without a specific encephalopathic event, some children will have expressed their neurologic abnormality because of their having mental retardation, cerebral palsy, or autism. Taking the family history is also important, to see if close family members have a history of epilepsy.

History-taking should include a search for significant and chronic non-neurologic disease. Illnesses which might increase the possibility of seizures include cyanotic congenital heart disease, renal insufficiency, juvenile diabetes, and chronic lung disease. The presence of even milder non-neurologic disease might be a factor leading to seizures because of the need for medications. One example would be a child with asthma who receives high doses of aminophylline preparations; another would be the child with severe psychiatric disease who is being treated with high dosages of neuroleptic agents.

It is also necessary to determine whether the seizure disorder is due to an intracranial lesion or whether it represents one aspect of a progressive neurodegenerative disorder. Children with intracranial mass lesions might have associated cranial nerve, cerebellar, or

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upper motor neuron abnormalities as well as symptoms of increased intracranial pressure. The developmental history is important for two reasons. In general, there is a higher than expected association of learning disorders and attentional deficits in children with seizures. In addition, children who have lost previously attained milestones and developmental abilities might be expressing seizures as a part of their degenerative problem.

PHYSICAL EXAMINATION

After the history has been obtained, the physician should have already formed an opinion as to whether or not the events represent an epileptic disorder or some other paroxysmal problem. The physical examination is an extension of the information sought during the taking of the history. The child's height and weight should be plotted on a growth curve to determine if they are excessive or deficient as might be seen in an endocrine disorder due to a midline CNS tumor. The head circumference is important since the presence of microcephaly or macrocephaly can be associated with various neurologic disorders. Abnormalities of vital signs may provide a clue to the presence of hypertension and/or renal disease as well as cardiac arrhythmias or other abnormalities. The presence of fever in a child whose seizure was recent might point to an infectious cause.

An assessment of a child's mental status and behavioral pattern helps to document the child's baseline neurologic development as well as the possible presence of psychological factors which may be operative in causing abnormal events. The presence of anxiety, depression, and family conflict may lead to the possible diagnosis of psychogenic seizures. Each organ system must then be examined fully to ascertain whether non-neurologic disease is present. Absence of femoral pulses may point to a coarctation of the aorta, and organomegaly may suggest a storage disease, inborn error of metabolism, or hematopoietic disease.

Examination of the skin is especially important because of the possibility of a neurocutaneous disorder. Multiple cafe-au-lait spots suggest neurofibromatosis and a possible CNS disorder, while hypopigmented macules and adenoma sebaceum could be a sign of tuberous sclerosis. Sturge-Weber syndrome is characterized by facial hemangiomas, and the presence of petechiae may point to a blood dyscrasia with hemorrhage into the CNS.

The neurologic examination should include auscultation of the cranium in an attempt to document a bruit which might point to an arteriovenous malformation. Examination of the cranial nerves must include the fundi. Optic atrophy may be due to chronic increased intracranial pressure or a lesion in the area of the optic chiasm. Papilledema or hemorrhage would lead to concern that the process was more acute and associated with either trauma or increased pressure. Abnormalities of the motor, cerebellar, and sensory system will help to determine whether the seizures are part of a more diffuse neurologic process.

LABORATORY TESTING

Every patient suspected of having a seizure disorder must have electroencephalography (EEG) performed. Although epilepsy is a clinical and not a laboratory diagnosis, the presence of ictal or interictal epileptiform discharges provides strong evidence that the patient's episodes are indeed seizures. The EEG pattern is of help in classifying the seizure type, and several specific pediatric epilepsy syndromes have been defined. Since the EEG is being reviewed specifically for epileptiform discharges, it is not necessary to wait for a specified period of time after the last seizure before the EEG is performed.

Skull radiographs are generally not indicated in the evaluation of children with a seizure disorder. Computed tomography is usually performed as part of the evaluation, but there are no studies to indicate that each child with a possible seizure disorder must have such an imaging technique performed.[1] Without question, however, any child with a focal seizure form must have an imaging technique performed, as must any child with focal neurologic findings or epileptiform discharges present in only one hemisphere. Magnetic resonance imaging is at times more accurate in determining intracranial abnormalities,[2] but it is not clear at this time that such imaging should preferentially be performed.

Routine chemical and metabolic screening is also indicated for every child experiencing seizures. These tests screen for abnormalities of electrolytes, glucose, calcium, and hepatic and renal function. Adolescents might also be screened for possible drug ingestion. No other tests are necessary for the child who is otherwise well, but more extensive testing of a specific nature might be indicated for children whose examinations have pointed to possible abnormalities in specific areas. Those few children whose history and examination

point to the possibility of a specific metabolic or degenerative disorder might benefit from tests for aminoaciduria, organic aciduria, lysosomal enzyme deficiencies, or peroxisomal disorders. A lumbar puncture is useful only if there is a strong suspicion of an infectious process or of increased intracranial pressure.

A small percentage of patients will best be evaluated by their spending time in an epilepsy monitoring unit where simultaneous videotaping and EEG recording can be performed. Closed-circuit TV monitoring with continuous EEG may help determine the exact nature of a paroxysmal event which cannot be defined by the history, physical examination, or routine EEG testing.

TREATMENT

If the child has, indeed, been experiencing epileptic seizures, it is necessary to combine the clinical and EEG features in a manner which allows diagnosis of a specific seizure type. The epilepsies are divided into two major groups, designated as generalized or partial, according to the Commission on Classification and Terminology of the International League Against Epilepsy.[3] The appropriate use of antiepileptic drugs (AEDs) is based on a detailed knowledge of individual medications and their potential value in each of the various seizure forms.

The use of medication is clearly indicated if the child has a pediatric epilepsy syndrome known to be associated with ongoing and recurrent seizures. Use of medication is also appropriate when the child has already experienced more than two seizures. The issue of whether or not to treat the child who has experienced only one seizure of unknown cause is a matter of debate and uncertainty.[4–8] Among children who have had a single unprovoked seizure, only 25% to 75% will have another episode within 3 years.[9] Among the reasons for hesitating to prescribe medication are the 25% to 50% recurrence rate in treated patients[10] as well as the 10% to 30% rate of unacceptable side effects which occur in children taking AEDs.[11] If, on the other hand, the child has already had two or more seizures, the risk for further episodes is increased to 65% to 95%.[9,12]

In assessing the question of whether a first seizure should be treated, it is helpful to consider the patient's relative risk factors for seizure recurrence. It would appear that the risk of a second seizure increases if there has been a history of a CNS insult, the finding of epileptiform discharges on EEG, lateralizing abnormalities on the neurologic examination, or a positive family history in a first-degree relative.[9,13–15] Risk of a second seizure is also increased if the patient is seen soon after the initial seizure. Approximately 75% of second seizures occur within 6 months of the first one.[9] The child seen shortly after the first seizure, therefore, has a higher chance of recurrence than does the child seen more than 6 months after the event. It is my current recommendation, however, that an otherwise healthy child who has experienced a single seizure not be treated until a second seizure has occurred.

All decisions regarding treatment must be made within the context of extended explanations of all these factors to the family and (if appropriate) to the child. Families are bewildered and distressed by the onset of seizures in their child, and they are usually frightened unnecessarily by the myths and untruths which are still widespread within the community. Fortunately, there are now excellent pamphlets and books available to help families better understand the nature of their child's disorder. Families should also be made aware of the Epilepsy Foundation of America, which can help support the family during this difficult time.

Compliance with any therapeutic regimen will also depend on patient and family education. Each time a medication is to be started, the family must be told explicitly what the values and possible side effects of this medication might be. Siblings must not be neglected, and it is important that other extended family members be educated about this disorder. Successful treatment will not be possible unless the family is made part of the treatment team.

Education must be ongoing and must address issues specific to the different ages of the child.[16] The impact on adolescents is especially great since adolescence is a time when the unpredictable and periodic loss of control threatens the autonomy that the adolescent is struggling to achieve.[17] Frank discussions must be held with the teenager to address the issues of drugs and alcohol, driving, and the effect of potential precipitating events such as sleep deprivation, as well as the future issues of employment and marriage.

AEDs may also have the adverse effect of impairing school function.[18] Attention must be directed to the issue of school performance and behavior, and alteration of dosages or even changing medication must be considered if problems exist in these areas. The goal of treatment is to help normalize everyday function while at the same time attempting to control seizures completely. If seizures are not controlled completely even with aggressive medical therapy, the role of the physi-

cian in supporting the patient and family is increased even further.

PROGNOSIS

The ability to control seizures completely with medical means varies according to the specific type of seizure as well as the neurologic background of the child. Unfortunately, not all children can achieve complete control of seizures. In the cases of such children, consideration must be given to their being referred to a specialized epilepsy center. For children in whom a seizure-free period of 2 to 5 consecutive years can be maintained, there is a greater than 50% chance that medication can be successfully withdrawn.[19–22] There is incomplete agreement among investigators as to which factors increase the risk of seizure recurrence after medication has been withdrawn. It would seem, however, that the risk of recurrent seizures is greatest in children whose seizures continued for several years before control was achieved and in those who have other neurologic abnormalities, such as motor impairment or developmental disabilities.

Continued psychological and emotional support is necessary at all stages of a child's battle with epilepsy. The need is even greater in those whose seizures will continue even after medication has been started. Those whose medications are being discontinued will also require continuing support to help deal with the anxiety produced by the possibility of recurring seizures. The sensitive and caring approach of the physician will remain as important as any medical or technologic contributions which can be made.

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