A Synopsis of the American Academy of Pediatrics' Practice Parameters on the Evaluation and Treatment of Children with Febrile Seizures

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This article provides a summary of the practice parameters on febrile seizures. The reader is urged to read the original parameters and technical reports in their entirety for a more complete understanding of the conceptual basis for the recommendations.[1,2]

Introduction

Febrile seizures are the most common convulsive event in childhood, occurring in 2% to 5% of children younger than 5 years of age. Despite their frequency, there have been longstanding differences among pediatricians, family practitioners, child neurologists, and emergency physicians regarding both the neurodiagnostic evaluation of the child who has a simple febrile seizure and the appropriate approach to long-term therapy. The American Academy of Pediatrics (AAP) and its Provisional Committee on Quality Improvement, in collaboration with experts from the Section of Neurology, general pediatricians, pediatric epileptologists, and epidemiologists, developed two practice parameters for children who have febrile seizures. The first was published in 1996,[1] and the second was published in 1999.[2] The parameters were restricted to children who were neurologically normal between the ages of 6 months and 5 years and who experienced simple febrile seizures. A simple febrile seizure was defined as a brief (<15 min) generalized seizure that occurred only once in a 24-hour period in a febrile child who did not have an intracranial infection. Recommendations regarding children who had complex febrile seizures were deferred.

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Creation of the Parameter

The Committee that wrote the first parameter, "The Neurodiagnostic Evaluation of the Child With a First Simple Febrile Seizure", consisted of a practicing pediatrician, three child neurologists (one of whom is a neuroepidemiologist), and the chair, who is a pediatric cardiologist (see Appendix). The second parameter, "The Long-Term Treatment of the Child With Simple Febrile Seizures", was developed by the same group, with the following changes: one child neurologist was added, and the chair from the first parameter resigned and was replaced by a child neurologist who had served on the original Committee.

For both parameters, the AAP performed extensive literature searches. The resulting articles were reviewed by the Committee, then re-examined by epidemiologic consultants. Population-based studies that were limited to children who had simple febrile seizures were the priority, but hospital-based studies and studies of comparable groups also were reviewed. For the second parameter, particular emphasis was placed on those articles that matched treatment and control groups and examined drug compliance.

Tables were constructed from those articles that best fit the noted criteria and were published in the technical reports. The parameters were reviewed by pediatric epileptology consultants as well as the American Academy of Family Physicians, the American Academy of Neurology, the Child Neurology Society, the American College of Emergency Physicians, and several AAP sections and Committees, including those on Emergency Medicine, Practice, and Pharmacology. Final review was performed by the Board of Directors of the AAP.

The Neurodiagnostic Evaluation of the Child With a First Simple Febrile Seizure

RECOMMENDATIONS

Lumbar Puncture

The American Academy of Pediatrics recommends, on the basis of the published evidence and consensus, that after the first seizure with fever in infants younger than 12 months, performance of a lumbar puncture be strongly considered, because the clinical signs and symptoms associated with meningitis may be minimal or absent in this age group. In a child between 12 and 18 months of age, lumbar puncture should be considered because clinical signs and symptoms of meningitis may be subtle. In a child older than 18 months, although a lumbar puncture is not routinely warranted, it is recommended in the presence of meningeal signs and symptoms, ie, neck stiffness and Kernig and Brudzinski signs, which are usually present with meningitis, or for any child whose history or examination results suggest the presence of intracranial infection. In infants and children who have had febrile seizures and have received prior antibiotic treatment, clinicians should be aware that treatment can mask the signs and symptoms of meningitis. As such, a lumbar puncture should be strongly considered.

A seizure with fever may be the first presenting symptom of meningitis in a young child, and 30% to 35% of young affected children may have no meningeal signs. Therefore, the Committee determined that the potential risks associated with performing lumbar punctures were far outweighed by the benefits of diagnosing meningitis in young febrile children. This was the most controversial of the recommendations made in the first practice parameter. The Committee, however, deliberately chose a conservative approach with an emphasis on the value of lumbar punctures in diagnosing meningitis because the parameter was developed for practitioners who had a wide range of training and experience.

Electroencephalograms (EEGs)

The AAP recommends, based on the published evidence and consensus, that EEGs not be performed in the evaluation of a neurologically healthy child with a first simple febrile seizure.

Review of the literature revealed that although many children who have febrile seizures have abnormal findings on EEGs, there is no correlation with either recurrence of febrile seizures or with the future development of epilepsy. As a result, these studies may add more confusion than clarity.

Laboratory Blood Evaluations

On the basis of published evidence, the AAP recommends the following determinations not be performed routinely in the evaluation of a first simple febrile seizure: serum electrolytes, calcium, phosphorous, magnesium, CBC, or blood glucose.

The child who has febrile seizures convulses as a response to the fever; the convulsion is not the cause of the fever. Therefore, blood evaluations should be tailored to the symptoms with which the child presents. Accordingly, the child who presents with a febrile seizure, vomiting, and diarrhea may require an assessment of electrolyte concentrations and serum glucose levels. Alternatively, the child who presents with a febrile seizure and otitis media will not need an extensive blood evaluation. Serum glucose levels, although not needed routinely, should be obtained in those unusual cases in which there is prolonged postictal obtundation or in the child who presents with vomiting and ketosis. Routine evaluation of the seizure does not involve blood studies, but determination of the cause of the fever may require a more extensive evaluation.

Neuroimaging

On the basis of the available evidence and consensus, the AAP recommends that neuroimaging not be performed in the routine evaluation of the child with a first simple febrile seizure.

This recommendation was based on consensus rather than on studies in the literature. The only published study in which any form of imaging was obtained was one in which skull films were performed on children who had first febrile seizures. As might be anticipated, the studies yielded negative results. If one extrapolates results of neuroimaging in neurologically normal children who experience afebrile generalized tonic clonic seizures, the yield is exceedingly low. There are no data to suggest that children who have simple febrile seizures have either an increased incidence of central nervous system abnormalities or that simple febrile seizures cause structural brain damage.

CONCLUSION

The physician evaluating an infant or young child with a first simple febrile seizure should direct the evaluation toward the cause of the child's fever. A lumbar puncture should be strongly considered in the very young child (<12 mo) and should be considered in children between the ages of 12 and 18 months. In children older than 18 months, the decision to perform a lumbar puncture rests on the clinical suspicion of meningitis. The seizure itself usually does not require further evaluation, specifically EEG, blood studies, or neuroimaging.

Long-Term Treatment of the Child With Simple Febrile Seizures

RECOMMENDATIONS

Based on the risks and benefits of the effective therapies, neither continuous nor intermittent anticonvulsant therapy is recommended for children with one or more simple febrile seizures. The AAP recognizes that recurrent episodes of febrile seizures can create anxiety in some parents and their children, and as such, appropriate education and emotional support should be provided.

The risk of simple febrile seizures recurring varies according to age. Children younger than 12 months of age at the time of the initial simple febrile seizure have approximately a 50% chance of experiencing a recurrent febrile seizure. Those older than 12 months of age at the time of the first event have an approximate 30% chance of a second febrile seizure, and of those who have a second febrile seizure, 50% have a chance of at least one recurrence. Alternatively, children who have simple febrile seizures have only a slightly higher risk of developing epilepsy than the general population (2% versus 1%). The children at the greatest risk (ie, those who experience multiple simple febrile seizures and have a positive family history for epilepsy) have a 2.4% risk of developing generalized seizures by age 25. No study has demonstrated that treatment for simple febrile seizures can prevent the later development of epilepsy. Moreover, there is nothing to suggest that simple febrile seizures cause structural brain damage or that children who experience simple febrile seizures are at risk for cognitive decline.

Although there is no evidence that treatment with anticonvulsants will prevent the development of epilepsy, agents have been shown to prevent recurrent febrile seizures. Phenobarbital, when administered daily to reach a therapeutic blood level of at least 15 mcg/mL, can prevent recurrent febrile seizures in 90% of cases. The adverse effects of phenobarbital include behavioral

problems and hypersensitivity reactions. Valproic acid also appears to be effective in preventing recurrent febrile seizures, but its use has significant potential drawbacks, including fatal hepatotoxicity (especially in young children), thrombocytopenia, weight gain and loss, gastrointestinal disturbances, and pancreatitis. Carbamazepine and phenytoin are not effective in preventing recurrent febrile seizures. Thus, continuous anticonvulsant therapy with either phenobarbital or valproic acid can prevent 90% of recurrent febrile seizures, but both agents have significant side effects.

Others have reported that recurrent febrile seizures can be prevented with intermittent oral therapy. Antipyretic agents in the absence of anticonvulsants are ineffective at preventing recurrent febrile seizures. Alternatively, diazepam has been effective in preventing recurrent febrile seizures when given at the time of fever. The drawback of intermittent medication is that a child could have a seizure before the parent recognizes that the child is febrile. Oral diazepam is associated with lethargy, drowsiness, and ataxia. Of most concern, however, is that the sedation associated with diazepam may mask the evolving signs of a central nervous system infection.

Because treatment with anticonvulsants will not prevent the development of epilepsy, the goal of treatment is to prevent recurrent febrile seizures. However, because these seizures are considered benign events with a very low risk to the individual child, any recommended therapy should have exceedingly low risks and side effects, be inexpensive, and be highly effective. Based on our review of both continuous and intermittent therapies, the Committee deemed that the potential adverse effects of these therapies were not commensurate with the benefits. The Committee recognized that there are some families for whom febrile seizures are extremely frightening events, and educational and emotional support should alleviate some of these concerns. There may be families, however, for whom the physician may believe that prevention of future febrile seizures is indicated because of the degree of parental anxiety. For those patients, intermittent oral diazepam at the onset of a febrile illness may be effective in preventing recurrence.

REFERENCES

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APPENDIX

Committee Members for The Neurodiagnostic Evaluation of the Child With a First Febrile Seizure:
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