

## Review Articles

# Febrile Seizures: Review Article

*Azhar Daoud*<sup>\* 1</sup>

### Demographic, Genetic and clinical profiles

Febrile seizures are broadly defined as seizures' occurring in the presence of fever, but in the absence of central nervous system infection. They occur in children aging from 6 months to 5 years with a mean age of onset of 18-24 months and they occur slightly more commonly in boys than in girls.<sup>1</sup> It is the most common reason for convulsions in children less than 6 years of age, and they occur in 2 to 5% of all children, although it has been reported to be more frequent in Asian countries. In Japan, the rate has been reported to be 7% and in Jordan 6.5%.<sup>2</sup> It is thought that the rates in these areas are higher because some of the common infections of childhood may occur earlier in life when children are most susceptible to febrile seizures.<sup>3</sup> Febrile seizures can be divided into two types: simple and complex. Simple febrile seizures are characterized by the following: duration less than 15 minutes generally, and it occurs in normal children neurologically and developmentally. Complex febrile seizures have the following features: duration greater than 15 minutes, multiple within 24 hours, and/or focal.<sup>2</sup> The risk of recurrence after the first febrile seizure is about 33%. The risk factors for recurrence are: occurrence of the first febrile seizure at a young age; family history of febrile seizures; short duration of fever before the seizure; relatively low fever at the time of the initial seizure; and possibly a family history of an afebrile seizure. It has been observed that the time of recurrence is usually within the first year of onset. Although complex febrile seizures are not usually associated with an increased risk of recurrent febrile seizures, they may be a risk factor for epilepsy later in life. Febrile seizures seem to run in families, but their mode of inheritance is unknown. The risk for other siblings developing febrile seizures is about 10-20%, but may be higher if the parents also have a history of febrile seizures themselves.<sup>4</sup> In large families, the FS susceptibility trait is inherited by autosomal dominant pattern with a reduced penetrance. It has long been recognized that there is a significant genetic component for susceptibility to this type of seizure and this may be caused by a mutation in several genes.<sup>2</sup> In the presence of cases of FS and epilepsy in the same family one study the concept of a genetic epilepsy syndrome termed Generalized Epilepsy with FC plus (GEFS+). GEFS has a spectrum of phenotypes including FC, and FC plus.<sup>2</sup>

Febrile seizures usually occur in the first 24 hours of the onset of fever. It has been suggested that it is the rapid rise in the child's temperature, which causes a febrile seizure rather than the actual height of the fever itself; however, there is no substantial proof to support this suggestion. The seizures are usually generalized and tonic-clonic, but other types may be present as well. There may be variations to this such as staring without stiffness, jerking movements without prior stiffening, and localized stiffness or jerking.

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1- Professor of Child Neurology, Department of Neuroscience, Faculty of Medicine, Jordan University of Science and Technology, Irbid, Jordan.

**\* Correspondence should be addressed to:**

Azhar Daoud

P. O. Box 2227 Irbid 2111, Jordan

E-mail: [daoud@just.edu.jo](mailto:daoud@just.edu.jo)

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Although the diagnosis of febrile seizure is likely in a 6- month to 5- year- old child with fever and a convulsion, one should consider other causes such as meningitis, encephalitis, shigella gastroenteritis, medications/toxins (such as diphenhydramine, tricyclic antidepressants, amphetamines, and cocaine), hypoglycemia, electrolyte abnormalities (that could be due to dehydration), shaken baby syndrome, accidental head trauma, and epilepsy.<sup>4</sup> Many of these other diseases can be ruled out by a good history, physical examination, and clinical appearance after the seizure has ended.

### Clinical approach and investigation

The American Academy of Pediatrics attempted to answer this in two practice parameters on the evaluation and treatment of children with febrile seizures that were published in 1996 and 1999.<sup>5,6</sup> The recommendations of these two practice parameters are listed below. It should be kept in mind that these are guidelines only and that each case should be individualized according to the particular child, and the situation. One should remember that these guidelines are written for practitioners with a wide range of experience and training; therefore, the points mentioned here are meant to be conservative. Also, these guidelines are written for children from 6 months to 5 years of age who had a simple febrile seizure and are neurologically normal. The guidelines do not include children with complex febrile seizures.

1. An LP should be performed in all infants less than 12 months of age because signs and symptoms of meningitis may be minimal or absent in this age group. An LP should be considered in children between 12 months to 18 months of age, since signs of meningitis might be subtle. An LP does not need to be done in children older than 18 months unless they show signs of meningitis (neck stiffness, brudzinski and kernig signs) or have symptoms of a CNS infection. Infants and children who were treated with antibiotics prior to the seizure should be strongly considered to have an LP done. This is because antibiotics can mask the signs and symptoms of meningitis (partially- treated

meningitis). Even if an LP is performed and the results are negative, it is still prudent to be cautious and vigilant since spinal fluid may be normal in the early stages of meningitis.<sup>5</sup> The clinical appearance of the child after the seizure has ended plays a very significant role, in that the playful, active child, who appears normal, probably does not have meningitis.

2. An EEG does not need to be performed as part of the work-up for a first time simple febrile seizure. Although the EEG may be abnormal (occipital slowing) in the first month after the seizure, there has been no correlation of this to recurrence risk or the risk for developing epilepsy in the future.<sup>5,7</sup>
3. Laboratory tests, such as a CBC, serum electrolytes, calcium, magnesium, phosphorus, and glucose, need not be done routinely. It should instead be tailored to the presenting symptoms. For example, electrolytes and glucose can be checked in a patient who is vomiting.
4. Neuroimaging, CT scan or MRI of the head does not need to be done routinely. There is no data available showing that children with febrile seizures have an increased incidence of CNS abnormalities, nor any evidence that febrile seizures lead to structural brain damage.

### Recommendation

If the child develops another seizure, then supportive measures are recommended. During the time the seizure is occurring, the patient should be placed on his/her side to prevent aspiration, and the airway should be maintained. Also nothing should be placed in their mouths. If it is prolonged, then diazepam or lorazepam should be given either intravenously or rectally. If the patient has a fever, avoiding overheating by removing blankets and heavy clothes can prevent febrile seizures, in addition to administering antipyretics such as acetaminophen and giving cool baths. Diazepam/lorazepam can also be used to prevent future recurrences of febrile seizures for the next several hours, although its administration as a preventive measure is controversial.<sup>7</sup>

Should a patient be hospitalized? Probably not, although it depends on what the circumstances are. It is recommended that patients who had a febrile seizure be observed in the emergency department for several hours and reevaluated. After this time, most children would have improved, and if the cause of the fever is known and treated, they can then be sent home. If they are not improving, then the diagnostic studies mentioned previously should be considered. Circumstances when they should be hospitalized for overnight observation are: the clinical situation is still unstable, there is a possibility of meningitis, and/or the parents are unreliable or unable to cope with a child who is developing another seizure.<sup>3</sup>

An essential component of management is parental counseling. Reassurance should consist of three components. First, parents should be reassured by informing them that although the febrile seizure is frightening, it will not cause brain damage, and the possibility of their child developing epilepsy is small. Secondly, they should also be told that there is a possibility that it could happen again, especially in the first 24 hours. Also, one third of children will have at least another febrile seizure later, being most occurring within one year of the episode. Thirdly, if a seizure occurs, the child should be kept on his/her side, and they should observe their child. If the seizure does not stop in 3 minutes, then emergency medical services should be contacted or to use rectal diazepam if available.<sup>5</sup>

### Treatment and Outcome

Long-term pharmacotherapy is probably unnecessary, especially for simple febrile seizures. Although the AAP Practice Parameters discourage use of anticonvulsants in simple febrile seizures, it does mention that giving diazepam during the start of fever in patients with parents having high anxiety is an option. Diazepam is given orally using a dose of 1 mg/kg/day in three divided doses when the child is febrile.

Disadvantages of using diazepam are lethargy, drowsiness, ataxia, and masking of a CNS infection. Other medications that have been used to prevent recurrences are phenobarbital and valproic acid. A dose of 5 mg/kg/day of phenobarbital is given once to twice a day. Although they can prevent 90% of recurrences of febrile seizures, they are not without significant side effects. Phenobarbital has been associated with behavioral problems (hyperactivity) and hypersensitivity reactions. Valproic acid has a risk of developing fatal hepatotoxicity, thrombocytopenia, weight changes, gastrointestinal problems, and pancreatitis. These medications have been considered in those patients who have focal paralysis after a seizure, multiple seizures in a young child, and high parental anxiety despite reassurance.<sup>3,6</sup> Phenytoin and carbamazepine have no demonstrated efficacy in preventing febrile seizures.

Despite the frightening appearance of the episode, and the parental belief that their child is going to die, simple febrile seizures remain a benign condition with the majority of children having no neurological sequelae. In other words, it does not lead to brain damage or cognitive abnormalities. Although the risk of developing another febrile seizure is moderate, the possibility of epilepsy is very small. For this reason, long-term therapy, anticonvulsant therapy, is not usually recommended, but practitioners should provide reassurance, education of what to do when their child has another febrile seizure and antipyretic therapy when a fever is present.

### References

1. Abuektiesh F, Daoud AS, Al-Sheyyab M, Nouman M. Demographic characteristics and risk factors of first febrile seizures: a Jordanian experience. *Tropical Doctor* 2000; 30:25-27.
2. Daoud AS. Febrile Convulsion: Review and update. *Journal of Pediatric Neurology* 2004; 2: 9-14.
3. Aicardi J. Chapter 15 - Febrile Convulsions. In Aicardi, J. *Epilepsy in Children*, second edition. 1994 New York: Raven Press, pp. 253-275.
4. Hirtz DG. Febrile Seizures. *Pediatrics in Review* 1997; 18(1): 5-9.

5. Provisional Committee on Quality Improvement, Subcommittee on Febrile Seizures: Practice Parameter: The Neurodiagnostic Evaluation of the Child With a First Simple Febrile Seizure. Pediatrics 1996; 97(5): 769-772.
6. Committee on Quality Improvement, Subcommittee on Febrile Seizures: Practice Parameter: Long-term Treatment of the Child With Simple Febrile Seizures. Pediatrics 1999; 103(6): 1307-1309.
7. Verity CM. Chapter 15 - Febrile Convulsions: A Pragmatic Approach. In: Porter RJ and Chadwick D (eds). The Epilepsies 2, 1997, Boston: Butterworth-Heinemann, pp. 289-311.

## التشنج الحراري عند الأطفال

أزهر داوود

قسم العلوم العصبية، كلية الطب، جامعة العلوم والتكنولوجيا الأردنية، اربد، الأردن

### الملخص

يُحصل التشنج الحراري عند الأطفال بنسبة عالية تصل إلى 2-5% في الدول المتقدمة ويزيد عن ذلك في الدول النامية حيث أن نسبته في الأردن 6.5 في المائة يحدث التشنج الحراري عند الأطفال في عمر يتراوح بين ستة شهور وخمسة سنوات. يقسم التشنج الحراري سريريا إلى قسمين وهما : التشنج البزّيء أو البسيط ويحصل في 95% من حالات التشنج الحراري والتشنج المقعد ويحصل في 5% من حالات التشنج الحراري. نظرا لشيوع حالات التشنج الحراري كتبنا هذا المقال لتذكير أطباء الأطفال والزملاء الآخرين الذين يتعاملون مع مثل هذه الحالات بالمستجدات في تشخيص التشنج الحراري والمكتشفات الحديثة حول أهمية عامل الوراثة وطرق العلاج أو الوقاية من التشنجات الحرارية.

الكلمات الدالة: التشنج الحراري.