Febrile Convulsions

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Abstract:

Febrile convulsions are seizures that occur in association with fever but without evidence of intracranial infection or other definable cause in children in the age between 6 months to 5 years. Febrile convulsions have a strong genetic predisposition and a benign outcome in the majority. Febrile convulsions are clinically distinguishable as simple febrile convulsions or they are called complex febrile convulsions when they have focal features and /or are prolonged and/or recurrent in the same illness. Complex febrile convulsions are associated with higher risk of developing subsequent epilepsy. The condition of mesial temporal lobe sclerosis has been linked to prolonged febrile convulsions in childhood. Majority of febrile convulsions need only parental assurance. In few cases intermittent or continuous prophylaxis with antiepileptic drugs may have to be advised.

Introduction:

Young children have a high susceptibility to convulsions in the presence of acute onset fever. They are a common occurrence in childhood with a benign outcome; nevertheless they cause great anxiety to the parents'. It is important to correctly diagnose febrile convulsions and to distinguish them from convulsions due to serious underlying diseases like meningitis and from epilepsy.

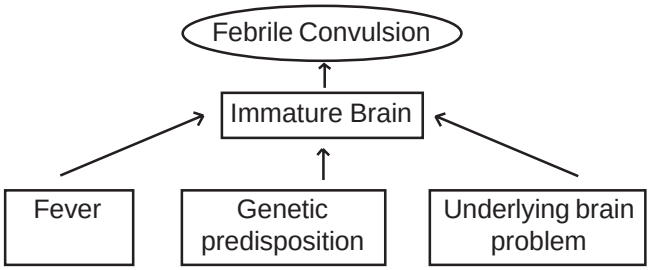
Febrile convulsions (FC) are defined **as s**eizures that occur in association with fever but without evidence of intracranial infection or other definable cause and the overall incidence is 4-5 % of the population. The higher incidence of febrile seizures reported in the developing countries is attributed to the higher incidence and earlier age of occurrence of some common childhood infections e.g. Measles.

Etiological Factors: Age, fever and genetic predisposition are the main risk factors in the causation of febrile convulsions. Other factors of lesser importance may be a history of abnormal prenatal and perinatal events that may facilitate the occurrence of FCs or influence their clinical expression and outcome[3]. Environmental influences combine with genetic factors to cause febrile convulsions.

Age: The commonly accepted age limit is 6 months to 5 years. Persistence of febrile convulsions beyond the age of 5 years is not very rare but convulsions before 5 months of age are much more common with infections of the central nervous system.

Fever: Upper respiratory tract infections, otitis media, gastroenteritis and urinary tract infections are the commonest causes of fever leading to febrile convulsions. Other causes are Pertussis and Measles vaccinations. Febrile convulsions usually occur during the first 24 hours of fever. Relationship with height or rate of rise of body temperature is inconsistent. Usually the temperature is more than 38.5 deg C at the time of febrile convulsion. Children who convulse with relatively low levels of fever may have a greater risk of repeated seizures and they should be observed with care.

Genetic predisposition: The vulnerability to seizures with fever clusters in families. Most studies suggest a dominant mode of inheritance with reduced penetrance and variable expression.



Clinical manifestations: All febrile seizures are either tonic –clonic or possibly hypo tonic. They never manifest as Myoclonic Seizures or non-convulsive attacks. They are clinically distinguished into two types-Simple and complex febrile convulsions. Majorities are simple febrile convulsions and carry a better prognosis than the complex ones.

A. Simple febrile convulsions: *60-70% of febrile convulsions are simple which means they are*

1. Generalized clonic or tonic-clonic without any focal features and
2. Brief with a duration of less than 15 minutes and
3. Without recurrence within a single illness episode.

B. Complex febrile seizures: *30% are complex and they have any of the following features.*

1. Focal features-Commonly the seizures are unilateral or
2. Prolonged with a duration of more than 15 minutes; they are termed as status febrile convulsions if they last longer than 30 minutes or
3. Recur more than once within the same illness episode.

Diagnosis: Rigors, febrile delirium and febrile syncope can sometimes be difficult to distinguish from febrile convulsions. When the clinician is faced with a child having seizures with fever for the first time the following situations are possible.

1. Illness causing brain insult e.g. meningitis, encephalitis
2. Simple febrile convulsion
3. Fever- triggered epilepsy

Long-term outcome of febrile convulsions: The consensus now is that majority of febrile convulsions have a benign outcome and residua, if any, are the result of the febrile disorder responsible for the convulsions or of previous abnormalities of development rather than being the consequences of the convulsions themselves[4]. Recurrent febrile seizures may occur in 40% of them. Subsequent epilepsy may occur in 2%. There is some controversy regarding the effect of prolonged febrile seizures on the brain but mesial temporal sclerosis has been related to prolonged febrile seizures in childhood.

Effect of prolonged febrile seizures: Incidence of sequelae is higher if the seizures occur at an earlier age. There is a strong relation between long duration and unilateral localization of the seizure.

Recurrence of febrile seizures: Approximately 40% of children with febrile convulsions experience at least one recurrence. The risk factors associated with higher rate of recurrence are

1. Family history of febrile seizures in a first degree relative
2. Age of onset <18 months
3. Low level of temperature at first seizure
4. Short duration of illness before seizure

The recurrence rate is approximately 14% with one risk factor and 76% with four risk factors.

Subsequent Epilepsy: Majority of children who have had febrile seizures do not develop epilepsy. The incidence of epilepsy is 2 to10 times higher in children with febrile convulsions than in the general population. Certain factors increase the risk for developing epilepsy in a child who has had febrile convulsions.

1. If the child had complex febrile seizures
2. Family history of epilepsy
3. Febrile convulsions in a child with neurodevelopmental abnormalities

Without any risk factors the incidence of subsequent epilepsy is 2% and the Incidence goes up to 5-15% in the presence of risk factors.

Epilepsy syndromes related to febrile seizures:

1. Most are benign epilepsies like Epilepsy with generalized tonic –clonic seizures, Childhood Absence epilepsy and Rolandic epilepsy. These are age related epilepsies, seizures are usually easily controlled with medications and the neurodevelopment remains normal.

2. GEFS+ -Generalized epilepsy febrile seizures plus. This is a recently described syndrome consisting of febrile seizures that continue beyond the usual age and subsequently generalized epilepsies occur in adolescence. There is a strong genetic background. Abnormal Sodium channel gene has been detected in many families.

3. Mesial temporal lobe sclerosis and Temporal Lobe Epilepsy. Some patients who have intractable temporal lobe epilepsy in adolescence with mesial temporal lobe sclerosis on MRI had prolonged febrile seizures in childhood. There is controversy whether the prolonged febrile convulsions are the cause or effect of the temporal lobe sclerosis. This syndrome is one of the epilepsies, which has an excellent response (80%) to surgery.

4. Severe Myoclonic Epilepsy of Infancy. This is an uncommon malignant epileptic syndrome characterized by generalized/unilateral febrile seizures in the first year of life followed by intractable myoclonic seizures, absences, mental retardation and neurodevelopmental retardation. EEG maybe normal in the initial stages.

Predicting the future

	Recurrence of febrile seizure	Epilepsy
Complex febrile seizure	—	+
Neurodevelopment problem	—	+
Family history of febrile seizures in a first degree relative	+	—
Age of onset <18 months	+	—
Level of temperature at first seizure	+	—
Duration of illness before seizure	+	—

Management of Acute Febrile Seizure: Most febrile seizures last only a few minutes and are over before the child comes to the doctor. Elementary supportive measures should be given. Child should be placed in semi prone lateral position to prevent aspiration and an adequate airway should be ensured. Prolonged seizure should be vigorously treated so as to avoid preventable sequelae. Intravenous or per rectal diazepam solution –not suppository- (O.25-0.5mg/kg) should be promptly administered. Alternative drugs that can be used

if available are Lorazepam (0.05-0.1mg/kg), Clonazepam and Midazolam. There are no data for the role of rapid reduction of body temperature by tepid water sponging and anti pyretic in preventing another febrile seizure in the same febrile episode. But overheating of the child with blankets etc. should be avoided absolutely.

Diagnostic workup: A thorough history and physical examination are essential. If the cause of the fever is known and the child is neurologically normal usually no further investigations are needed. Routine blood tests and determination of blood electrolytes, calcium and sugar are of not much help. The most important investigation is lumbar puncture. Once a febrile seizure has stopped it is critical to exclude meningitis/encephalitis. Lumbar puncture should be done in a child who does not recover consciousness completely after the seizure has stopped or has some other neurological deficit or features of CNS infection. Children less than one year of age may have meningitis with minimal or no signs .In all children younger than one year of age a lumbar puncture should be strongly considered unless an experienced pediatrician is available to assess the child. Meningitis is unlikely in an older child who appears well shortly after the seizure. One must remember that if the child has received antibiotics previously the signs and symptoms of CNS infection may be masked.

Reassuring and counseling the parents is very important, as most of them are very anxious. The parents should be informed of the nature of the disorder, the attendant risks and what they should do in the event of a recurrence. An EEG is generally not indicated because it cannot be used as a means for selecting candidates for prophylactic therapy. Later on it can be done when an epileptic syndrome is suspected. Most prospective studies found no correlation between the presence of EEG paroxysms and the later emergence of non-febrile seizures. Neuro-imaging should be reserved only for cases in which an underlying structural brain lesion is suspected.

Management of recurrent febrile seizures: No treatment is required in majority of the children with simple febrile seizures. Prophylactic anticonvulsants do not reduce the risk of developing epilepsy in future. In selected cases prophylactic anticonvulsant therapy may be considered. The types of prophylaxis that can be considered are:

1. Intermittent prophylaxis given at the first sign of a febrile illness
2. Prevention of *prolonged* seizure only, by immediate administration of an anticonvulsant drug
3. Continuous prophylaxis with the daily administration of an anticonvulsant drug

1.Intermittent prophylaxis given at the first sign of a febrile illness: Prompt recognition of illness by parents is important. Antipyretics must be administered at the onset of fever. But fever may continue or even recur. An anticonvulsant is administered at the onset of illness and continued throughout the febrile period. But at times the febrile convulsion has occurred even before the fever has been recognized. Besides side effects such as drowsiness, ataxia and hypotonia are frequently observed. The following drugs have been used for intermittent prophylaxis.

1. Diazepam: Oral diazepam-0.3mg/kg/dose 3 times or day. Rectal liquid diazepam-0.5mg/kg 12 hrly. Rectal diazepam suppository 5 mg every 8 hours
2. Clobazam: 5 and 10 mg tablets available. 0.8mg/kg / day in 2 -3 divided doses. About 10-20 mg /day
3. Phenobarbitone 4-5MG/kg/day once daily**.** Because of its slow build up in the blood failure rates are higher with phenobarbitone.

2.*Prevention of prolonged seizure only, by immediate administration of an anticonvulsant drug in the event of a seizure*: Per rectal diazepam; parents administer solution 0.5 mg/kg if the seizure does not stop on its own after about 5-10 minutes. Readymade solution is available in some countries. The other option is to teach the parents to administer diazepam injectable solution through infant feeding tube. Suppository is not useful. Recently intranasal Midazolam has become available in some countries.

3.Continuous Daily Prophylaxis: Continuous daily prophylaxis raises the problems of compliance and side effects of anticonvulsant drugs. Circumstances where continuous daily AED may be considered are

1. Extreme Parental anxiety
2. Complex febrile seizures especially long lasting and recurrent ones

Phenobarbitone at a dose of 4-5 mg /kg once daily has been found to be effective, but serious behavioral side effects and drowsiness are common. As many as 30% to 50% of the treated children display over activity and aggressiveness. Valproate at a dose of 20-40mg/kg /day in 2-3 divided doses is almost equally effective. Risks of hepatic and GI toxicity are very uncommon. Phenytoin and Carbamazepine are considered ineffective.

Conclusion:

Febrile seizures are the single most common neurologic problem in childhood. Most febrile seizures are brief, bilateral and tonic-clonic with a favourable long –term outcome. However long- lasting and focal seizures may occur, and these may be associated with residual brain damage. They deserve vigorous and prompt anticonvulsant treatment. Intermittent anticonvulsant prophylaxis during a febrile illness is difficult to implement and its results are limited. The balance of risks, as currently evaluated, does not favour continuous prophylactic therapy for a benign condition like febrile seizures except in a few selected children. Efforts should be made to establish an effective emergency treatment of febrile convulsions and make it readily available to those who need it.

Bibliograpgy:

1. Alexis Arzimanoglou, Renzo Guerrini,Jean Aicardi .*Febrile convulsions. Aicardi's Epilepsy in children* .3rd ed Lippincott William &Wilkins,2004:114-175.

2. Carol CAMFIELD and Peter CAMFIELD. *Febrile seizures in Epileptic Syndromes in Infancy, Childhood and Adolescence*. edited by Joseph Roger, Michelle Bureau at all .Fourth ed.2005 John Libbey Eurotext Ltd.159-165.

3. Forsgren L,Sidenvall R, Blomquist HK, et al.1991.*Pre- and Perinatal Factors in Febrile Convulsions*. Acta Paediatr Scand 80:218-225

4. Annegers JF,Hauser WA,Elveback LR,Kurland LT.1979b.*The Risk of Epilepsy Following Febrile Convulsions.* Neurology 29:297-303

5. Offringa M,Bossuyt PM,Lubsen J,et al.1994.*Risk Factors for Seizure Recurrence in Children with Febrile Seizures :A Pooled Analysis of Individual Data Studies.* J Pediatr 124:574-584

6. Rosman NP,Colton T,Labazzo J,et al .1993.*A Controlled Trial of Diazepam Administered During Febrile Illnesses to Prevent Recurrences of Febrile Seizures*. N Engl J Med 379 :79-84.