PedsCases Podcast Scripts

This is a text version of a podcast from Pedscases.com on the "**Febrile Seizures**." These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedcases.com/podcasts.

# Febrile Seizures

Developed by Elma Raissi, Dr. Barry Sinclair, and Dr. Melanie Lewis for PedsCases.com on June 27, 2015

## Introduction

My name is Elma Raissi and I am a medical student at University of Alberta. A huge thank you to Dr. Mel Lewis, a pediatrician, and Dr. Sinclair, a pediatric neurologist, for helping out with the development of this podcast.

This podcast will be addressing febrile seizures commonly presented in the pediatric population. For a more detailed review of a general approach to seizures see our podcast on Seizure Types and Epilepsy. By the end of this podcast, the listener should be able to;

1. List the criteria that distinguishes typical from atypical febrile seizures
2. Discuss the risksd of febrile seizures acutely and long term (risk of future recurrence)
3. Discuss the management of febrile seizures acutely and long term
4. Discuss treatment possibilities
5. Discuss important points to tell caregivers about febrile seizures

Let's start with a clinical scenario: You are a clinical clerk working in the emergency room when an 8-month-old baby presents with a history of a 5-minute seizure. Preceding the seizure, the baby had upper respiratory tract symptoms and was noted at triage to have a temperature of 39 °C. What is your approach to this clinical presentation?

## Difference between typical vs. atypical febrile seizures

Febrile seizures are considered typical if the following are included in the history:

1. The child is between the age of 6 months to 6 years
2. The child has a history of normal development
3. The seizure is short (less than 5 minutes)
4. The seizure is generalized

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5. The child has had only one seizure in 24 hours or one per illness

Complex (atypical) febrile seizures do not meet the 5 criteria outlined. Complex febrile seizures possess a higher risk of recurrence of febrile seizures and epilepsy.

Now, what is a seizure?
A seizure is an abnormal and excessive discharge of neurons in the brain involving hypersynchrony (many neurons firing simultaneously). There may be clinical behavioral changes such as,

- The child/infant often presenting with impaired consciousness and rhythmic jerking of the extremities
- Other symptoms may include;
    - Sudden tightening (contractions) of muscles on both sides of the body
    - Crying or moaning
    - Falling if standing
    - Vomiting or biting of tongue
    - Sometimes, the child may not breath and begin to turn blue
    - Rhythmic jerking and no response to external voices
    - The passing of urine and feces
- Less commonly, the child becomes rigid or has twitches in only a portion of the body such as an arm or a leg, or on the right or the left side of the body.

Risk factors
Febrile seizures are the most common neurologic disorder in infants and young children. 2-4% of children younger than 6 years of age experiences febrile seizures.. Simple febrile seizures are harmless. There is no evidence indicating the risk of death, brain damage, epilepsy, a decrease in IQ, or learning problems after a simple febrile seizure. Most patient have 2 or 3 febrile seizures in a lifetime. Patients are considered to have epilepsy (generalized epilepsy with febrile seizures plus (GEFS+) if they present with more than 5 or 6 febrile seizures.

The number of febrile seizures is not related to future risk of epilepsy.
The risk of recurrence in the first two years following the first febrile seizure is between 15 to 70% (Graves et al., 2012). The chance of experiencing a second febrile seizure is approximately 30% if the child presenting with their first febrile seizure is older than 12 months (The American Academy of Pediatrics). For those patients with a second febrile seizure, the chance of having at least 1 additional febrile seizure is 50%. Furthermore, the risk of the recurrence of a febrile seizure is increased if there is a family history of febrile seizures, a short duration of fever before the seizure started or the fever was low at the time of the initial seizure (BCGuidelines).

Family history of epilepsy, any neurodevelopmental problems or neurological exam abnormality, and atypical febrile convulsions increase the risk of future afebrile seizures (Clinical Practice Guidelines – The Royal Children's Hospital Melbourne).

- If the child has no risk factors, then the risk of subsequent epilepsy is approximately 1% (similar to population risk)
- If the child has 1 risk factor, then the risk of subsequent epilepsy is approximately 2%
- If the child has more than 1 risk factor; then the risk of subsequent epilepsy is approximately10%

How do you manage a patient presenting with febrile seizures?

Start by asking about history:

**When inquiring about the history of Presenting Illness,** ask the caregivers of the child about the characteristics of the seizure such as the duration of the seizure and the presence of focal symptoms (e.g. shaking limited to one limb or one side of the body).

- Ask about any provoking events prior to the seizure episode (breath holding spells and vasovagal events are often confused with seizures).
- Ask about persistent vomiting or diarrhea for-example due to a current viral illness.

**When inquiring about the past medical history,** ask the caregivers about any current medical conditions the child might have. Ask about the neonatal history, any history of head trauma, developmental delays, previous neurological deficits, and past history of viral illness that could have resulted in persistent vomiting causing electrolyte abnormalities.

**When inquiring about the family history,** ask about any family history of seizures including febrile seizures and epilepsy.

**When inquiring about medications the child may be taking,** ask about medications that may lower the seizure threshold such as antibiotics (there are many more medications that are able to lower the seizure threshold).

Physical Exam:

The purpose of the physical examination is to determine the neurological status of the patient, identify the source of infection, and rule out any CNS infections.

- Complete a general physical examination of the child to determine the site of infection such as the ears, upper respiratory tract, lungs, skin, GI tract, or urinary tract.
- Complete a neurological and developmental examination on the child.
- Don't forget to check vital signs and level of consciousness.

Meningitis and intracranial infection may be apparent on physical examination by altered level of consciousness, lethargy or irritability, hypotension, signs of increased intracranial pressure, petechial rash, positive Kerning's or Brudzinski's signs.

Children presenting with a typical febrile seizure are usually not obtunded on presentation. The post-ictal drowsiness that may follow a seizure usually resolves within 5-10 minutes.

There are some important clinical clues to help you differentiate between a seizure that is occurring and one that has ended.

- The presence of closed eyes and a deep breathing movements indicates that the seizure has ended.
- The presence of persistent open and deviated eyes with twitching may indicate that the child is still seizing even if the convulsive motor activities have stopped.

Investigations:

In children with a typical history of a simple febrile seizure and a reassuring physical examination, further diagnostic testing is unnecessary.

- **Clear explanation about what has happened and reassurance of caregivers is key in the management of febrile seizures!**

Further investigations (such as CBC or a lumbar puncture) should be done if during the physical and neurologic examinations there are concerns regarding,

- Vital signs
- Altered level of consciousness
- Presence of meningismus
- A tense or bulging fontanelle
- Lateralized differences in muscle tone, strength, or spontaneous movements
- If the child is presenting with prolonged, focal febrile seizure, or recurrent seizures in 24 hours
- If the child presenting to you is younger than 6 months or older than 6 years of age

In these circumstances, the febrile seizure may be due to meningitis/encephalitis or an underlying structural abnormality.

A complete CBC, serum electrolyte, blood sugar, calcium, and urea nitrogen should be measured only when the patient has a history of vomiting, diarrhea, and abnormal fluid intake, or when physical findings of dehydration or edema exists.

- Checking for glucose is very important! The patient may be diabetic, have another underlying metabolic condition, or may have taken hypoglycemic medication.

Neuroimaging is indicated in children with abnormally large heads, a persistent abnormal neurologic examination, or with signs and symptoms of increased intra-cranial pressure.

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A prolonged seizure or recurrent febrile seizures warrants an EEG and neurologic follow-up (risk of repeated afebrile seizures/epilepsy is higher in this instance).

Treatment Options

**In acute management,**

Most febrile seizures have stopped before the child presents to the ER or the clinic but if they haven't, IV lorazepam or midazolam or rectal diastat should be administered.

If an infection or other provokers such as metabolic disorders are present then the causative agent is treated first.

**What is the role of prophylactic treatments?**

Antipyretics have shown no value in preventing febrile seizures or their recurrence (antipyretics facilitate heat loss, but do not slow down temperature elevation during a fever that leads to a seizure).

Patients with a history of prolonged febrile seizures (>5 minutes) should go home with a distat PR prescription.

Prophylactic medication is rarely indicated. A Cochrane Database systematic review (Offringa & Newton, 2012) concluded that there are no benefits for children with febrile seizures in receiving intermittent oral diazepam, phenytoin, phenobarbitone, intermittent rectal diazepam, valproate, pyridoxine, or intermittent ibuprofen.

**When are long-term anticonvulsive treatment recommended?**

The decision to treat an initial unprovoked seizure is dependent on the child and the caregivers.

- There are some data suggesting that treatment can reduce the risk of recurrent seizures however; the interval between seizures cannot be determined.
- The risks of not treating the child include; recurrence of the seizure with the additional risk of injury and psychological stigma associated with the recurrent seizure and sudden unexpected death in epilepsy (SUDEP). There is also the risk of status epilepticus, although this is not common.
- The risks of chronic anti-epileptic drugs include allergic reactions, and systemic toxicity. This is in addition to the financial cost of anti-epileptic drugs, the burden of office visits, and laboratory tests that are required.

Treatment can be withheld until a recurrence pattern (a 2$^{nd}$ afebrile seizure) is established. Many parents chose to not treat their child if the seizures are infrequent and/or mild. This may vary parent to parent.

A recent type of epilepsy has been described, Generalized Epilepsy with Febrile Seizure plus (GEFS +). These patient start with febrile seizures but soon have non-febrile seizures. Valporic Acid is the treatment of choice.

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However, children with epilepsy and infantile spasms are always treated since they present to the clinician with an already established pattern of recurrence.

What are important points to tell caregivers about typical febrile seizures?

- Vast majority are short and harmless.
- There is no evidence that short febrile seizures cause brain damage.
- If the child experiences more febrile seizures they should be placed on a protected surface.
    - The child should not be held or restrained during a convulsion.
    - Loosen tight clothing. If possible, open or remove clothes from waist up.
    - If the child vomits or if saliva and mucus build up in the mouth, turn the child onto its side.
    - Let patient sleep after the seizure

Review:

A child presenting with a typical febrile seizure will be between the age of 6 months to 6 years, will have a normal development, will have had a short (less than 5 minutes) duration seizure, the seizure is generalized, and the child will have had only one seizure in last 24 hours or one per illness. Children with a typical febrile seizure are usually not ill presenting and their physical examination is unremarkable. No further testing is necessary. The management of a typical febrile seizure is reassurance of caregivers.

There are **red flags** to be mindful of, which warrant further investigations.

- Infants under 6 weeks of age require careful evaluation to rule out infection, metabolic conditions, or other congenital anomalies/conditions.
- Abnormal vital signs, levels of consciousness, presence or absence of meningismus, tense or bulging fontanelle, and focal differences in muscle tone, strength, or spontaneous movements warrant further investigations.
    - It is crucial not to overlook a potential case of encephalitis, meningitis, or stroke.
- If the child is presenting with atypical febrile seizure, further investigations are often warranted such as EEG and brain imaging.
- If there is a history of vomiting, diarrhea, and abnormal fluid intake or when physical findings of dehydration or edema exists, investigations of electrolytes and glucose are indicated. The most common abnormalities will be hyper/hyponatremia and hypoglycemia. Rarely will there be problems due to hypomagnesaemia or hypocalcemia.
- Abnormally large head, persistent abnormal neurologic examination, or signs and symptoms of increased intra-cranial pressure also warrant further investigations.

After having listened to this podcast, you should be able to;

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## References


BCGuidelines. (2010). *Febrile Seizures Guideline*. Retrieved from http://www.bcguidelines.ca/pdf/febrile.pdf

Farrell, K., & Goldman, R.D. (2011). The management of febrile seizures. *BCMJ, 53*, 268-273

Graves, R.C., & Oehler, K., & Tingle, L.E. (2012). Febrile Seizures: Risks, Evaluation, and Prognosis. *American Family Physician, 15*, 149-153

MayoClinic. (2015). *Febrile seizure*. Retrieved from http://www.mayoclinic.org/diseases-conditions/febrile-seizure/basics/definition/con-20021016

MedlinePlus. (2015). *Febrile seizures.* Retrieved from http://www.nlm.nih.gov/medlineplus/ency/article/000980.htm

Medscape. (2015). *Pediatric Febrile Seizures.* Retrieved from http://emedicine.medscape.com/article/1176205-overview

National Institute of Neurological Disorders and Stroke. (2015*). Febrile Seizures Fact Sheet.* Retrieved from http://www.ninds.nih.gov/disorders/febrile_seizures/detail_febrile_seizures.htm

Offringa, M., & Newton, R. (2012). Prophylactic drug management for febrile seizures in children. *Cochrane Database Systematic Review,* doi: 10.1002/14651858.CD003031.pub2.

The American Academy of Pediatrics. (2008). Febrile Seizures: Clinical Practice Guideline for the Long-term Management of the Child With Simple Febrile Seizures. *Journal of the American Academy of Pediatrics,* 121, 1281-1286.

The Merck Manual Home Edition. (2015). *Seizure Disorders.* Retrieved from http://www.merckmanuals.com/home/brain_spinal_cord_and_nerve_disorders/seizure_disorders/seizure_disorders.html

The Merck Manual Professional Edition. (2015). *Febrile Seizures: Neurologic Disorders in Children.* Retrieved from http://www.merckmanuals.com/professional/pediatrics/neurologic_disorders_in_children/febrile_seizures.html?qt=febrile%20seizure%20&alt=sh



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The Merck Manual Professional Edition. (2015). *Seizure Disorders*. Retrieved from http://www.merckmanuals.com/professional/neurologic_disorders/seizure_disorders/seizure_disorders.html?qt=febrile%20seizure%20&alt=sh

The Royal Children's Hospital Melbourne – Clinical Practice Guidelines. (2011). *Febrile Convulsions.* Retrieved from http://www.rch.org.au/clinicalguide/guideline_index/Febrile_Convulsion/

UpToDate. (2015). *Overview of the classification, etiology, and clinical features of pediatric seizures and epilepsy.* Retrieved from http://www.uptodate.com.ezproxy.lib.ucalgary.ca/contents/overview-of-the-classification-etiology-and-clinical-features-of-pediatric-seizures-and-epilepsy?source=search_result&search=seizures+in+children&selectedTitle=1~150