The McMaster at night
Pediatric Curriculum

Pediatric Seizures

Shazli Shethwala
PGY 4

Pediatrics in Review – Pediatric Seizures,
by Sidhu et al, 2013
Objectives

• Medical Expert
  • Review approach to first episode seizure
  • Identify key elements of evaluation of seizures
  • Review common pediatric seizure syndromes

• Scholar
  • Establish a differential diagnosis for first episode seizure

• Health Advocate
  • Review seizure safety recommendations
Seizure

- Excessive synchronous abnormal electrical activity of neurons in the cerebral cortex
  - May be manifested as loss of consciousness, abnormal motor activity, sensory disturbances, autonomic dysfunction

- Epilepsy – 2 or more unprovoked afebrile seizures
Classification of Seizures

- Partial Seizures (focal onset seizures)
  - Simple partial (consciousness retained)
  - Complex partial (consciousness impaired)
  - Partial seizure w secondary generalization

- Generalized seizures
  - Absence
  - Myoclonic
  - Clonic
  - Tonic
  - Tonic-clonic
  - Atonic
The Case

- 3 year F with seizure
History

What would you ask?
History

- **Preictal**
  - any warning? Abdo pain, fear, unpleasant sensation
  - What was child doing
  - Asleep or awake
  - Triggers?
  - Was child well? Any fever?

- **Ictal**
  - Responding during spell vs consciousness impaired
  - Did child remember spell
  - Repetitive behaviors during spell – lip smacking, etc
  - Body movements – part or all
  - Cyanosis
  - Incontinence
  - How long, how many, how often
  - Gaze deviation, eye roling
History

• Post ictal
  • How did they feel after
  • Drowsy? Confused? Tired?
  • How long until return to baseline?
• Trauma
• Previous history of seizures, febrile seizures
• ROS – GI disorders (reflux), psychiatric d/o (ADHD), sleep d/o
• PMHx
• Development
• Current medications (e.g. buspirone can lower sz threshold)
• Family Hx of seizures/epilepsy
Physical Exam

What would you look for?
Physical Exam

- Vitals, temp
- Ht, wt, HC**
- Neuro – signs of increased ICP, cranial nerves, fundi, Motor, sensory, cerebellar, reflexes, Kernig, Brudzinski
- Signs of trauma
- Skin exam – neurocutaneous stigmata
- Sources of infection – ears, throat, abdo, resp, CVS
Workup

What would you order?
Workup

- Lytes, extended lytes, glu
- CBC, CRP, UA, Urine culture, blood culture
- Urine tox screen, ammonia, urine/serum amino acids, organic acids
- Consider karyotype
- LP if <12 mo w first episode febrile seizure, meningeal signs
- Neuroimaging – infants <6 mo, focal features, neuro deficits, signs of increased ICP, recent head trauma, failure to return to baselines
- EEG
### Differential Diagnosis

<table>
<thead>
<tr>
<th>Category</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td></td>
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<tr>
<td>CNS</td>
<td>Trauma, abuse</td>
</tr>
<tr>
<td></td>
<td>Increased ICP, herniation</td>
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<tr>
<td></td>
<td>Vascular – hemorrhage, stroke, AVM, venous</td>
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<td></td>
<td>thrombosis</td>
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<td></td>
<td>Neurocutaneous syndrome – tuberous sclerosis</td>
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<td>Structural – tumor, congenital malformation</td>
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<td></td>
<td>(cortical dysplasia, lissencephaly)</td>
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<tr>
<td>Infection</td>
<td>Meningitis, encephalitis, abscess</td>
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<tr>
<td>Metabolic</td>
<td>Hypoglycemia</td>
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<tr>
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<td>Abnormal electrolytes – Na, Ca, Mg</td>
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<tr>
<td>Toxins</td>
<td>Drugs – buspirone, alcohol, lead poisoning</td>
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<td></td>
<td>Withdrawal – benzo, alcohol</td>
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Seizure mimics

- Syncope
- Breath holding spell
- Aspiration/GERD
- Psych – panic attack, day dreaming, ADHD
  - Conversion, pseudoseizures
- Benign sleep myoclonus
- Complex migraine
- Motor tics
# Common Pediatric seizure syndromes

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Epidemiology</th>
<th>Symptoms</th>
<th>Diagnosis</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>Febrile Seizures</td>
<td>6 mo to 6 years, peak at 18 mo</td>
<td>Typical vs atypical; <strong>Typical</strong> – generalized, less than 15 min, single seizure in 24h</td>
<td>Exclude CNS infection; consider LP&lt;br&gt;- atypical prolonged sz&lt;br&gt;<strong>Neuroimaging</strong>&lt;br&gt;- atypical sz&lt;br&gt;- prolonged postictal&lt;br&gt;- signs of increased ICP&lt;br&gt;- focal deficits&lt;br&gt;- focal features</td>
<td>Treat underlying infection&lt;br&gt;Reassurance.&lt;br&gt;Counselling&lt;br&gt;- Recurrence risk of 60%&lt;br&gt;- 2-7% risk of epilepsy (slightly higher than baseline of 1%)</td>
</tr>
<tr>
<td>Childhood Absence seizures</td>
<td>Peaks at 5 years, 60-70% girls</td>
<td>Lapses in consciousness, with motionless stare, lasting 10-15 s. May resume activity after sz or briefly confused (&lt;30s)</td>
<td>EEG 3 Hz spike and wave discharges</td>
<td>Ethosuxamide&lt;br&gt;Valproic acid&lt;br&gt;Lamotrigine</td>
</tr>
<tr>
<td>Juvenile myoclonic epilepsy</td>
<td>Begins at age 5-15y</td>
<td>1. Myoclonic jerks on awakening 2. GTC seizures in 90% 3. Development of absence seizures in 1/3 of all patients (myoclonus – quick, involuntary muscle jerks)</td>
<td>EEG generalized 4-6 Hz polyspike and slow wave discharges associated with quick jerks</td>
<td>Valproic acid&lt;br&gt;Levetiracetam</td>
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<td>Benign Rolandic Epilepsy (Aka Benign childhood epilepsy with centrotemporal spikes)</td>
<td>Most common partial epilepsy of childhood Onset age 5-10 y</td>
<td>Characteristic partial seizure = Unilateral facial sensory-motor and oropharyngo-gutteral symptoms, hypersalivation, and speech arrest Child awake, fully aware, but unable to speak, drooling, experiencing unilateral face and arm twitching Can have GTCs (usually in sleep)</td>
<td>EEG hallmark - biphasic, focal centrotemporal spikes and slow wave</td>
<td>Almost always remit by 16 y</td>
</tr>
<tr>
<td>Infantile Spasms (West syndrome)</td>
<td>&gt;200 causes: HIE, tuberous sclerosis, brain malformations, CNS infections (incl TORCH), HSV, metabolic d/o, genetic causes (T21)</td>
<td>Epileptic encephalopathy Spasm-like seizures with flexion, extension or mixed-flex/extension of arms, legs, trunk. Occur in clusters</td>
<td>Characteristic EEG hypsarrhythmia</td>
<td>Vigabatrin ACTH Overall poor neuro outcome in symptomatic causes</td>
</tr>
<tr>
<td>Pseudoseizures</td>
<td>Rare Older age 11-14y Longer duration seizures</td>
<td>Paroxysmal event that resemble seizures, but psychological in origin Stressors – family, friends, school</td>
<td>EEG normal</td>
<td>Treat psychological factors Screen and treat SI, HI</td>
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Seizure Safety

- Seizures do not hurt/damage the brain if short – after 30 minutes there is some evidence of damage.
- During seizure – turn over to side, nothing in mouth, make sure nothing in the environment can hurt the child.
- Water safety – shower, don’t bathe. Do not swim without someone big enough to pull you out.
- Don’t lock doors.
- If older than 16 years – ask about driving.
- Medic alert bracelet.
Test Your Knowledge

A 7-year-old boy develops spells that consist of a unilateral contraction of the left side of his face without impairment of consciousness or speech arrest. Which of the following is the most likely diagnosis?

A. Absence seizures  
B. Benign rolandic epilepsy  
C. Juvenile myoclonic epilepsy  
D. Pseudoseizures
The Answer

- B. BenignRolandic Epilepsy
Summary

• Seizures are a behavioral change produced by an abnormal hypersynchronous neuronal discharge

• In a febrile seizure – important to rule out CNS infection

• In a first episode seizure – assess for traumatic causes, CNS infections, hypoglycemia or electrolyte abnormalities, toxic ingestions; among other causes
Fin