

## From EMRAP June 2006

### Pediatric Seizures

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#### I. Definitions

- Status epilepticus: seizure lasting > 30 minutes (?10 minutes) or multiple seizures without recovery in-between.
  - Changed definition – about 10mins
  - Most seizures last for less than a minute
- Epilepsy: two or more unprovoked seizures – ie not provoked by head injury, toxin injection etc
- Delayed seizure following blunt head trauma (> 1 day) increases risk of epilepsy.
- Breath-holding spells: cyanotic type (more common) occurs at 6mo – 5yr (angry, breath hold, seizure – same age as febrile seizures)
  - Hx important – what happened immediately before seizure?
- pallid type occurs secondary to vagal response to pain (more concerning).

#### DDx

- syncope
  - migraines
  - breath holding
  - night terrors
  - eclampsia
- 
- Etiologies of seizure include (but not limited to): inadequate or recently changed drug levels (increased metabolism – induced enzymes) – or recently substituted generic for trade, febrile seizure, ingestion, post DPT immunization, breath holding, and psychiatric. (50% of seizures in children with known epilepsy are pseudoseizures)
    - Unique aetiologies to children:
      - Inborn errors of metabolism
      - Saturday morning fits – EtOH
  - Who needs a head CT?
    - Provoked seizures
    - Unprovoked seizures – more likely to have abnormality

## II. Medications

- *Ativan (Lorazepam)*: 0.1 mg/kg IV/IM.
- *Valium (Diazepam)*: 0.5 mg/kg IV/IM/PR
- *Versed (Midazolam)*: 0.2 mg/kg IM
- *Dilantin (phenytoin)*: 20mg/kg (rate < 1mg/kg/min)
- *Fosphenytoin*: can be given faster than *Phenytoin*
- *Phenobarbital*: preferred in neonates over *Dilantin*.
- *Pentobarbital*
- *Valproic Acid*
- Lidocaine
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## II. Febrile Seizure

- Definition very important
- Simple febrile seizures: last < 15min, 1 seizure/24hr period, generalized in nature, age 6mo – 5yr.
  - Recurrence rate:
    - 25–30%
    - 50% recur in 1<sup>st</sup> 6/12, 75% within 1 year
- Complex febrile seizures: last > 15min, > 1 seizure/24hr period, can be focal or generalized. – evidence of CNS infection
- Increased risk for recurrence if: first seizure < 1 yr age, complex seizure, low fever(<39) with seizure, and (+) family Hx.
- The workup is straightforward: if the child meets criteria for a febrile seizure, the seizure workup is done; just workup the fever according to standard protocol – no higher risk of serious bacterial illness.

Who needs an LP? (2003, Annals of EM, review – simple febrile seizures)

- If under 18/12 consider LP if:
  - Hx irritability (non-consolable)
  - lethargy
  - Decreased feeding
  - Abnormal fontanelle
  - Severe headache
  - Abnormal exam
  - Abnormal mental status
  - Complex febrile seizure
  - Slow post ictal clearing - >60mins
  - Pretreated with ABx

#### Newborn

Focal seizure, well 3/7, jerking every 20mins-2mins, no Hx trauma

CT – subdural haematomas

Jittery baby-

Stimulus sensitivity, slam the bed, baby responds the same as what they thought was a seizure, then not a seizure

Does the baby stop doing the jittery thing when you hold it? This won't stop a seizure.

?any autonomic changes eg increase HR/RR/BP/apnoeic – in newborn

Good prenatal Hx, Hx substance abuse, home remedies, hyponatraemia (watered down formula, free water) <6/12 old, unresponsive to usually Rx, lower body temp, status epilepticus – so VBGs useful. Rx 3% N/Sal, 4ml/kg – bolus.

Other DDX- pyridoxine deficiency, inborn errors of metabolism,

Ix:

- Septic w/u
- U&E, C/M/P
- Serum ammonia levels
- Urine tox screen
- Urine and blood amino acids and organic acids
- Cranial u/s, ct, mri

Rx:

- benzos OK
- not phenytoin – use phenobarbitone (20mg/kg – load with 10 then repeat if OK to avoid resp depression) max infusion rate 1mg/kg/min (phenytoin and phenobarbitone)
- acyclovir with focal seizures/abN mental status whilst awaiting LP results
- antibiotics

2yo, febrile seizure, pre-treated with amoxil, ears normal, wcc 20,000, lp normal, if running around ed, don't need an LP – well supported by studies

Lilit Minasyan, MD

“What’s shaking? New Onset Seizures”

Objectives:

- general categories seizures
- ED evaluation and Mx
  - Febrile seizures
  - Afebrile seizures
- Case presentations

Was it a seizure?

Stiffened, trembling

?conscious

?responding

?moving

?look at eyes eg eyes persistently deviated – in status

?a post ictal phase

Seizure types:

- Febrile/non-febrile
- Breakthrough in known epileptic
- Post-traumatic
- Focal vs generalized
- determine work-up in ED

Key features in history:

- What was the child doing before the seizure?
- How long did it last?
- What did it look like?
- Any cyanosis, apnoea?
- Any incontinence?
- Any trauma before or during the seizure?
- Any recent illness, fever, v, d?
- Prior Hx seizure?
- FHx seizure?
- Does the child take any medications?
- Any possibility of toxic ingestion?

Key features on physical exam:

- Vital signs: fever, HT(?HT crisis), hypoxia?
- Age-appropriate neuro exam
  - Developmental stage
  - Tone
  - Symmetry of movement
  - Level of alertness
- Skin exam for neurocutaneous illness eg neurofibromatosis, tuberous sclerosis

Case – 7/12, coryza, BIBA, in ED alert and smiling, temp 38.5, HR 168, RR24, SaO2 99%, normal exam  
Ix? Urine

#### Simple Febrile Convulsion

- 6/12 to 6(5) yrs
- GTC seizure
- Lasts < 15mins
- 1 seizure in 24/24
- return to normal mental status

Ix appropriate...

#### LP or no LP?

Green SM, et al, *Pediatrics*, 1993, 92: 527-34

- n = 503, age 2/12 – 15 yrs w/ meningitis
- 115 (23%) had sz
- 105 of those were obtunded or comatose
- 10 had normal level of consciousness
  - 6 w/ nuchal rigidity
  - 1 w/ focal seizure
  - 1 w/ multiple sz and petichial rash
  - 2 thought to have viral meningitis

#### Complex febrile seizure

- duration > 15 min
- 1 seizure during same illness
- focal seizure
- focal neuro deficit after the seizure
- age outside the range (6/12 – 6yrs)

#### Neuroimaging required in CFSz?

- None of 71 patients w/ CFSz had intracranial abnormality requiring emergent neurosurgical or medical intervention (95% CI 0-4%)
- Conclude that neuroimaging is unnecessary  
Teng D, et al. *Pediatrics* 117, 2006: 304-308

Ix child with simple febrile seizure as you would a child with a fever.

- Trainor JL, et al. *Acad Emerg Med*, 2001; 8:781-7
- Shah SS, et al. *Arch Pediatric Adolescent Med*. 2002; 156: 469-72

#### Case #2

3y/o male BIBA following GTC, lasting 3 mins  
no fever, no trauma. Now sleeping, but awakes during exam.

- Ix??

#### Role of Emergent Neuroimaging in Children with New-Onset Afebrile Seizures

Sharma S, et al. *Pediatrics*, 2003; 111:1-5

- n=475 (MRI or CT) 437 were done in ED

- “clinically significant abnormalities” in 8% (95% CI 6-11)
- “Low risk group” had clinically significant abnormality in 2% (95% CI 0.6-3.7)
  - 6 pts, 2 with “normal” exam
- “High risk group” 26% (95% CI 17-35)
- Focal seizure in age < 33 months
- Predisposing factor
  - Sickle cell disease
  - Bleeding disorder
  - Cerebral vasc disease
  - Malignancy
  - HIV
  - Hemihypertrophy
  - Travel to areas with cysticercosis
  - Closed head injury
- Therefore – no need to image low risk kids

Maytal J, et al. *Epilepsy* 2000, 41: 950-4

- 14 of 65 patients with new onset seizure who underwent CT scan had abnormal CT result
  - 2 were “immediate therapeutic significance”; both were symptomatic
  - conclude that routine practice of obtaining CT for first non-febrile seizure is unjustified for patients with no known seizure risk factors, normal neuro exam, reliable follow-up

Predictors of abnormal findings of CT of the head in paediatric patients presenting with sz

Warden CR, et al. *Ann Emerg Med* 1997; 29: 518-523

- 25 of 203 patients with seizures who had a head CT, had abnormal results
- head CT was always normal in patients without underlying high-risk condition (malignancy, neurocutaneous d/o, recent CHI, recent shunt revision), who was > 6mo, sz<15min, no focal neuro deficits (95% CI 0-1.9%)

\*\* be wary using these types of retrospective studies as a decision rule – not prospective and not generally applicable

Laboratory studies for seizures

- directed based on Hx

LP

- based on other findings

EEG

- routinely indicated
- timing not agreed on

- can be done as an outpatient

#### Neuroimaging

- MRI preferred
- When atypical presentation
- In the setting of other probs – eg developmental delays, atypical seizure pattern (eg not absence seizures/Lennox-Gastaut seizures)
- CT for acute things only – space occupying, trauma, Todds paresis – based on exam
  - o Do if prolonged, Todds, ongoing seizure

#### First-time seizures in children under 6mo presenting to ED

Boi TT, et al. *Amer J Emerg Med* 2002; 20: 518-20

- N=31, all seizure types, age < 6mo
  - o 12 of 22 abnormal neuroimaging
  - o 5 of 19 lab abnormalities
  - o 19 of 21 had sepsis w/u
    - 2 w/ infectious aetiology (3mo w/ pneumoc meningitis & 1 w/ toxoplasmosis)
  - o conclude that large % children < 6mo w/ first seizure have significant underlying pathology

#### Treatment

#### Summary

- children with simple febrile seizures are generally not at higher risk of SBI
- physical exam should guide the extent of the laboratory and radiological w/u
- age approp neuro exam
- appropriate outpt f/u
- younger infants may need more w/u

#### Neurocutaneous Images

- tuberous sclerosis
- Sturge-Webber
- neurofibromatosis