



Pediatric Telehealth Rounds

Today's topic:
Seizures in Children
Speaker:
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Pediatrics



Date: October 2, 2015

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questions!**



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Speaker has nothing to disclose with regard to commercial support.

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Overview

- 1) Definition and Pathophysiology
- 2) Clinical evaluation of Pediatric Seizures
- 3) Seizure Mimics
- 4) Common Pediatric Seizure Syndromes
- 5) Management of Status Epilepticus
- 6) Counseling families of Children with Seizures

DEFINITIONS AND PATHOPHYSIOLOGY

Definitions and Pathophysiology

- Seizures:
 - Stereotypical clinical manifestations of excessive, abnormal electrical activity of neurons in the cerebral cortex
- Epilepsy: 2 or more unprovoked afebrile seizures

Definitions and Pathophysiology

- Status epilepticus:
 - Continuous generalized tonic clonic seizure activity with LOC for > 30 min, or 2 or more discrete seizures without a return to baseline mental status
 - Early or impending status epilepticus – continuous or intermittent seizures lasting > 5 minutes without full recovery of consciousness between seizures

CLINICAL EVALUATION OF PEDIATRIC SEIZURES

Clinical evaluation

- History – Common Features:
 - Limb jerking
 - Drooling, eye rolling, facial movements
 - Impaired consciousness
 - Not respond to tactile stimulation
 - Loss of bladder and bowel function
 - Color changes, unusual noises
 - Changes in vital signs
 - Post-ictal phase

Clinical Evaluation

- History (continued):
 - How often occurs
 - Environmental setting and time of day
 - Provoking Factors
 - sleep deprivation, fevers, illness/infection
 - Family history
 - Developmental history
 - Anti-epileptic drugs
 - Conditions related to metabolic abN (diarrhea/rickets), ingestion hx

Clinical Evaluation

- Episodic movements with altered LOC suggest seizure if:
 - No response to touch
 - Unusual eye or head or mouth, facial movements
 - Unusual posturing of limb
 - Stereotyped hand movements
 - Incontinence

Clinical Evaluation

- Physical exam
 - Vital signs **fever, Cushing's triad (increased ICP)
 - Change in sensorium/mentation
 - Fundoscopy
 - Focal neurological signs
 - Signs of head trauma
 - Neurological exam

SEIZURE MIMICS

It could also be...

- Syncope/cardiac syncope
- Breath-holding spell
- GERD/Sandifer syndrome
- Dystonic reactions
- Sleep related
 - Benign sleep myoclonus, night terrors
- Self-stimulation
- Migraines
- Pseudo-seizures

2 year old boy



<https://www.youtube.com/watch?v=15RX2azZwX8>

COMMON PEDIATRIC SEIZURE SYNDROMES

Febrile Seizures

- Most common type of seizure
- Age 6 months-5 years (peak at 18 months)
- Criteria:
 - Fever
 - No previous neonatal or unprovoked seizure

Simple Febrile seizure	Complex Febrile Seizure
Generalized	Focal features
<15 min in duration	>15 minutes
Single seizure/24 hours	>1 seizure in 24 hours

Febrile Seizures

- Family history common
- Evaluation: Reassurance!!!!!!!!!!!!
 - Consider LP if:
 - <12 months, complex febrile seizure, partially tx with antibiotics
 - Consider neuroimaging if:
 - Complex febrile seizure, focal neurological deficit, prolonged post ictal phase, signs of increased ICP
 - Consider EEG if:
 - Febrile status epilepticus

Febrile Seizures

- Management:
 - Reassurance and counseling
 - Can consider Rx of benzo for RFs for recurrent febrile seizures/prolonged or low threshold
 - Recurrence:
 - usually within the initial 1-2 years after the initial seizure
 - 60% recurrence risk after initial febrile seizure
 - RFs for recurrence: younger age, family history, brief duration between onset of fever and seizure

Partial Complex Epilepsy

- Partial seizure:
 - Simple: focal neurological signs: focal jerking of hand/arm, sensory change or pain in one limb, unilateral contraction of the face
 - Complex : focal neuro signs with impairment of consciousness
 - Common signs: aura, behavioural arrest, then may have jerking movements of limbs on opposite side ; often have secondary generalization
 - EEG findings: focal sharp waves or spike and slow wave discharges
 - Treatment: 1st line levetiracetam

7 year old boy



<https://www.youtube.com/watch?v=obbg1BFt26Q#t=91>

Absence Seizures

- Lapses in consciousness – motionless stare – 10- 15 seconds, eyelids may droop, flutter or briefly roll backwards, usually resume full activity after seizure or briefly confused
- Can be associated with automatisms, brief clonic movements or eyelids or loss of tone
- EEG: 3Hz spike and wave discharges – begin and end suddenly
- Treatment: ethosuximide 1st line

Juvenile myoclonic epilepsy

- Starts 5-15 years
- Myoclonic jerks on awakening
- Generalized tonic clonic seizures in 90% of patients
- Absence seizures in 1/3 of patients
- EEG: generalized 4-6 Hz polyspike and slow wave discharges with quick jerks, usually have normal neuroimaging
- Treatment: valproic acid, levetiracetam

3 year old boy



<https://www.youtube.com/watch?v=WkaveTuiLCI>

Symptomatic Generalized Epilepsies

- Tonic Seizures:
 - Tonic spasms of the face or chest and trunk
 - Tonic flexion of the upper extremities and flexion or extension of the lower extremities
 - Impaired consciousness, pupil dilation, tachycardia, apnea or cyanosis and urinary incontinence, post ictal confusion

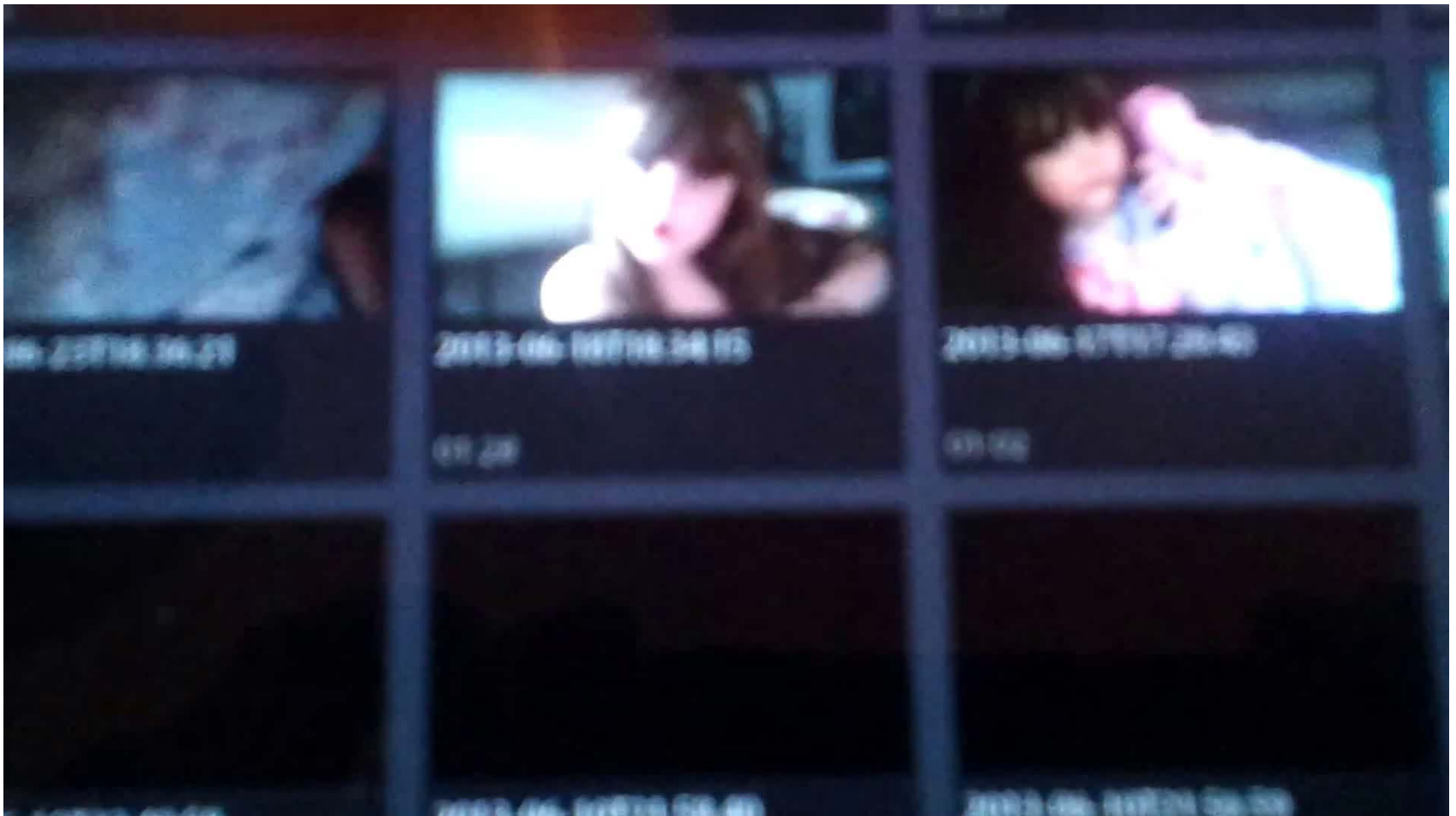
4 year old boy with developmental delay



Symptomatic Generalized Epilepsies

- Atonic seizures (drop attacks)
 - Sudden loss of postural tone
 - May be preceded by one or more clonic jerks
 - Whole body may drop to the floor, may last a few seconds and have little to no postictal period

5 year old girl developmentally normal



https://www.youtube.com/watch?v=w_WPuofP0rM

Benign Rolandic Epilepsy

- Aka benign childhood epilepsy with centrotemporal spikes (BECTS)
- Most common parial epilepsy in childhood
- Age of onset 5-10 years
- Unilateral facial sensory-motor and oropharyngogutteral symptoms, hypersalivation and speech arrest
- Awake, aware but unable to speak, drooling and experiencing unilateral face and arm twitching

Benign Rolandic Epilepsy

- Can also have GTC seizures,
- Usually meds only after 3 or more seizures and even then usually only if lots of parental concern, interval of seizures
- Usually remit by 16 years old
- EEG: hallmark features, biphasic, focal centrotemporal spikes and slow waves
- Multiple AEDs can be used, wean after 2 years seizure free

6 month old baby boy



<https://www.youtube.com/watch?v=aVoJtslvqOU>

Infantile Spasms

- Occur in infancy, spasmlike seizures with flexion, extension or mixed flexion-extension of the arms, legs and trunk
- Severe developmental epilepsy
- Many known causes
 - Including HIE, tuberous sclerosis, brain malformations, central nervous system infections, metabolic disorders, genetic causes (T21)
- Clinical presentation: 3-9 month old

Infantile Spasms

- Occur in clusters
- Often after awaking
- West syndrome: infantile spasms, hypsarrythmia, developmental regression
- EEG: chaotic, hypsarrhythmia
- Treatment: vigabatrin 1st line

**Management of Status Epilepticus –
Canadian pediatric Society
STatement**

Status Epilepticus

- Continuous generalized tonic clonic seizure activity with LOC for > 30 min OR
- 2 or more discrete seizures without a return to baseline mental status
- Early or impending status epilepticus:
 - continuous or intermittent seizures lasting > 5 minutes without full recovery of consciousness between seizures

Etiologies of Status Epilepticus

- Acute symptomatic:
 - CNS infection
 - Metabolic derangement
 - hypoglycemia, hyperglycemia, hyponatremia, hypocalcemia or anoxia
 - Antiepileptic drug noncompliance, withdrawal
 - Drug overdose – antiepileptic or non antiepileptic
 - Prolonged febrile convulsion

Etiologies of Status Epilepticus

- Remote Causes :
 - Cerebral migrational disorders
 - Cerebral dysgenesis
 - Perinatal Hypoxic ischemic Encephalopathy
 - Progressive neurodegenerative disorders

Acute management of Status Epilepticus

- ABCs
- End the Seizure and Prevent recurrence
- Diagnosis and Initial Therapy of life-threatening causes
 - Hypoglycemia, meningitis, cerebral space occupying lesions
- Appropriate referral or transport
- Management of Refractory status Epilepticus

ABCDs in Status Epilepticus

- Airway and Breathing concerns:
 - Clenched jaw, Poorly coordinated respirations, Secretions/vomit, Hypoxia
 - Management:
 - position on side, suction easily available secretions, Do NOT pry apart the teeth
 - After suctioning, reposition on back , chin lift/jaw thrust if needed
- 100% O₂, Cardiorespiratory and O₂ monitor
- Obtain IV access

ABCDs in Status Epilepticus

- Circulation:
 - Increased HR and BP common in seizure
 - Should be normal after seizure stops
 - Hypotension, bradycardia, poor perfusion are ominous-> should ventilate patient ASAP
- D (extrose):
 - Check bedside glucose

Termination of seizure and prevention of recurrence

- Goal is to STOP the seizure and prevent brain injury
- Seizure >5-10 min are at high risk of continuing for at least 30 min
 - early treatment is important!

Treatment Algorithm for status epilepticus

- 1st 10 minutes: 1st line
 - non IV tx options - lorazepam/midazolam**/diazepam
 - IV tx options: lorazepam*, midazolam, diazepam
 - Repeat x 1 within 5 minutes

Treatment Algorithm for Status

- 2nd line – 2nd 20 minutes:
 - IV options: fosphenytoin(*preferred), phenytoin, phenobarbital
 - No IV?: fosphenytoin IM, phenytoin IO, paraldehyde PR
 - Valproate: Increased interest in sodium valproate
 - Less Ses – ie no resp or CV compromise
 - Pyridoxine (B6):
 - <18 month old where seizure might be caused by undiagnosed metabolic disorder

Treatment Algorithm for Status Epilepticus

- Still seizing after 30 min – Refractory Status epilepticus
 - RSI
 - Midazolam infusion
 - Talk to neuro/specialist center re: further treatment options

Side Effects of 1st and 2nd line treatments

- Benzodiazepine:
 - SEs: hypotension, resp depression, sedation
 - >2 doses of benzos – respiratory depression
- Fosphenytoin/phenytoin:
 - Phenytoin – high pH->can lead to “purple glove syndrome” ->severe SC irritation
 - Fosphenytoin – no purple glove syndrome, can give IM, BUT more \$\$\$ and not always available
 - SEs of both: cardiac arrhythmias, low HR and hypotension

Side Effects of 1st and 2nd line treatments

- Phenobarbital
 - More respiratory depression than phenytoin and fosphenytoin
 - BUT 1st line in neonates and on those who are already on phenytoin
 - SEs: sedation, resp depression, low BP

Diagnosis and Initial Therapy of Life Threatening causes of Status epilepticus

- Full clinical assessment: look for signs of infection, meningitis, trauma, focal neuro deficits, overdose
- Prolonged febrile seizure and children with known seizure disorder on anticonvulsant therapy may not need extensive work up

Diagnosis and Initial Therapy of Life Threatening causes of Status epilepticus

- If cause unclear, consider:
 - Electrolytes, glucose, Complete Blood Count, cultures, blood gas, Anticonvulsant levels, Toxicology, Calcium, BUN, Magnesium, Liver function tests, lactate and ammonia
 - Decide on LP if patient is stable, no increased ICP, seizure has stopped
 - May treat empirically with antibiotics if suspected sepsis/meningitis

Diagnosis and Initial Therapy of Life Threatening causes of Status epilepticus

- Indications for CT head:
 - Increased ICP
 - Trauma history
 - Focal neurological signs
 - Unexplained LOC
 - AFTER the patient is stable and the seizure has stopped
- Treat increased ICP if suspected clinically
- If LOC does not recover after seizure has stopped, or if patient on neuromuscular paralysis, then an EEG should be performed to exclude non convulsive status epilepticus or treat empirically

Arrange for appropriate referral for ongoing care or transport to secondary or tertiary care centre

- 1st episode of status epilepticus – refer to secondary or tertiary care hospital for further treatment and investigation
- Unstable vital signs or continuing seizure -
 - Transfer to Pediatric ICU
 - Discuss management with the referral centre prior to transfer

Management of refractory status epilepticus

- Refractory status epilepticus: unresponsive to two different antiepileptic medications, some have added a criteria of longer than 30 min or longer than 60 min
 - Should consider escalation to PICU, subspecialist consultation, midazolam infusion at 20-30 minutes of starting the algorithm

SEIZURE COUNSELING FOR FAMILIES

Seizure Counseling for Families

- No baths or swimming alone
- Seizures must be under control x 1 year to drive
- If child has a seizure:
 - Keep calm, time the seizure, loosen clothing, don't put anything in mouth, remove environmental hazards
- Avoid sports that are high risk for head injury (ie boxing)

Resources

- 1) Friedman, JN. Emergency management of the Pediatric Patient with generalized convulsive status epilepticus. *Pediatrics and Child Health*. 2011; 16(2) 91-7
- 2) Sidhu, R et al. Pediatric Seizures. *Pediatrics in Review*. 2013; 34 (8) 333-342
- 3) Parent Resource:
 - <http://www.aboutkidshealth.ca/En/ResourceCentres/Epilepsy/Pages/default.aspx>

Questions or Comments?



Video-conferencers:
Unmute your system to
ask a question



Webcasters:
Type your question

Thank you!

for participating in today's

Pediatric Telehealth Rounds

Join us next time:

Irregular Periods & PCOS

Dr. Hannah Wigle

Oct 16, 2015



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