emDocs

The EM Educator Series

The EM Educator Series: Subtleties of seizures

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Cases:

#1: A 26-year-old male is brought in by EMS seizing for over 10 minutes. He received midazolam IM X 2 en route, without resolution.

#2: A 2-year-old female with URI and fever presents with parents after a 1 minute generalized "shaking episode" per mom. She appears well now, with a temperature of 38C.

Questions for Learners:

1) What defines a seizure? How are seizures classified?

2) What are etiologies of seizures, adult and pediatric?

3) How do seizures present? Do pediatric and adult seizures present differently?

4) What are seizure mimics?

5) Is there utility in obtaining labs and imaging?

6) What is the ED management for the following:
    a. 1st unprovoked seizure?
    b. 2nd unprovoked seizure?

7) What is the ED management for a known seizure disorder?

8) The seizing patient is not responsive to benzodiazepines… What's your plan?

Suggested Resources:

- ✓ Articles:
  - emDOCs – Treatment of Seizures in the Emergency Department: Pearls and Pitfalls
  - emDOCs – Seizure Mimics: Pearls & Pitfalls
  - EM Basic – Seizures
  - ICN - status epilepticus: when the seizure doesn't stop
  - PulmCrit – Resuscitationist's guide to status epilepticus
  - PulmCrit – Rapid Sequence Termination (RST) of status epilepticus
- ✓ Podcast/Vodcast:
  - CORE EM – Episode 82.0 – ED Management of Seizures
  - EM in 5 – Special Seizures
  - EM Cases – Episode 73 Emergency Management of Pediatric Seizures
  - EM Cases – CritCases 10 Hyponatremia Associated Seizures
  - EM Crit – Podcast 155 – Status Epilepticus with Tom Bleck

Answers for Learners:

1) What defines a seizure? How are seizures classified?

Seizures result from abnormal neurologic electrical activity. This abnormal activity can occur in both hemispheres (**generalized** seizure) or within one hemisphere (**focal** seizure), which may spread to the entire brain. Generalized seizures are more common than focal seizures, and often have a genetic association. Generalized tonic-clonic seizures most frequently occur in adults – the motions of which consist of a tonic phase with muscle stiffening, followed by a clonic phase with rhythmic muscle contractions. Focal seizures often occur in the setting of cerebral insult. Unlike generalized seizures, symptoms of focal seizures vary according to the anatomic location of the abnormal electrical activity.

Seizures can be classified as **provoked** or **unprovoked**. **Provoked** seizures are those with identifiable causes, which can be isolated to the brain, or are thought to occur secondary to a systemic disorder or illness. Such causes include: brain trauma, CNS infection (i.e. meningitis, encephalitis, brain abscess), anoxic brain injury, intracranial hemorrhage or surgery, metabolic disorders, illicit drug abuse or intoxication (most commonly tricyclic antidepressants and isoniazid), or alcohol withdrawal.9,10 Seizures may also occur in the setting of metabolic derangements (hypoglycemia or hyponatremia).9-12

Unprovoked seizures are those with no discernible cause, or those occurring greater than seven days following precipitating factors or events.

2) What are etiologies of seizures, adult and pediatric?

Causes of secondary seizures- AMS differential- AEIOU TIPS
Alcohols/acidosis Trauma/Toxins
Electrolytes Infection
Insulin (too much)/Ischemia Psychiatric/polypharmacy
Oxygen (hypoxia/hypercapnea) Stroke, SAH, space occupying lesion
Uremia (renal failure)

Condensed differential- TINE or NETTI
Trauma/toxins Neurologic
Infection Electrolytes
Neurologic Trauma
Electrolytes Toxins
Infection

3) How do seizures present? Do pediatric and adult seizures present differently?

- HPI significant for **aura**: déjà vu, a rising sensation in the abdomen, abnormal taste or smell, or autonomic changes.
    - **Activity commonly associated with a true seizure: witnessed tonic/clonic movements or observed head turning in the setting of a generalized seizure, or the abrupt onset of limb movements, abnormal sensations, or hallucinations in the setting of a focal seizure**. [6,7,20]
    - **A postictal period occurring for minutes to hours** with confusion, disorientation, and drowsiness.

- Physical exam remarkable for **tongue biting.**

Elements that are highly suggestive of true seizure activity include:

1. Lateralized tongue-biting (high specificity)
2. Flickering eye-lids
3. Dilated pupils with blank stare
4. Lip smacking
5. Increased heart rate and blood pressure during event
6. Post-ictal phase

4) What are seizure mimics?

Studies indicate that approximately 20% of patients presenting for evaluation of seizure are misdiagnosed as having epilepsy. Conditions most commonly mistaken for epitileptiform seizure activity include syncope and psychogenic non-epileptic seizures.

If a seizure is not suspected, consider syncope, psychogenic non-epileptic seizures, stroke or TIA, sleep disorders, and migraines.

5) Is there utility in obtaining labs and imaging?

CT scan is the most common brain imaging study performed on patients with first time seizures. A review article by the American Academy of Neurologists found treatment changed due to CT findings in 9-17% of patients. This review also found that patients with AIDS and a first seizure were commonly diagnosed with abnormalities via CT. Toxoplasmosis was a frequent finding.

Although neurologists tend to prefer MRI over CT, there is no published data that shows superiority of MRI over CT. The practice parameters published by the AAN also state that CT is an adequate first brain imaging study for a patient with first-time seizure and even in some cases of repeat seizures.

6) What is the ED management for the following:

a. 1st unprovoked seizure?

b. 2nd unprovoked seizure?

New onset seizure without other suspected cause like trauma/meningitis
-Labs- CBC, Chem 10, urine HCG, +/- EKG (all low yield)
-Urine drug screen- controversial whether needed, consider
-Fingerstick glucose (low yield unless diabetic)
-Non-contrast head CT- eval for mass

Patient with a known seizure disorder- no suspected secondary cause
-Shouldn't need a lot of testing- urine HCG mandatory
-Find out if any missed seizure med doses
-Search for physiologic stresses that could have triggered it
-No imagining needed unless they have NEVER had a CT/MRI
-Can draw levels of seizure meds -Dilantin (phenytoin) usually available on a STAT basis but others such as Keppra (levitrecam) are send outs

-Can consider giving the patient a dose of seizure med in ED
-Can refill patient's seizure medication if needed but give limited amount (1 week or less) to ensure followup

7) What is the ED management for a known seizure disorder?

Forgetting your ABCs: if a patient is continually seizing they may not be able to protect their airway or ventilate properly. If intubation is required to properly oxygenate, there should be no delay of intubation. Cardiopulmonary monitoring should also occur, especially in light of the rare but possibly fatal dysautonomia that can accompany seizures.

BZDs are first line therapy for seizure termination. If you don't have IV access, go with 10 mg of midazolam or 2-4 mg of lorazepam IM

8) The seizing patient is not responsive to benzodiazepines… What's your plan?