

XVI: Seizures

Eric H. Green MD
Assistant Professor
Department of Internal Medicine
Montefiore Medical Center

Updated by:
Monica Ann Shaw, MD
Associate Professor
Department of Medicine
University of Louisville
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Specific learning objectives

1. Knowledge.

Subinterns should be able to:

1. Generate a differential diagnosis for seizures including toxic/metabolic, medications, drugs of abuse, and brain diseases
2. Describe the potential consequences of status epilepticus

2. Skills.

Subinterns should demonstrate specific skills, including:

1. Elicit a focused history from patients and observers
2. Conduct a physical examination
3. Rapidly assess a patient who is having a seizure
4. Recognize tonic, clonic, tonic-clonic, and myoclonic movements and tongue or oral mucosal injuries related to seizures
5. Perform a complete neurological examination
6. Develop a patient-specific management plan
7. Generate a patient-specific differential diagnosis
8. Appropriately order and interpret tests
9. Develop a treatment plan for inpatients with seizures
10. Counsel patients about state requirements for limitations on driving following a seizure

3. Attitudes and professional behavior.

Subinterns should demonstrate:

1. Understanding towards patients' concerns about seizure-related limitations on driving or other activities

CASE 1

SCENARIO: You are on call for the general medical team. During dinner you are over-head paged “stat” 6W, a general medical floor. When you arrive on the floor the unit secretary states Mr. Chapman, a patient you are covering, is “having a seizure.” When you walk in a nurse, 2 patient aides, a nursing student, 2 third year medical students, and the patient’s wife are all crowded into the room looking at the patient. From the door he appears to be shaking uncontrollably. You review your sign-out list, which states:

Chapman 6W: HD#2 for a 60 y.o. admitted for work-up of lung mass with post-obstructive pneumonia. Likely non-small cell carcinoma. DM, HTN. On levofloxacin, hctz, lisinopril, glyburide, sliding scale insulin, wellbutrin, paxil. NDKA. Stable, for discharge tomorrow. Nothing to do.

1) Question: What are your immediate priorities?

Establish control of the clinical encounter

Alert all members of the health-care team that you are present and are assuming the role of team leader

Ask non-essential personnel to step outside but remain available

Establish clinical stability

Rapidly obtain vitals signs including HR, resp rate, BP, temp, pulse-ox

Insure that the patient has a patent airway

Rapidly confirm the diagnosis of seizure

2) Question: What is your initial differential diagnosis (bold most likely)?

Exacerbation of previous seizure disorder

*Toxic/metabolic: **hypoglycemia**, hyponatremia (if SIADH from lung cancer)*

*Medications: **wellbutrin** (lowers seizure threshold), quinolones (rare)*

*Drugs of abuse/withdrawal: **alcohol withdrawal**, acute substance ingestion, benzodiazepine withdrawal*

*CNS abnormality: **metastatic lesion**, subarachnoid hemorrhage (if pt fell), CVA, infection*

***key is prioritizing dx and also using categories to insure no missed dx*

3) Question: What specifically will you look for on exam?

Does the patient have obvious signs of hemodynamic instability (pallor, cyanosis)?

Is it really a seizure? Asymmetric movements, complex vocalizations, rigidity alone all may suggest pseudoseizure?

Is the seizure localized or generalized?

Is the seizure tonic (muscle spasms), clonic (flaccid), or tonic-clonic (both)?

Does the neurological exam reveal localizing symptoms suggestive of CNS lesion?

Are there obvious signs suggestive of CNS infection (stiff neck)?

Are there signs of recent CNS trauma (laceration, contusion)?

4) Question: While you are assessing the patient what orders will you give?

Obtain frequent vital signs either manually or with a rapidly cycling automated machine

Place on cardiac monitor

Check pulse oximetry - continuous or frequent

Start oxygen (either nasal canula or face mask)

Confirm patency of /establish at least peripheral IV 20 gauge or larger

Check finger stick glucose and consider empiric administration of glucose IV (50 mL of 50% dextrose)

MORE INFORMATION: Your initial exam reveals an elderly appearing man who appears older than his stated age engaged in symmetric tonic-clonic movements but with no signs of impending respiratory distress. His BP is 160/90, HR 110, resp rate 22, temp 38 (100.4). His pulse-ox is 92% on 2L nasal canula. His HEENT exam reveals no head laceration or contusions. His lung exam reveals scattered wheezes and dullness in the right base. His cardiac exam is regular without murmurs, rubs, or gallops. His neurologic exam reveals symmetric tonic-clonic movement. There are no obvious areas of weakness or flaccidity. His extremities are cool but have a capillary refill < 30 secs. Initial EKG rhythm reveals sinus tachycardia. Initial blood glucose is 150. The nurse states he has been seizing for approximately 5 minutes.

5) Question: What is your next immediate priority?

Stopping seizures

(Finding the etiology, although important for long-term treatment and prognosis, is less important while the patient is actively seizing!)

6) Question: What are the dangers of prolonged seizures/status epilepticus?

Seizures increase susceptibility for further seizures, thus increasing the risk of status epilepticus

Status is associated with increased risk of death or neurologic dysfunction/deficits

7) Question: What specific orders will you give now?

Increase oxygen delivery

Administer IV benzodiazepine, lorazepam (ativan) preferred –initially give Lorazepam 0.02-0.03 mg/kg IV. Wait 1 minute for response, then give additional Lorazepam PRN: maximum dose 0.1 mg/kg; maximum rate 2 mg/min (patient weighs approximately 70 kilograms)

Draw stat labs for CBC, chemistries, lfts, calcium, magnesium

Call for back-up

Consider Arterial blood gases

Toxicology testing should be performed when substance abuse is suspected

8) Question: What specific historical facts do you want to elicit from the chart, patient's wife, and/or nursing staff?

History of previous seizures/circumstances leading up to seizure

History of alcohol or other substance use [from chart or wife] and prophylaxis

Recent administration of insulin or other meds [from nurse or medication administration record]

Previous neuro-imaging or extent of a “metastatic work-up”

MORE INFO: You order 2 mg of Ativan IV. After a minute his seizure activity stops. His repeat vital signs are BP 150/88, HR 104, RR 24, pulse-ox 96% on 6L O2. There is no previous history of seizures or epilepsy. Review of the chart reveals a history of ethanol use. The wife confirms these details and additionally states that Mr. Chapman is a “heavy drinker.” His nurse confirms he has been increasingly agitated and confused all evening. His last dose of insulin was this morning, at which time he got 2 units of

regular insulin. He has had no benzodiazepines since admission. He has had no neuro-imaging since admission.

9) Question: What are the most likely diagnoses?

Alcohol-withdrawal or brain metastasis.

Majority of seizures related to alcohol withdrawal are generalized. Focal onset seizures suggest an intracranial structural lesion.

10) Question: Is there a role for other testing at this point?

Regarding seizures in any substance abuser, concurrent medical conditions that might be causing or contributing to seizures must be identified and treated.

Neuroimaging is recommended for patients who have an increased risk of acute intracranial pathology. It would be of highest yield if there are localizing signs pointing to acute or subacute process (eg sub-arachnoid hematoma) or some other reason to think that there might be a CNS lesion (e.g. in this case the suspicion of lung cancer). In this case it would be appropriate but can wait until after the patient is stable neurologically unless he has an abnormal neurologic exam. For patients with acute seizures, CT should be the initial test as it more accurately detects acute bleeding and is reasonably sensitive in detecting other abnormalities and is timelier in most situations. However, MRI is the preferred method because it has greater sensitivity for detecting abnormalities than CT.

Electroencephalography (EEG) is recommended for patients presenting with a first seizure. It can be useful to confirm the diagnosis (especially if there was a question of pseudoseizures) or there is a continued alteration in mental status with a question of non-convulsive status epilepticus. There is rarely a need in this situation for a "stat" EEG. Lumbar Puncture would be indicated if there is a question of an infection or diffuse neoplastic process: probably not in this case.

11) Question: What other medications should be ordered?

Question: Do MVI, thiamine, and folate [because of alcohol; thiamine should be IV].

Consider loading with an anti-convulsive, using either phenytoin or fosphenytoin.

More experience with phenytoin, but administration can cause hypotension and/or arrhythmias. Careful attention to administration rate is required.

Fosphenytoin is a pro-drug of phenytoin. It has less (but some) cardiovascular effects, and can be given IM if necessary. It is dosed in phenytoin equivalents.

Dosing is usually 20 mg/kg (1000-1500 mg) IV at 150 mg/min in saline or dextrose solution.

If seizures persist, another 10 mg/kg of fosphenytoin can be administered.

In most cases, unless phenytoin or fosphenytoin administration causes cardiovascular complications, an ICU bed is not needed.

If you believe the seizure is alcohol-withdrawal related, then anticonvulsants are usually not indicated.

MORE INFO: You re-examine the patient. He is lethargic. Your neurologic examination shows equal tone in all 4 extremities, symmetric reflexes, and downward pointing toes. His stat labs reveal: WBC 17 80% segs 10% bands; hgb 13.5 Na 138 K 4.4 Cl 108 HCO 15 BUN 8 Cr .6 glucose 210. LFTS: ALT 50, AST 55, GGT 200, Alk Phos 70, Tbili 1.1, Calcium 9.4, Albumin 3.8, His ABG (on 6L O2) reveals PH 7.32 PAO2 86, PCO2 30 HCO3 15. An urgent Head CT is ordered.

12) Question: Interpret labs

Gap acidosis likely from seizure activity/mild lactic acidosis
Leukocytosis likely from seizure plus the post-obstructive pneumonia
Hypoxemia likely from pneumonia plus atelectasis during seizure
ABG shows metabolic acidosis (seizures) and respiratory alkalosis (possibly from tachypnea associated with pneumonia).
Lfts consistent with mild alcoholic hepatitis
(Not unusual to see metabolic acidosis and leukocytosis after seizure)

13) Question: What additional monitoring/orders are needed during the post-ictal phase?

Frequent neuro-checks by nursing staff initially
“Seizure precautions” (pads on bed, etc)
Review drugs that lower seizure threshold that patient is currently taking – wellbutrin and levofloxacin – and discuss with upper level resident about discontinuing these medications
Consider need for starting oral phenytoin

14) Question: What do you do if he starts to seize again?

Call for help: many of the therapies you may need to give may cause respiratory failure/need for intubation. Depending on the structure of your hospital you may need to arrange for anesthesia/critical care at the bedside or summon the “code response team.”
Start again with benzodiazepines.
If those fail consider barbiturates (e.g. Phenobarbital). May cause respiratory failure, likely will need ICU monitoring.
If those fail will need general anesthesia or propofol. Will need ICU monitoring and likely intubation.

15) Question: What additional measures should you initiate?

When the patient is stable and alert, it is the clinician’s role to inform the patient of risks and laws regarding driving and seizures. All states require drivers with epilepsy or seizures to report their condition. Several states legally require clinicians to report their patients with seizures. Clinicians neither grant nor suspend driving privileges, this is the sole legal prerogative of the state. Regulations vary considerably in different states. Most states, but not all, specify a seizure free interval for patients to meet prior to licensure and driving.
Document discussions about driving in patient’s medical record.

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Epilepsy foundation website:

<http://www.epilepsyfoundation.org/advocacy/transportation/driverlicensing.cfm>