Seizures
What do you need to know?

- History of seizure disorder?
- History of neurological disorder or neurosurgery?
- Alcoholism?
- Immunosuppressed?
- History of cancer?
- Liver failure?
- Meds
Is it really a seizure?

- **TIA**
- **Transient global amnesia**
  - Occurs in older patients
  - Short-term memory loss without other cognitive or motor impairment
- **Migraine**
  - Visual auras, altered consciousness
- **Pseudoseizure** – preserved consciousness with bilateral seizure movements
  - Prolactin and CK elevated during true seizure but not pseudoseizure (although prolactin normalizes with prolonged seizure)
Classification

- **Generalized**
  - Widespread electrical discharge affecting both sides of brain
    - Tonic-Clonic (Grand Mal)
      - Loss of consciousness, loss of posture, eye deviation, extension of body
      - Quick repetitive contractions, incontinence, tongue biting

- **Partial Seizure**
  - Limited to one area of brain
    - Simple – does not impair consciousness
      - Arm/leg jerking, stomach pain, deja vu, olfactory sensation
    - Complex – impairs consciousness but appear awake
      - Grimacing, Gesturing, Chewing, Lip smacking
    - Secondary Generalization

- **Myoclonic** – frequent myoclonic jerks and altered mental status
Non-structural Causes

- Epilepsy - sub-therapeutic drug levels
- Drugs - Cocaine, Stimulants, Ephedrin
- Alcohol/Benzodiazepine Withdrawal
- Metabolic
  - Hypoglycemia/Hyperglycemia
  - Hypocalcemia, Hypomagnasemia, Hyponatremia
  - Thyroid (hyper- and hypo-) - rare
- Hepatic encephalopathy/cerebral edema
- Hypoxia
- Uremia
- Porphyria
- Cardiogenic Syncope – no post-ictal state
Structural Causes

- Stroke
- Infection
- Tumor
- Intracerebral Hemorrhage
- Prior head injury
Medication-related seizures

- Imipenem
- Tricyclics
- Lithium
- Lidocaine
- Theophylline
- Cyclosporine
- Isoniazid
- Quinolones
- Metronidazole
- Clozapine
- Penicillin G
Status Epilepticus

- Technical Definition: 5-30+ minutes of continuous seizure activity or 3 sequential seizures without full recovery between

- In reality: will try to break seizure after about 5 minutes

- Earlier identification and treatment improves outcomes (important for non-convulsive status)
Pathophysiology

- Early compensation meets increased CNS metabolic needs (SBP, CBF ↑↑)
- Failure at 40-60 minutes, (SBP, CBF ↓↓)
- CNS tissue necrosis, adverse sequelae
  Glutamate toxic mediator
- CNS necrosis even if systemic complications fully mitigated
Complications of Status

- Rhabdomyolysis
- Lactic acidosis
- Aspiration
- Pulmonary edema
- Respiratory failure
- Cardiac injury from massive catecholamine release
- Neuronal injury after 30-60 minutes
Goals of Management

- Terminate seizure activity
- Prevent recurrent seizure
- Treat underlying cause
Initial seizure management

**Airway**
- Roll on side to prevent aspiration
- Chin lift if airway not open

**Breathing** – intubate if respiratory arrest or airway compromise

**Circulation** – hypotension will induce/prolong seizure due to cerebral anoxia
Management

- Cushion head to prevent trauma
- Check fingerstick – IV D50 bolus
- Thiamine 100 mg IV if possible ETOH withdrawal
- ABG if prolonged seizure
- Labs to evaluate electrolytes
- Bicarb if pH<7.1 – acidosis lowers seizure threshold
- Anti-pyretics for fever
Pharmacological Management

If continued seizure activity after 5-10 minutes:
- First line is benzodiazepines – increase chloride conduction through GABA receptors; decrease excitability
  - Ativan 2-4 mg IV over 1 minute
    - Works in 1-2 minutes; lasts 4-6 hours
    - Can repeat q2-4 minutes x 2-3
  - Alternative: Valium 5-10 mg IV over 30-60 seconds
    - Works in 10-20 seconds; lasts <20 minutes
    - Can repeat q5 minutes x 2

Ativan easiest to use in clinical trials

Side effects: Hypotension, respiratory depression
Pharmacological Management

Second line:
- Phenytoin
  - 18-20 mg/kg IV at 50 mg/min (30 minutes) or slower if hypotensive
  - Side Effects: Hypotension; Cardiac Arrhythmias (need cardiac monitor), infusion site irritation
- Fosphenytoin
  - 20 mg/kg IV at 150 mg/min (10 minutes)
  - Less infusion site irritation
  - Can be given IM but less predictable

Third line
- Phenobarbital – bind GABA receptor and increase chloride flow
  - 20 mg/kg IV at 30-50 mg/min (30 minutes-1 hour); slower in elderly
  - 20-30 minutes onset; Half-life 100 hours
  - Side effects: sedation, respiratory depression, hypotension → will probably need to intubate
  - Avoid if seizure related to drug overdose

Fourth line: Pentobarbital/Propofol/Midazolam drip
No IV access...

- IM Midazolam 2-4 mg
- Rectal Diazepam 10 mg
- Diazepam via endotracheal tube
Exam

- Vitals: Temperature, oxygen saturation
- Mental Status:
  - Normal post-ictal state 20-40 minutes
  - If longer, consider non-convulsive status
  - Can this pt protect airway? Stay on floor? Go to ICU?
- HEENT: evidence of tongue biting
- Neuro exam –
  - Non-focal in setting of epilepsy
  - Focal findings with mass, infection, bleed
Labs

- BMP (glucose, calcium, magnesium, creatinine)
- LFTs – hepatic encephalopathy, anti-epileptic drug metabolism
- Tox screen
- Anti-epileptic drug levels
- TSH
- CBC – evidence of infection
- CK – monitor for rhabdomyolysis
Tests

- Non-Contrast Head CT
- MRI
- EEG
- LP if concerned for infection or immunosuppressed
  - seizure alone can cause increased CSF WBC