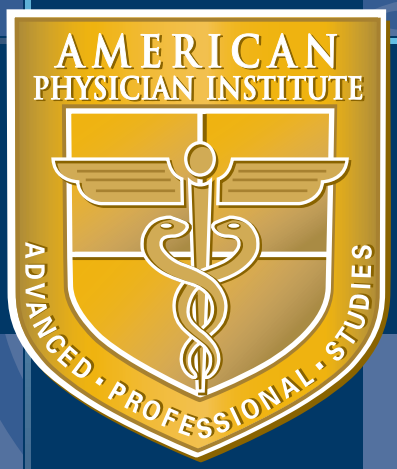
Neuro Nugget: Seizures



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Neuro Nugget: Seizures

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Seizure: Definitions & Background

- Seizures are defined as disorders characterized by excessive or oversynchronized discharges of cerebral neurons. Note the concept of "cerebral" neurons.
- Seizures Disorders are Classified as follows:
    - Generalized seizures
        - Tonic-Clonic Seizures (previously called Grand Mal Seizures)
        - Absence (or Petit Mal) Seizures
        - Tonic Seizures (stiffening seizures)
        - Clonic Seizures (shaking seizures)
        - Myoclonic Seizures
        - Atonic Seizures (drop attack seizures)
    - Partial Seizures
        - Simple Partial Seizures
        - Complex Partial Seizures (Temporal or Psychomotor)
- Etiologies include
    - Primary Neurologic Disorders:
        - Benign Febrile Convulsions: Childhood seizures, occurring in 2-4% of children 3 months to 5 years of age. Occur with fever and in the absence of CNS infection. Last for 15 minutes or less and lack local features. 90% of children have recurrences. Probability of developing a chronic seizure disorder is 2-6%.
        - Idiopathic Epilepsy: idiopathic means that no specific etiology can be established. Account for up to 75% of all seizures. Usually begins between 5-25 years of age. 30-70% of patients will have recurrences.
        - Head Trauma: common when due to a depressed skull fracture or intracerebral or subdural hemorrhages.
        - Stroke: Strokes that effect the cerebral cortex lead to seizures in 5-15% of patients. Usually, post-stroke seizures do not indicate development of a seizure disorder and long-term anti-convulsant therapy often is not given.
        - Meningitis or Encephalitis: bacterial, fungal, tubercular, and parasitic infections can cause seizures.
        - Tumor and other mass lesions: glioblastomas, astrocytomas, meningiomas can cause seizures.
    - Systemic Disorders
        - Hypglycemia
        - Hypnatremia
        - Hyperosmolar states
        - Hypocalemia
        - Uremia
        - Hepatic encephalopathy
        - Porphyria
        - Drug overdose or withdrawal
        - Global cerebral ischemia from cardiac arrest

- Hypertensive encephalopathy
- Eclampsia

Seizure Assessment

- Main Point of Assessment: Must decide if generalized or partial. If partial, work up to find focal lesion.
- Family History
    - History of childhood febrile convulsions
    - History of seizures in family members.
    - History of neurologic disorders such as mental retardation and cerebral palsy. Ask about and *look* for neurocutaneous syndromes.
- Social History
    - Travel-consider cystercicosis.
    - Occupation-consider chemical exposure, head trauma.
    - EtOH, IVDA (when in doubt get urine tox!)
- Witness descriptions of seizure
    - Ictal cry? (tonic phase or seizure)
    - Any tonic-clonic movements? Are they in all 4 extremities? (generalized)
    - Did the movements happen all at once or march across the body (partial simple with Jacksonian march).
    - Were there any eye deviations or head deviation? (partial)
    - Consciousness maintained? (simple partial seizures)
    - Consciousness clouded but partial (partial complex)
    - Automatisms? (partial complex seizures)
- Physical Exam
    - Dysmorphism of facial features.
    - Signs of injury or trauma suggestive of brain injury.
    - Mental status-evaluate for aphasia and short term memory loss.
    - Field cut-for temporal lobe seizures.
    - Fundi: papilledema, cherry-red spot
    - Eye movements: Look for nystagmus. Can be seen in certain epilepsy syndromes/toxicity of seizure meds.
    - Nuchal rigidity: Kernig's/Brudzinski's for possible meningitis
    - Cardiovascular system: r/o orthostatic hypotension
    - Skin: any port-wine nevus? (Sturge Weber Syndrome)
    - Cafe-au-lait spots? (Neurofibromatosis)
    - Hypopigmented macules? (tuberous sclerosis)
    - Gingival hypertrophy? (dilantin use)
    - Alopecia (depakote) or hirsutism (dilantin)?
    - Ext: limb-length discrepancy- check thumb nail side by side
- Labs:
    - Accu check!
    - CBC (WBC), BMP (Na/Ca/Mg/Cr), CK/Trp, LFT, urine tox
    - AED levels
    - If infant/child, needs serum aminoacids, urine organic acids, baseline serum lactate/pyruvate.

- EKG: to rule out any cardiac arrhythmias or if concern for cardiogenic syncope.
- Chest x-ray: if any concern for aspiration during seizure.
- LP if has altered mental status, fever, nuchal rigidity. (Get head CT first!)
- Brain MRI pre and post infusion
- Why EEG
    - Seizures
        - New onset seizure in a patient.
        - Can assist in choosing anti-epileptic medication.
        - Increased seizure frequency or change in character of seizures in a known epileptic patient.
        - Consideration of anti-epileptic medication (AED) discontinuation.
        - Patients with history of well controlled seizures who wish to taper off medications.
    - Altered Mental Status
        - Can detect and grade encephalopathies from metabolic, toxic, infectious and iatrogenic etiologies.

Generalized Seizures

- Tonic phase lasts for about 10-30 s – unconsciousness and extension of limbs and body arching occurs. Ventilation stops and cyanosis can manifest. Beginning of clonus can lead to a vocalization as air is exhaled from the contracting thoracic cavity. Usually, no aura is present (which would suggest secondarily generalized partial seizures).
- Clonic phase lasts for the length of the seizures – alternating contraction and relaxation of limbs, neck, and torso. Ventilation returns in this phase.
- Recovery may last many minutes or even longer as the patient's level of consciousness returns to normal.
- In the recovery phase, a neuro exam should be conducted to search for unilateral weakness. This would suggest a Partial seizure disorder with secondary generalization and the presence of a focal brain lesion.
- Status Epilepticus is defined as seizures that fail to abort spontaneously or that recur so frequently that full consciousness is not restored. It is a medical emergency because permanent brain damage may occur from anoxia or neuronal excitotoxic damage.
- EEG: spike and wave
- Treatment:
    - Start with Valproic Acid
    - Adjunctive Meds: lamotrigine, topiramate, zonisamide, levetiracetam
    - Consider also phenytoin, phenobarbitol, mysoline (older meds)

Absence Seizures

- Genetically transmitted.
- Always begin in childhood and usually end by age 20.
- Brief spells of 5-10 s with loss of consciousness but with retained postural tone. Recur hundreds of times a day. Leads to impaired school performance and social interactions (peers may find the child to be odd).
- Sometimes motor findings are present – blinking, head turning, or automatisms
- EEG: 3 hz generalized spike and wave
- Treatment
    - Start Ethosuximide (and only for Absence Seizures0

- Note that Carbamazepine may worsen Absence Seizures

Tonic, Clonic, and Myoclonic Seizures

- Tonic Seizures have the tonic phase without clonic phase. The tonic phase may last long enough to lead to cyanosis and anoxia.
- Clonic Seizures have the clonic phase without a preceding tonic phase.
- Myoclonic Seizures are brief, jerk-like contractions effecting the entire body or only certain muscle groups. This seizure type is related to several rare hereditary neurodegenerative disorders.
- Treat like Tonic-Clonic Seizures

Simple Partial Seizures

- In Simple Partial Seizures **consciousness is preserved** (despite presence of neuropsych symptoms as described below). Note that the seizure may secondarily spread to other cortical areas and at that point present with altered consciousness.
- Simple Partial Seizures can begin with motor, sensory or autonomic changes. The cortical area of discharge can spread and thus the seizure symptoms can spread across the body – Jacksonian March
- Autonomic changes include sweating, flushing, piloerection, pupillary dilatation, and urinary incontinence.
- Neuropsychiatric symptoms may occur, such as feeling of déjà vu, distorted memory, visual illusions, hallucinations, affective lability, panic attack, slowed or forced cognition.
- Focal neurological deficits may be present in the post-ictal state, such as Todd's paralysis.

Partial Complex Seizures

- These seizures result in **impaired consciousness** without total LOC.
- Symptoms include
    - Somatosensory: epigastric sensations
    - Neuropsychiatric: fear, olfactory hallucinations, déjà vu
    - Motor: automatisms such as sitting down, standing up, orobuccal movements, other facial or neck movements
- Seizures discharge from temporal lobe or medial frontal lobe.
- Seizures differ among patients but stereotyped for each individual.
- Last on average 1-3 min but up to 30 min.
- May secondarily generalize.
- Treatment of Simple and Complex Partial Seizures and Secondarily Generalized Seizures
    - Start with Carbamazepine
    - Adjunctive Meds: Lamotrigine, Levetiracetam, Topiramate, Zonisamide
- In Partial Complex Seizure Disorder Surgery is superior to med response

Status Epilepticus

- Two Treatment Goals
    - Aggressive Supportive Care
        - ABCs
        - Rapid glucose determination and correction
        - Hospitalize
        - Treat complications of status: hyperthermia, acidosis, hypotension, respiratory failure, rhabdomyolosis, or aspiration

- Termination of Seizure
  - Give AED if seizure continuing past 4-5 min
  - Give Lorazepam to abort
  - Or Alternatives: diazepam, midazolam
  - If refractory
    - phenytoin
    - general anesthetic: propofol
    - barbiturate: phenobarbitol

Other Treatment Tips

- Do not start anticonvulsant therapy after single new onset seizure: only 33% of second seizure in 5 yrs
- Rational AED choice
  - Type of seizure
  - Safety profile
  - Monotherapy when possible
  - Age of patient
  - Drug-drug interactions
- Start monotherapy and increase until seizure-free or as can tolerate. If still with seizures, switch to another med as monotherapy with cross-titration or add adjunctive med to the first.
- Note that many of the new AED's are broad spectrum for both generalized and partial seizures
  - Lamotrigine
  - Levetiracetam
  - Topiramate
  - Zonisamide
- Renally excreted
  - Gabapentin
  - Levetiracetam
- Real Simple Seizure Treatment Tips
  - Generalized: Valproic Acid
  - Partial: Carbamazepine
  - Absence: Ethosuximide
  - New AEDs: good for both generalized and partial