

# Seizure Disorders

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# Definition

- An epileptic seizure consists of an episode of uncontrollable, abnormal motor, sensory or psychological behavior caused by repetitive, hypersynchronous abnormal electrical activity of the CNS. A chronic disorder characterized by recurrent seizures in which the attacks themselves become the target for therapy.

# Epidemiology

- Developed world 2-4% seizure incidence, third world approximately doubled.

# Etiology

- Primary or Idiopathic epilepsy – Genetic, exact cause not definitively known.
- Secondary or symptomatic epilepsy – seizures are secondary to a known structural or metabolic disease adversely affecting the brain.

# Secondary Seizure disorders (DDX)

- Drug intoxication/withdrawal
- Alcohol intoxication/withdrawal
- Trauma
- Stroke (hemorrhagic or ischemic)
- Infection (meningitis, encephalitis, abscess)
- Surgery
- Other Toxins
- Neoplasm
- Cerebral Malformations
- Metabolic disorders
- Degenerative CNS conditions

# Seizure pattern classification

- Partial seizures
- Generalized seizures
- Atypical seizures

# Partial seizures

- Partial Seizures – usually originate from a focal region of the brain with a predominate symptom without altered level of consciousness. (simple)
- If changing symptoms with altered consciousness then (complex)
- Motor, sensory psychological or partial complex (behavioral seizures with altered level of consciousness usually of limbic-temporal lobe region).

# Generalized seizures

- Often myoclonic attacks associated with at least a temporary loss of consciousness. Seizure activity is generalized as opposed to a focal area of abnormal electrical activity.

# Nonconvulsive Generalized Seizures

- Absence ( petit mal) – Common, early onset, genetic, no structural abnormalities, diagnostic EEG good cognitive prognosis adult petit mal rare with some intellectual decline.
- Myoclonus – Benign juvenile epileptic myoclonus, common, early onset, mild clinically, Autosomal dominant on chromosome 6. EEG like petit mal.
- Atonic – akinetic epilepsy and infantile spasms severe myoclonic and spasmogenic illness, early onset.
- Myoclonus rhythmic tremor > 120/min

# Atypical

- Paroxysmal tonic spasms
- Spinal myoclonus
- (CONSCIOUSNESS USUALLY REMAINS INTACT)

# Diagnosis

- H&P including family history, drug use, alcohol, trauma, infection, surgery, stroke risk factors and a thorough neurological examination.
- Labs to include glucose, electrolytes, BUN/CR liver profile, blood alcohol level, ABG, CBC, PT/PTT, urine drug screen, RPR, lyme titer, HIV testing, LP
- CT, MRI, EKG, Echocardiography, Holter, Carotid doppler U/S, Angiography, EEG, ALL TESTING IN THE APPROPRIATE CLINICAL SETTING.

Seizure type and drug	Usual adult daily dose(g)	Daily frequency	Serum level (mcg/ml)
Generalized tonic-clonic	XXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXX
Carbamazepine	0.8-1.2	3-4	8 – 12
Valproate	1-4	4	50 – 100
Phenytoin	0.3 – 0.5	2	10 – 20
Phenobarbital	0.1 – 0.25	1	15 – 40
Absence seizures	XXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXX
Ethosuximide	0.75 – 2.0	2	40 – 100
Valproate	see above	see above	see above
Clonazepam	0.002 – 0.02	2	0.005-0.01
Partial seizures	see above	see above	see above
Carbamazepine, phenytoin, valproate, phenobarbital, clonazepam			

For secondary seizures treat the underlying cause and use anti-epileptic agents as a temporizing/stabilizing measure until more definitive treatment is done.

# Drug toxicity

- Carbamazepine (Tegretol)

*Dose related* – mental slowing, nausea, drowsiness, ataxia, nystagmus.

*Idiosyncratic* – exanthem, rash, leukopenia, aplastic anemia, hepatotoxicity.

- Phenytoin ( Dilantin)

*Dose related* – tremor, vertigo, drowsiness, ataxia, nystagmus.

*Idiosyncratic* – exanthem, gingival hyperplasia, hirsutism, coarse features.

# Drug toxicity cont.

- **Valproic acid ( Depakote)**

*Dose related* - ↑ appetite, hair loss, tremor, drowsiness, ataxia

*Idiosyncratic* – hyperammonemia, hepatotoxicity

- **Phenobarbital**

*Dose related* – Mental slowing, drowsiness, ataxia, nystagmus, dysarthria

*Idiosyncratic* – exanthem

- **Ethosuximide**

*Dose related* – dyspepsia, hiccup, headache, insomnia

*Idiosyncratic* – psychotic behavior, aplastic anemia

# Drug toxicity cont.

- Clonazepam  
*dose related* – sedation, muscular hypotonia, ataxia, oral and tracheal hypersecretion
- Primidone same as phenobarbital

# Syncope vs Seizures

- Nausea, lightheaded, faintness
- Sitting or erect
- Usually no motor activity or brief
- Seconds
- Pulse slow and weak
- Pale, sweating
- Readily oriented N/V
- EEG normal
- Aura or epigastric rise
- Any position
- Focal, tonic, clonic sustained motor activity
- 30 sec – 2 min.
- Pulse fast and strong
- Flushed, salivating
- Postictal HA, confusion and drowsy
- EEG abnormal

# Status Epilepticus

- **Convulsive tonic-clonic or partial complex**
- **1) ABC's, O2, IV**
- **2) Draw glucose and electrolytes, ABG**
- **3) Dextrose IV**
- **4) Diazepam 5mg/min (20mg total) IV**
- **5) Phenobarbital 100mg/min (loading dose 20mg/kg) or 100mg in 500cc D5W at 40 cc/hr. Monitor ventilation.**
- **6) If convulsions refractory, start anesthesia with pentobarbital intubate and begin neuromuscular blockade**
- **For serial seizures everything except 6 for petit mal status up to step 4 then oral ethosuximide, and valproic acid**