

Team Medicine

24#

Epilepsy

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What is epilepsy?

*Epilepsy is a grey matter disease

***Epileptic seizure**: a transient occurrence of signs and/or symptoms of sudden changes of neurological functions due to abnormal excessive or synchronous neuronal activity in the brain.

***Provoked seizures**: occur in the setting of acute medical and neurological illnesses in people with no prior history of seizures Ex: seizure after a hypoglycemic attack.

***Epilepsy**: recurrent (two or more) unprovoked seizures.

*Seizure is a symptom of epilepsy, it is NOT a diagnosis

The **Postictal state** is the altered state of consciousness after an epileptic seizure. It usually lasts between 5 and 30 minutes, but sometimes longer in the case of larger or more severe seizures and is characterized by drowsiness, confusion, nausea, hypertension, headache or migraine and other disorienting symptoms. Additionally, emergence from this period is often accompanied by amnesia or other memory defects. It is during this period that the brain recovers from the trauma of the seizure.

While the postictal period is considered to be the period shortly after a seizure where the brain is still recovering from the seizure, the **Ictal period** is considered to be the seizure itself, and the **Interictal period** to be the period between seizures, when brain activity is more normal.

When doctors ask the patient how long the attack lasts, some patients add both the ictal and postictal periods. You have to differentiate between them because the management hugely differs.

Status Epilepticus:

*Defined as recurrent convulsions that last for more than 20 minutes and are interrupted by only brief periods of partial relief.

→ or patient can get frequent attacks of convulsions and do not gain consciousness in between.

***(SE)**: is a serious, potentially life threatening. It has a different management plan and a special protocol to follow.

*Any type of seizure can lead to SE, the most serious form of status epilepticus is the generalized tonic-clonic type.

Epidemiology and course:

* 5% of the population suffers a single seizure at some time

* 0.5-1% of the population have recurrent seizure = EPILEPSY

* 70% = well controlled with drugs (prolonged remissions)

* 30% epilepsy at least partially resistant to drug treatments = INTRACTABLE (FARMACORESISTANT) EPILEPSY.

Frequent causes

_ 65% **Unknown cause** (idiopathic)→ you do CT, MRI...etc and you don't find a cause. However, you have to treat the patient, you don't leave him/her without treatment

_ 4% **Space occupying lesion**→ inflammation, granuloma, tumor..etc. it results in irritation of the cortex "grey matter"

_10% **Stroke**→ either ischemic or hemorrhagic can cause seizure. It can cause seizure at onset "evoked" due to the edema, or later on after months of having the stroke because the already infarcted tissue becomes an epileptic focus releasing abnormal discharges from time to time.(more in elderly)

_6% **Trauma**→ what kind of trauma? Frontal penetrating trauma

A **penetrating head injury** involves "a wound in which an object breaches the cranium but does not exit it." In contrast, a **perforating head injury** is a wound in which the object passes through the head and leaves an exit wound

Perforating



Penetrating



_8% **Genetic** → it is a well-known cause. Some types of epilepsy run in families.

_3% **CNS infections** → any CNS infection can cause seizure but mostly encephalitis.

Ex: patient with a history of headache and fever, and was told to have a mild flue. Days later the same patient presents to the ER with decreased level of consciousness and repeated seizures "9 seizures in one day" MRI was done and it shows temporal lobe changes (this is usually seen in post herpatic encephalitis)

If the encephalitis was captured and treated early, there would not be any consequences. However, this patient should be kept on medications due to the high risk of seizure recurrences because of the changes in temporal lobe.

Triggers for seizure:

- ☐ Poor compliance→ Not adhering to medication
- ☐ Sleep Deprivation
- ☐ Stress
- ☐ Alcohol
- ☐ Infection (Ex: tonsillitis)
- ☐ Menstrual cycle(Catamenian seizure: a type of seizure that is associated with the female cycle)

- ☐ Fever (=Febrile seizure) → is a convulsion associated with significant rise in body temperature. They most commonly occur in children between the ages 6 months and 6 years of age.

Dangers of seizures:

_RTA “road traffic accidents” → epileptic patients should not be allowed to drive.

_Drowning → there should be someone around epileptic patients while swimming in case patient had an attack to help them.

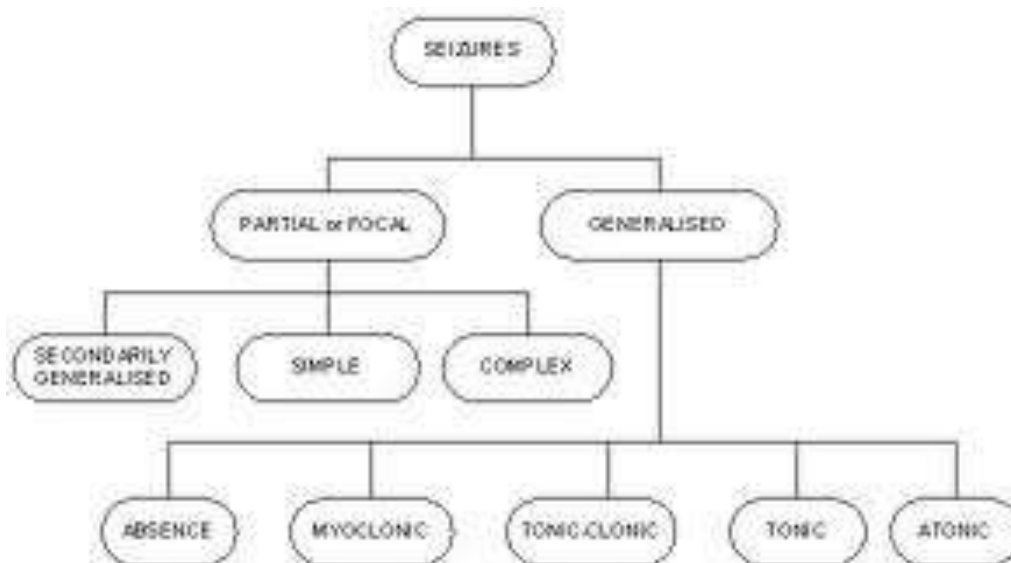
_SE “Status Epilepticus” → ICU complications

_SUDEP “Sudden Unexpected Death of Epilepsy” → is a fatal complication of epilepsy. It is defined as the sudden and unexpected, non-traumatic and non-drowning death of a person with epilepsy, without a toxicological or anatomical cause of death detected during the post-mortem examination.

Seizure Classification:

Why is it important to understand seizure classification?

Because management differs completely, selection of the right drug is very important. If you give the wrong drug it will harm the patient.



(How to differentiate between generalized and partial epilepsy?)

1) By level of consciousness:

Generalized: patient loses consciousness completely.

Partial: if simple → preserved consciousness. If complex → altered level of consciousness.

Generalized = Loss of consciousness
Complex = Altered level of consciousness

2) Warnings (Aura):

Generalized: seizures are usually SUDDEN without any warning. All brain fire at the same time.

Partial: seizures are usually preceded by an AURA. Patient knows something is going to happen

*The warning symptoms depend on the site of lesion:

If in **temporal** lobe → Rising epigastric sensation.

-Hand automatism.

-Lip smacking.

If in **occipital** lobe → Flashes of lights.

If in **parietal** lobe → Numbness and sensory symptoms.

If in **frontal** lobe → Bizarre movements → Ex: bicycling

Types of generalized seizures:

1) **Tonic Clonic** → The most common.

Have both Tonic and Clonic phase.

Clonic phase: The person's muscles will start to contract and relax rapidly, causing convulsions.

Tonic phase: skeletal muscles will suddenly tense. (rigidity)

2) Myoclonic

Brief shock-like jerks of a muscle or group of muscles

3) Absence

Brief loss and return of consciousness not followed by a period of lethargy. The hallmark of the absence seizures is **abrupt and sudden-onset impairment of consciousness, interruption of ongoing activities, a blank stare**, possibly a brief upward rotation of the eyes. If the patient is speaking, speech is slowed or interrupted; if walking, he or she stands transfixed; if eating, the food will stop on its way to the mouth. Usually, the patient will be unresponsive when addressed.

4) Tonic

Skeletal muscles will suddenly tense →

5) Atonic

= "Drop attacks" = "Drop seizures."

Muscles suddenly lose strength. The eyelids may droop, the head may nod, and the person may drop things and often falls to the ground.

Todd's paresis(=Todd's paralysis) is focal weakness in a part of the body after a seizure. This weakness typically affects appendages and is localized to either the left or right side of the body. It usually subsides completely within 48 hours. Todd's paresis may also affect speech, eye position (gaze), or vision.

Differential Diagnosis of epilepsy:

- ▣ TIA→It can be confused with Todd's paresis
- ▣ Syncope→Ask what is the color of the patient? Does it changes?
If Blue-cyanosed...it is more likely epilepsy
If White-yellow-Pale...it is more likely syncope
+Syncope is preceded by palpitations
- ▣ Migraine
- ▣ Movement disorders
- ▣ Panic attack
- ▣ Psychogenic seizure

How to approach a patient with seizure?

Non invasive tests:

- ▣ Clinical history
- ▣ MRI→Lesional (Tumor,Vascular, Trauma, Developmental, Mesial Temporal Sclerosis)
→Non lesional
- ▣ Video EEG→ very important to see the seizure
- ▣ VEM
- ▣ Neuropsychological evaluation →evaluate the memory
- ▣ Nuclear medicine
- ▣ MEG
- ▣ Cognitive Testing (Neuropsychology)→Intelligence.
→Memory (Verbal, Visual)
→Language.

Invasive monitoring:

- ▣ Intracranial electrodes
- ▣ Intraoperative corticography
- ▣ Cortical stimulation.

Questions that help clarify the type of seizure include the following:

- ▣ Was any warning noted before the spell? If so, what kind of warning occurred?
- ▣ What did the patient do during the spell?
- ▣ Was the patient able to relate to the environment during the spell?
- ▣ How did the patient feel after the spell? How long did it take for the patient to get back to baseline condition?
- ▣ How long did the spell last?
- ▣ How frequent do the spells occur?
- ▣ Are any precipitants associated with the spells?

Treatment:

A) Medical:

*The majority of patients respond to drug therapy (anticonvulsants). In intractable cases surgery may be necessary. The treatment target is seizure-freedom and improvement in quality of life!

*The commonest drugs used in clinical practice are: Carbamazepine, Sodium valproate, Lamotrigine(first line drugs) Levetiracetam, Topiramate, Pregabalin (second line drugs) Zonisamide, Eslicarbazepine, Retigabine (new AEDs)

*Basic rules for drug treatment: Drug treatment should be simple, preferably using one anticonvulsant (monotherapy). "Start low, increase slow" ...Add-on therapy is necessary in some patients

*If patient is seizure-free for three years, withdrawal of pharmacotherapy should be considered. It should be performed very carefully and slowly!

*The risk of teratogenicity is well known (~5%), especially with valproates, but withdrawing drug therapy in pregnancy is more risky than continuation. Epileptic females must be aware of this problem and thorough family planning should be recommended. Over 90% of pregnant women with epilepsy will deliver a normal child.

Mechanism of Action:

Current antiepileptic drugs are thought to act mainly by two main mechanisms:

- Reducing electrical excitability of cell membranes, possibly through inhibition of sodium channel.
- Enhancing GABA-mediated synaptic inhibition. This may be achieved by an enhanced pre- or post- synaptic action of GABA, by inhibiting GABA-transaminase, or by drugs with direct GABA-

*Clinical Uses of Antiepileptic Drugs:

- ▣ *Tonic-clonic (grand mal)* seizures: **phenytoin, valproate (Depakene)**. Use of single drug is preferred when possible, because of risk of pharmacokinetic interactions.
- ▣ *Partial (focal)* seizures: **carbamazepine (Tegretol), valproate; clonazepam** or **phenytoin** are alternatives.
- ▣ *Absence seizures (petit mal)*: **ethosuximide** or **valproate**. Valproate is used when absence seizures coexist with tonic-clonic seizures, since most drugs used for tonic-clonic seizures may worsen absence seizures.
- ▣ *Myoclonic seizures*: **valproate** or **clonazepam**.
- ▣ *Status epilepticus*: must be treated as an emergency.

Drug of choice:

Broad spectrum drug is: Valproate
Generalized "Tonic-clonic Seizure" → Valproate, phenytoin
Partial → Carbamazepine
Absence → Ethosuximide

*** Attentions:**

- ☐ Selection of an appropriate antiseizure agent
- ☐ Use of single drug
- ☐ Withdrawal
- ☐ Toxicity
- ☐ Fetal malformations

***Valproate side effects:**
-Weight gain
-Alopecia (temporary)
-Thrombocytopenia
-Hepatotoxicity

***Seizure Freedom with AED use:**

- ☐ 1st drug ----- seizure free (47%)
- ☐ 2nd drug----- seizure free (14%)
- ☐ 3rd drug----- seizure free (3%)
- ☐ Medication resistant 36%

***Elderly and epilepsy:**

- ☐ More cautious dosing
- ☐ Monotherapy preferred
- ☐ More frequent SEs
- ☐ Comorbid medical problems/meds
- ☐ Osteoporosis
- ☐ Cognitive decline
- ☐ Risk of falls/injury

B) Surgical:

It is an option if:

- ☐ There is a clear focus
- ☐ There is failure of two antiepileptic drugs “refractory”

***You cannot operate on patients with generalized epilepsy**

Type of surgeries:

- ☐ Hemispherectomy.
- ☐ Hemispherotomy.

If the patient is not a good candidate for surgery?

- ☐ **VNS: Vagal Nerve Stimulation.**
- ☐ **DBS : DeepBrainStimulation**



Summary

Epileptic seizure: a transient occurrence of signs and/or symptoms of sudden changes of neurological functions due to abnormal excessive or synchronous neuronal activity in the brain.

Status Epilepticus: Defined as recurrent convulsions that last for more than 20 minutes and are interrupted by only brief periods of partial relief.

65% epileptic patients are idiopathic.

Seizure Classification:

1) By level of consciousness:

- Generalized: patient loses consciousness completely.
- Partial: if **simple** → **preserved consciousness**. If **complex** → **altered level of consciousness**.

2) Warnings (Aura):

- Generalized: seizures are usually **SUDDEN** without any warning.
- Partial: seizures are usually **preceded** by an AURA.

Types of generalized seizures:

- Tonic Clonic → **The most common**.
- Myoclonic
- Absence → **typically involves school-age children and usually resolves as child grows older**.
- Tonic
- Atonic → **"Drop attacks" = "Drop seizures."**

Treatment:

Medical:

Drug of choice:

- Broad spectrum drug is: Valproate
- Generalized "Tonic-clonic Seizure" → Valproate, phenytoin
- Partial → Carbamazepine
- Absence → Ethosuximide

Surgical:

Type of surgeries:

- Hemispherectomy.
- Hemispherotomy.

* cannot operate on patients with generalized epilepsy

MCQs

1. The patient recalls having episodes when he smells a pungent odor, becomes sweaty, and loses consciousness. His wife describes a period of motor arrest followed by repetitive picking movements that last about a minute. The patient does not fall or lose muscle control.

- a. Absence seizure
- b. Complex partial seizure
- c. Simple partial seizure
- d. Atonic seizure
- e. Myoclonic seizure

2. The teacher of a 14-year-old child recounts episodes where the child stares into space and does not respond to verbal commands for a few seconds. These episodes occur several times per day. An EEG shows 3-per-second spike and slow wave discharges.

- a. Absence seizure
- b. Complex partial seizure
- c. Simple partial seizure
- d. Atonic seizure
- e. Myoclonic seizure

1=B

2=A