Medicine
TEAM 437

MED437
KING SAUD UNIVERSITY

Epilepsy

Objectives :

- Definition of epileptic seizure , provoked seizure and epilepsy.
- Status epilepticus
- Frequent causes of seizure and risk factors
- Triggers of seizure in epileptic patient
- Epilepsy classification and seizure semiology
- DDX of seizures
- Seizure vs syncope
- Approach to seizure disorders (Hx , EX , inx)
- Medical and surgical management of epilepsy
- How to select antiepileptic medications
- When to stop antiepileptic medications

Worked On This Lecture :

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Resources :

Doctors Slides + Notes: Dr. Bandar AlJafen
Books: Step up
Teams: 436

What is Epilepsy?

- Epileptic seizure:
  - Transient occurrence of signs and symptoms of sudden changes in neurological function due to abnormal excessive ,synchronous discharge of cortical neurons .. every word in the definition is important
- Provoked seizures:
  - Occurs in the setting of acute medical and neurological illnesses in people with no prior history of seizures For example: a healthy patient with hypoglycemia or hyponatremia or CNS infection presented with a seizure, do we call this patient epileptic? NO
- Epilepsy:
  - Recurrent (two or more) unprovoked seizures. The word unprovoked here is very important. For example: a known diabetic got 2 seizures in the past but both were due to hypoglycemia, is he considered an epileptic? NO
- Seizure is a symptom of epilepsy.

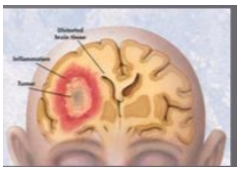
Status Epilepticus:

- Status epilepticus (SE):
  - Defined as recurrent convulsions that last for more than 30 minutes (5 min in the last update) and are interrupted by only brief periods of partial relief. In the new definition they changed it to 5 minutes rather than 20 minutes to encourage rapid treatment of SE to prevent complications.
  - It is a **serious, potentially life-threatening.**
  - Any type of seizure can lead to SE, the most serious form of status epilepticus is the generalized tonic-clonic type.
  - Treat with **I.V diazepam,** I.V Phenytoin, and 50g Dextrose

Epidemiology and Course

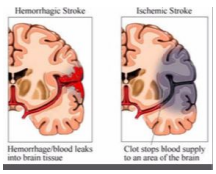
- 5% of the population suffer a single seizure at some time due to any cause but mainly **provoked**
- 0.5-1% of the population have recurrent seizures = EPILEPSY
- 70% are well controlled with drugs (prolonged remissions)
- 30% epilepsy at least resistant to drug treatments = INTRACTABLE EPILEPSY. Require surgery

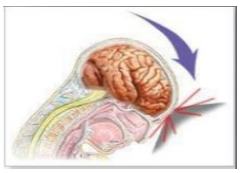
Risk Factors for Epilepsy



Doctor said these could be asked in the OSCE. But, despite all risk factors around 65% of cases are of unknown etiology

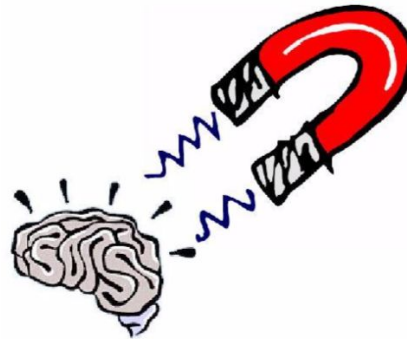
- Febrile convulsion*
- Perinatal insult*
- CNS infection
- CNS mass lesion
- Family history of epilepsy*
- Head injury frontal penetrating
- Abnormal gestation or delivery cerebral palsy
- Developmental delay
- Stroke (ischemic or hemorrhagic





*Febrile convulsions تشنج حراري
is when babies get seizure due to fever. Prolonged and recurrent febrile convulsions increase the risk of epilepsy in the future.
* Intrauterine infections like toxoplasmosis
*Juvenile myoclonic epilepsy runs in families

Triggers for seizures

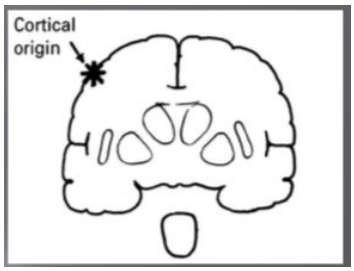


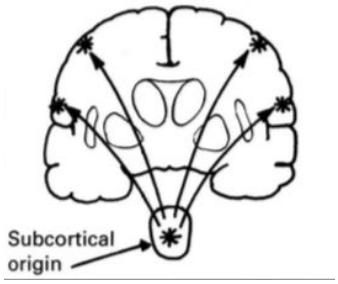
- Poor compliance Most common cause
- Sleep deprivation
- Stress
- Alcohol
- Infection any infection not necessarily a CNS infection.
- Menstrual cycle catamenial seizure is a type that only comes during menstruation.

When we say trigger then this means we are talking about a known epileptic case. For example: two people are known epileptics, one gets seizures once a year and the other gets seizures 3 times. What is the difference? There must be a trigger.

Seizures Types

Guides the management





A) Focal Seizures:

Account for 80% of **adult** epilepsies

- Simple partial seizures Intact consciousness
- Complex partial seizures Altered level of consciousness. May come with or without an Aura. The aura could be epigastric rising sensation, deja vu..etc.
- Partial seizures secondarily generalised when a focal seizure evolve into a generalized.

People with focal seizures are candidates for surgery, whereas generalized can only be managed by medications.

B) Generalized seizures:

Characterized by loss of consciousness

C) Unclassified seizures

International classification of seizures 1981

Partial Seizures (start in one place)

- Simple (no loss of consciousness of memory)
  - Sensory
  - Motor
  - Sensory-Motor
  - Psychic (abnormal thoughts or perceptions),
  - Autonomic (heat, nausea, flushing, etc.)
- Complex (consciousness or memory impaired)
  - With or without aura (warning)
  - With or without automatisms.
- Secondarily generalized.

Generalized Seizures (apparent start over wide areas of brain)

Characterized by Loss of consciousness

- Absence (petit mal) يتكلم معك بعدين يسرح و يرجع
- Tonic-clonic (grand mal)
- Atonic (drop seizures)
- Myoclonic
- Other Unclassifiable seizure

New ILAE classification:

A) Generalized seizures:

a) **Tonic-clonic** (in any combination)
b) **Absence**
   i) Typical
   ii) Atypical
   iii) Absence with special features
   iv) Myoclonic absence
   v) Eyelid myoclonia
c) **Myoclonic**
   i) Myoclonic atonic
   ii) Myoclonic tonic
d) **Clonic**
e) Tonic
f) Atonic

B) Focal Seizures

C) Unknown

Epileptic spasm

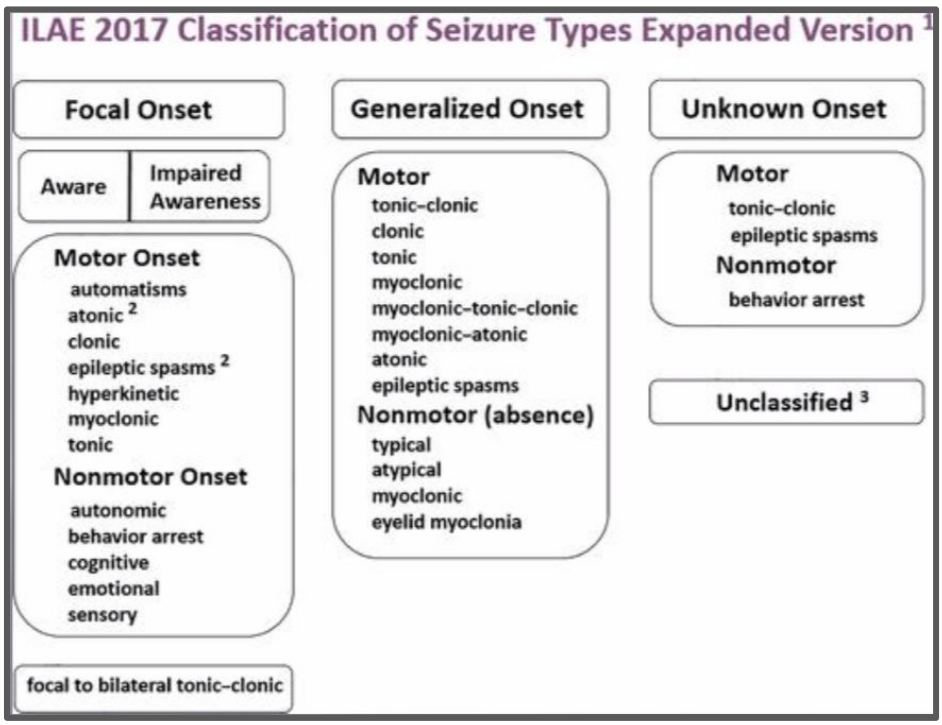
Extra from book

Tonic-clonic (grand mal) phases:

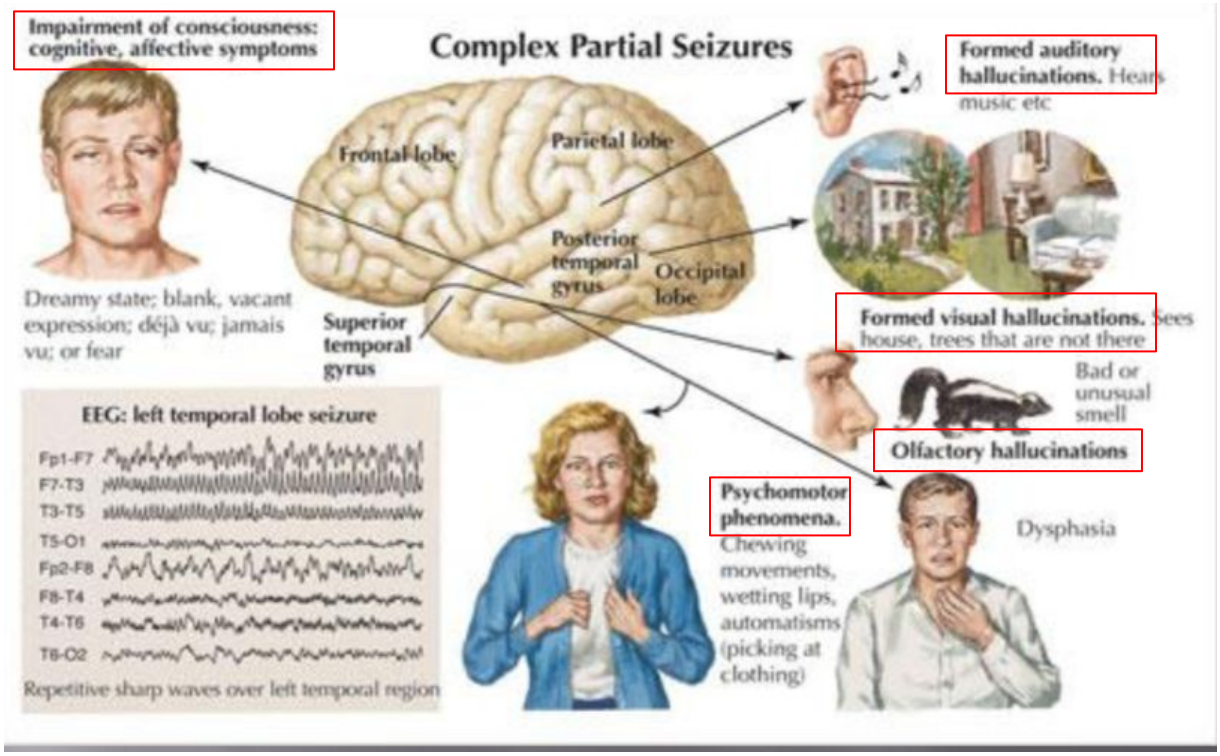
1) **Sudden loss of consciousness** "drop"
2) **Tonic phase:**
   a) Patient is rigid, apnic with trunk and limbs extended.
3) **Clonic phase:**
   a) Musculature jerking at least 30 sec
4) Patient becomes flacid and comatose before regaining consciousness.
5) **Postictal confusion and drowsiness** are characteristic. Typically lasts between 10-30 mins

Absence seizures

- Typically is **children** and **revolves** as child grows older
- Episodes are **brief** (few seconds) but **frequent** (up to 100 times/day)
- **No** loss of postural tone or continence
- **No** postictal confusion



Seizure Semiology



Summary of typical signs on video EEG

	Typical EEG sign	Localizes to
★	Oral automatisms	Temporal lobe
★	Hypermotor automatisms	Frontal lobe
	Manual picking automatisms	Temporal lobe
★	Visual hallucinations	Occipital lobe
	Auditory hallucinations	Temporal neocortex (Heschl's Gyrus)
★	Olfactory hallucinations	Mesial temporal lobe
	Nystagmus, eye blinking, eye pulling sensation	Occipital lobe
	Ictal amaurosis	Occipital lobe
	Tonic arm elevation	Supplementary motor area
★	Epigastric aura	Temporal lobe
	Throat tightening sensation	Insula
	Ictal pain	Parietal lobe
	Somatosensory sensations	Postcentral gyrus or supplementary motor area
	Clonic activity	Precentral gyrus
★	De-ja vu or jamais vu aura	Mesial temporal lobe
	Fear	Most often temporal, but also frontal

Tingling and numbness: parietal

VERY IMPORTANT!!! The doctor said all MCQ's will be from this table .

DDx for seizure attacks

- TIA transient ischemic attack
- Syncope resembles atonic seizures
- Migraine they also have an aura
- Movement disorders tick's may resemble myoclonic seizures
- Panic attack resembles frontal lobe seizures
- Psychogenic seizure should be the last in your DDx. There are typical signs of psychogenic seizures: arching back, forceful eye closure, and head side to side.

Seizures vs Syncope

Comparison of clinical features in cardiogenic syncope versus seizure disorders

Clinical features	Cardiogenic syncope	Seizure disorders
Loss of consciousness	Typical	Common
Episode duration	Seconds	Minutes
Involuntary movements	Common	Typical
Amnesia	Yes	Yes
Arrhythmia	Common	Rare*
Electroencephalogram	Slow waves Flattening	Focal or general spike activity
Responsive to AEDs	No	Often
Short term mortality†	High	Low

It is very important to differentiate between seizure and syncope. The color of the face is important:
Cardiogenic syncope = pale
Seizures = cyanosis.

Diagnosis

- **Non invasive tests**
  - Clinical history
  - MRI mandatory to rule out any focal mass lesions
  - video EEG
  - Neuropsychological evaluation
  - nuclear medicine
- **Invasive monitoring**

Diagnosis cont.

A) Clinical history

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

- Was any warning noted before the spell? Aura
- What did the patient do during the spell? Describe the seizure itself
- Was the patient able to relate to the environment during the spell ? to determine if its focal or generalized
- 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? The longer the higher the complications and the risk of sudden death
- How frequent do the spells occur?
- Are any precipitants associated with the spells? Triggers,
  - for example:
    - Myoclonic jerks are triggered by flashes of light.
    - Focal seizures are triggered by lack of sleep and stress.
    - Absence is triggered by hyperventilation
    - Juvenile Myoclonic Seizures triggered by **carbamazepine**, **Phenytoin**.

(might come in MCQs)

B) MRI

A) Lesional :

- Tumor
- Vascular
- Trauma
- Developmental
- Mesial Temporal
- Sclerosis

B) Non lesional

C) EEG

A generalized spike wave appearance on EEG indicated Juvenile Myoclonic Seizures which is a familial condition.

D) VEM

E) Nuclear Medicine

F) Cognitive testing Neuropsychology

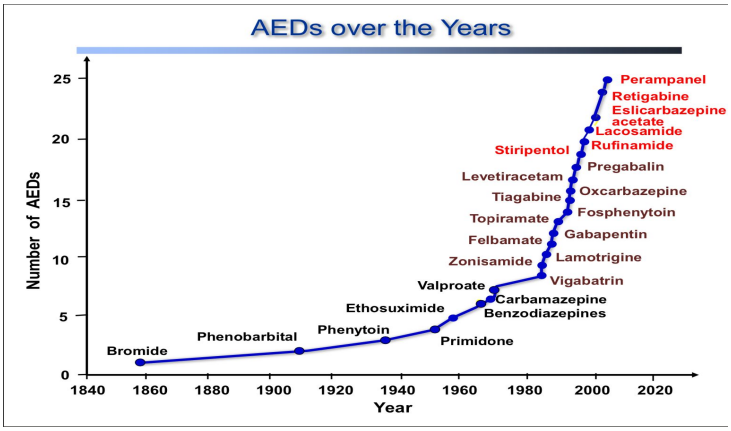
- Intelligence
- Memory:
  - Verbal , Visual
- Language

Treatment

1) Medical.
2) Then Surgical.

1- Medical .

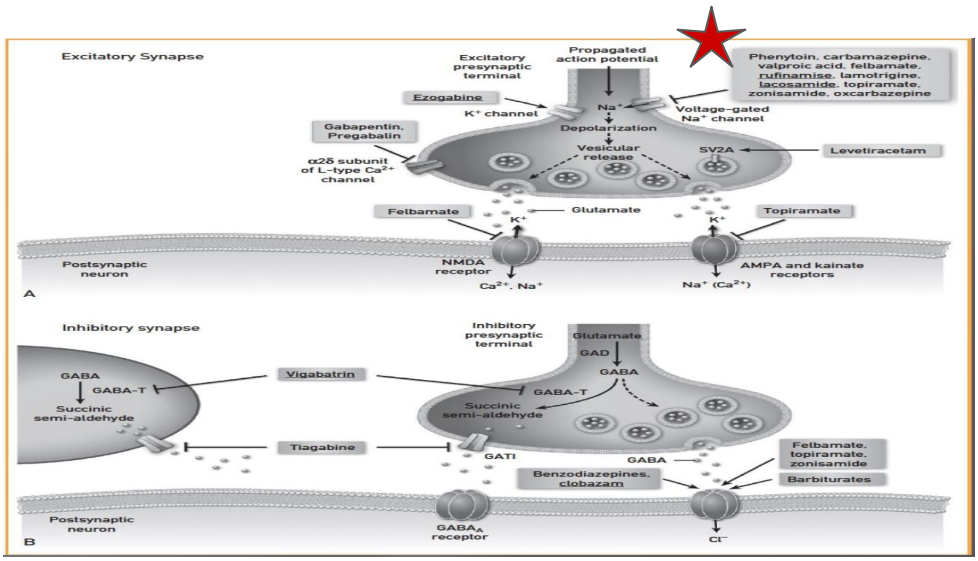
Bromide salt, Phenobarbital, **Phenytoin**, Primidone, **Ethosuximide**, **Carbamazepine**, Clonazepam, **Valproate**, Felbamate, Gabapentin, **Lamotrigine**, Topiramate, Tiagabine, Levetiracetam, **Oxcarbazepine**, Zonisamide, Pregabalin, Rufinamide, Lacosamide, Ezogabine.



Mechanism of Action

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

- Reducing electrical excitability of cell membranes.
  - By inhibition of sodium channel.
- Enhancing GABA.
  - By inhibiting GABA-transaminase Or
  - By drugs with direct GABA-agonist properties.



This picture is very important , Focus on the star!

Clinical uses of Antiepileptic Drugs:

Tonic-clonic (grand mal) seizures:

- phenytoin,valproate.
- Use of single drug is preferred when possible, because of risk of pharmacokinetic interactions.
- Start with a low dose first then build up gradually.
- It is contraindicated to give 2 medications together.

Partial (focal) seizures:

- carbamazepine,valproate; clonazepam or phenytoin are alternatives.

Absence seizures (petit mal):

- ethosuximide or valproate drug of choice

Myoclonic seizures:

- valproate or clonazepam.

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.
  - Should be performed very carefully and slowly!
  - **20%** of pts will suffer a further seizure **within 2 years.**
- Do not treat a patient with only one single seizure unless:
  - Abnormal EEG
  - Abnormal MRI
  - Patient is in Status epilepticus

Epilepsy treatment and pregnancy

- The risk of teratogenicity is well known (~5%), especially with **valproates**, but withdrawing drug therapy in pregnancy is more risky than continuation.
- All antiepileptic medications are not safe, however lamotrigine is the safest. Might come as MCQ! Remember it is NOT SAFE but it's the least dangerous.
- 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.

Seizure freedom with AED use

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

Drug resistant epilepsy :

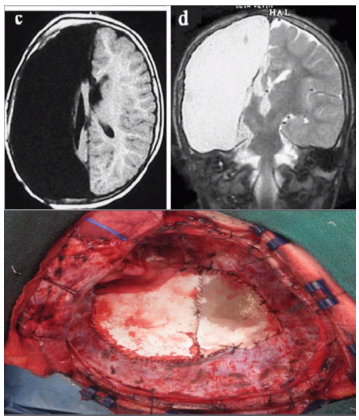
- Failure of at least **TWO** antiepileptic medications to completely control seizures **Appropriately chosen for seizure type** you must choose the right medication for the type of seizures first otherwise it is not resistant.
- Taken as prescribed Good compliance
- Well tolerated (not failed due to side effects)

IMPORTANT
Summary of treatment by the doctor:

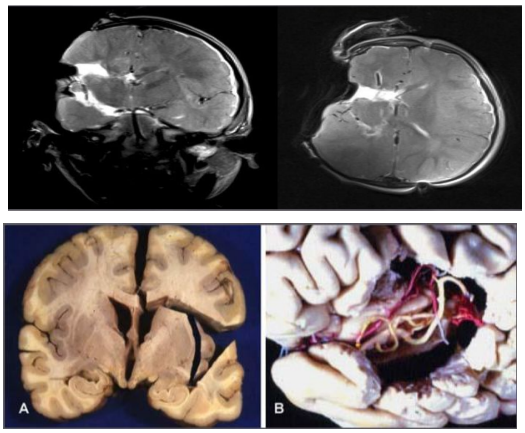
- Generalized epilepsy:
  - Valproic acid
- Focal epilepsy:
  - Carbamazepine
- Generalized and female
  - Avoid valproic
    - Why? It has many side effects like teratogenicity, weight gain hirsutism , PCOS.
- Migraine + epilepsy
  - Topiramate
- Obese + epilepsy
  - Topiramate
- Juvenile myoclonic epilepsy
  - **Valproic acid** is the drug of choice
  - **Carbamazepine** and **Phenytoin** are **CONTRAINDICATED** and are considered triggers for seizures.

2- Surgical :

1- Hemispherectomy done only in one case known as **Rasmussen Encephalitis**



2- Hemispherectomy

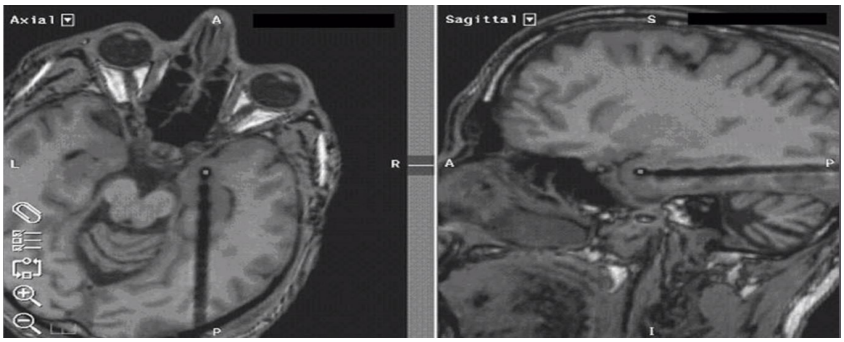


If my patient is not a good candidate for surgery ?

This is just FYI

VNS

DBS



Summary

Epilepsy

- Epileptic seizure: transient occurrence of signs and symptoms of sudden changes in neurological function.
- Provoked seizures: occurs in the setting of acute illnesses in people with no Hx of seizures.
- Epilepsy: recurrent (two or more) unprovoked seizures.

Risk factors and triggers

Risk Factors:
- Febrile convulsions
- Family Hx
- CNS mass/infection
- Trauma
- Stroke

Triggers (for epileptic pt):
- Poor compliance
- Stress
- Infection

Classification

Generalized	Focal
• Absence (petit mal) • Atonic (drop seizure) • Tonic-clonic (grand mal) • Myoclonic	• Simple partial seizures (no change in LOC) • Complex partial seizures (impairment of LOC)

Seizure semiology (MCQs)

- Frontal:Abnormal behaviour
- Temporal: Deja vu, epigastric aura, olfactory hallucinations
- Parietal: Sensory involvement
- Occipital:Visual hallucinations

Treatment

- Grand mal: Phenytoin
- Focal: Carbamazepine (first choice)
- Absence: Ethosuximide
- Myoclonic: Valproate
- Notes:
  - Valproate can be used for all types.
  - Clonazepam is an alternative in partial and myoclonic seizures.
  - N.B: all AEDs are teratogenic, BUT lamotrigine is the safest.

Quiz

Q1: Which one of the following describes temporal lobe involvement during an epileptic episode?

A. Epigastric involvement
B. Agitation
C. Seeing trees that are not there
D. Numbness

Q2: A 71-year-old man with atrial fibrillation is seen in clinic following an episode of syncope. He describes getting a poor night's sleep and, as he got out of bed in the morning, feeling dizzy for a couple of seconds before the lights dimmed around him. He was woken a couple of seconds later by his wife who had witnessed the event. She says he went pale and fell to the floor and his arms and legs jerked. After waking, he was shaken but was 'back to normal' a few minutes after the event. His medication includes aspirin, atenolol and furosemide. What is the most likely diagnosis?

A. TIA
B. Orthostatic hypotension
C. Cardiogenic syncope
D. Seizure

Q3: A 17-year-old girl is brought into accident and emergency with generalized tonic-clonic seizure. Her mother had found her fitting in her bedroom about 20 minutes ago. The ambulance crew handover state that her sats are 96 per cent on 15 L of oxygen and they have given her two doses of rectal diazepam but she has not stopped fitting. What is the most appropriate management?

A. Lorazepam
B. Phenobarbital
C. Intubation
D. Phenytoin loading

Q4:A 23-year-old woman is seen in clinic for recurrent funny turns. She is not aware of them, but her family and friends have noticed them. They say she looks around blankly, then starts picking at her clothes and sometimes yawns, then she comes back after a minute. She can get drowsy after these episodes. What seizure type does this patient describe?

A. Absence
B. Tonic clonic
C. Simple partial
D. Complex partial

Q5: A 68-year-old man is seen in the emergency room after an unwitnessed syncopal episode. His wife heard a strange noise and found him confused and on the floor of the living room where he had been watching TV. His wife tells you that he has no ongoing medical problems, does not take any medications, and does not use alcohol or illicit drugs. On examination, the patient is drowsy, has a tongue laceration, and his pants are wet with urine. Serum electrolytes (including calcium) are normal and urine drug screen is negative. Which of the following is the best next step in evaluation?

A. MRI scan of brain
B. Lumbar puncture
C. CT scan of head
D. Echocardiography

Answers:
1- A
2- B
3- D
4- D
5- A