University of Basrah
Al-Zahraa Medical College

Ministry of higher Education
and Scientific Researches

BLOCK:

Mental health care and Neurology

Seizure Disorders

Module staff:
Dr. Abbas Jumah Hamdan \ Arabic Board in Psychiatry.
Dr. Hiba Abdulhussain Al Sufar \ Arabic Board in Psychiatry.
Dr. Ali Mohammed Radhi \ Iraqi Board in Neurosurgery.

Objectives:

- Distinction between a seizure event and a seizure disorder.
- The major classes of seizure disorders.
- The common triggers likely to induce seizure disorders.
- The management strategies in usage to control seizure disorders.
- The usefulness of the EEG in the diagnoses and classification of seizure disorders.
- Convulsive and Nonconvulsive status epilepticus.
- Epilepsy Syndromes.
- Antiepileptic Medications.
- Safety advices would you give a patient with a new diagnosis of epilepsy.
- What issues in epilepsy and its treatment are of particular importance to young women.
- Status epilepticus: emergency management.

Distinction between a seizure event & a seizure disorder

Seizure is a sudden, uncontrolled electrical disturbance in the brain. It can cause changes in the behavior, movements or feelings, and in levels of consciousness. ***Seizure disorder*** is a general term used to describe any condition in which seizures may be a symptom and it is often used in place of the term ‘***’epilepsy***”.

Epilepsy is a neurological disorder in which a person has two or more *unprovoked seizures* that occur more than 24 hours apart. ***“Unprovoked” seizures*** are those that are not brought on by a clear cause, such as trauma, low blood sugar (hypoglycemia), low blood sodium, high fever, or alcohol or drug abuse.

You may have a seizure without having epilepsy, but you can’t have epilepsy without seizures.

The major classes of Seizure Disorders

Seizure disorders are classified into 2 major classes according to their seizure type; Focal onset seizures and Generalized onset seizures.

General onset seizures affect a widespread network of cells on both sides of the brain at the same time.

Absence seizures: This seizure type causes a blank stare or “staring into space” (a brief loss of awareness). Absence seizures are more common in children, last for only seconds (usually less than 10 seconds) and are commonly mistaken for daydreaming. This seizure type used to be called *petit mal seizures*.

Atonic seizures: Atonic means “without tone.” An atonic seizure means losing of muscle control or muscles are weak during the seizure. Parts of the body may drop (such as eyelids or head), or fall to the ground during this short seizure (few seconds). This seizure type is sometimes called “drop seizure” or “drop attack.”

Tonic seizures: Tonic means “with tone.” A tonic seizure means the muscle tone has greatly increased. Arms, legs, back or whole body may be tense or stiff, causing fall to the ground during this short seizure (few seconds).

Clonic seizures: "Clonus" means fast, repeating stiffening and relaxing of a muscle ("jerking"). A clonic seizure happens when muscles continuously jerk for seconds to a minute or muscles stiffen followed by jerking for seconds up to 2 minutes.

Tonic-clonic seizures: This seizure type is a combination of muscle stiffness (tonic) and repeated, rhythmic muscle jerking (clonic). This seizure is also called a *convulsion* or *grand mal seizure*. This may be associated with bitting of the tongue and losing of muscle control of bowels or bladder.

Myoclonic seizures: This seizure type causes brief, shock-like muscle jerks or twitches ("myo" means muscle, "clonus" means muscle jerking). Myoclonic seizures usually last only a couple of seconds.

Focal onset seizures start in one area, or network of cells, on one side of your brain. This seizure used to be called *partial onset seizure*. There are 3 types of focal seizures:

Simple focal seizures affect a small part of the brain and the patient aware during the seizure. These seizures can cause twitching or a change in sensation, such as a strange taste or smell.

Complex focal seizures can make a person with epilepsy confused (lost awareness) for up to a few minutes.

Secondary generalized seizures begin in one part of the brain, then spread to both sides of the brain. In other words, the person first has a focal seizure, followed by a generalized seizure.

The common triggers likely to induce seizure disorders

Triggers are situations that can bring on a seizure in some people with epilepsy. Some people's seizures are brought on by certain situations. Triggers can differ from person to person, but common triggers include:

(1) Specific time of day or night
(2) Sleep deprivation – overtired, not sleeping well, not getting enough sleep, disrupted sleep
(3) Illness (both with and without fever)
(4) Flashing bright lights or patterns
(5) Alcohol - including heavy alcohol use or alcohol withdrawal
(6) Drug use (cocaine)
(7) Stress
(8) Menstrual cycle or other hormonal changes
(9) Not eating well, long times without eating, dehydration, not enough fluids, low blood sugar, vitamins and mineral deficiencies
(10) Specific foods (excess caffeine)
(11) Use of certain medications (diphenhydramine)
(12) Missed medications (Anti-epileptic Drugs)

The management strategies to control seizure disorders

The majority of epileptic seizures are controlled through drug therapy. Diet may also be used along with medications. In certain cases in which medications and diet are not working, surgery may be used.

Anti-seizure medications:can control seizures in about 60% to 70% of people with epilepsy.

Diet therapy: The diets high in fat, moderate in protein and low in carbohydrates are the most common diets recommended for people with epilepsy.

Surgery and devices: Surgery is considered if anti-seizure medications don't control the seizures, and if your seizures are severe and debilitating. Surgery options include:

(1) *Surgical resection* (removal of abnormal tissue)
(2) *Disconnection* (cutting fiber bundles that connect areas of your brain)
(3) *Stereotactic radiosurgery* (targeted destruction of abnormal brain tissue)
(4) *Implantation of neuromodulation devices* (send electrical impulses to the brain to reduce seizures over time).

EEG in the diagnoses and classification of seizure disorders

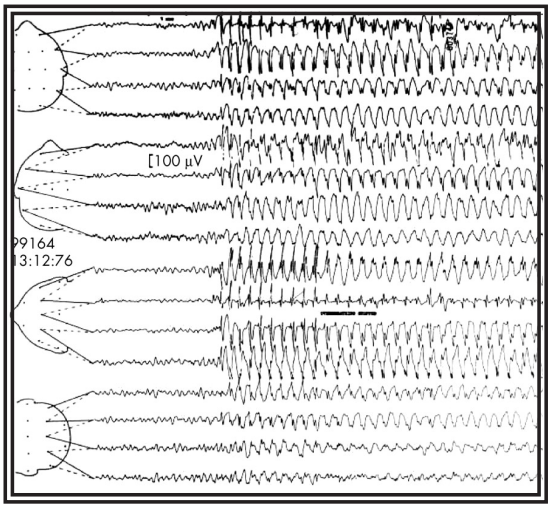
Although the diagnosis of seizures and seizure disorders is primarily made from careful history and examination, the EEG (**E**lectro**E**ncephalo**G**ram) remains an important investigative tool. The EEG often provides supportive evidence of seizure disorder and assists with classification of seizures and epilepsy. EEG help in epilepsy in the following ways:

(A) Diagnosis of epilepsy:

(1) Differential diagnosis of paroxysmal neurological events.
(2) Distinction between a focal and generalised seizure disorder.
(3) Identification of syndrome specific changes.
(4) Recognition of photosensitivity.

(B) Treatment of epilepsy:

(1) Assessing risk of recurrence after an unprovoked seizure.
(2) Selection of antiepileptic treatment.
(3) Likelihood of seizure relapse if medication is withdrawn.
(4) Identification of epileptogenic region in epilepsy surgery candidates.
(5) Investigation of cognitive decline
(6) Detection of non-convulsive status
(7) Monitoring in convulsive status



Non-Epileptic Events

Non-epileptic events are not caused by abnormal brain activity. Although they may look like seizures, they seem to be the result of another type of mind-body connection which is not the same as epilepsy. They are also called ***pseudo seizures*** (because they resemble seizures) or ***psychogenic seizures*** (because of the mind-body connection).

These may be form of stress response. Distress, fear, anger or resentment may be channeled into an involuntary somatic (bodily) response.

Non-epileptic events may result in brief disturb in conscious level. There may be hyperventilation, trembling, or confusion. Visual disturbances, loss of speech, numbness or weakness may also occur. One or more limbs may undergo rhythmic shaking. Significant shaking of all four limbs may resemble a "grand mal" seizure. Some episodes may include eye rolling, stiffening and urinary incontinence.

The best type of evaluation is direct observation or a videotape of the events and simultaneous EEG recordings of brain wave activity during the event.

There is no benefit from drugs intended to treat epileptic events.

Convulsive and Nonconvulsive status epilepticus

Convulsive status epilepticus (CSE) is a medical emergency with an associated high mortality and morbidity. It is defined as a convulsive seizure lasting more than ***5 minutes*** or consecutive seizures ***without recovery of consciousness***. Successful management of CSE depends on rapid administration of adequate doses of anti-epileptic drugs.

Nonconvulsive status epilepticus (NCSE) is characterized by persistent change in mental status lasting more than ***5 minutes***, generally with epileptiform activity seen on EEG monitoring and subtle or no motor abnormalities. NCSE can be a difficult diagnosis to make in the emergency department setting, but the key to diagnosis is a high index of suspicion coupled with rapid initiation of continuous EEG

Current guidelines recommend the use of ***benzodiazepines*** as first-line treatment in CSE and NCSE.

Epilepsy Syndromes

Epilepsy syndromes affect infants and children, and are characterized by a variety seizures and other symptoms such as developmental delays, and includes:

Infantile Spasms: typically begin between 3 and 12 months of age and usually stop by the age of 2 to 4 years. The spasms appear as a sudden jerk followed by stiffening.

Myoclonic Astatic Epilepsy of Childhood: most commonly appearing between ages 1 and 5 and featuring generalized seizures.

Juvenile myoclonic epilepsy: have myoclonic seizures that may begin between late childhood and early adulthood.

Benign rolandic epilepsy: is an epilepsy syndrome affecting children.
Electrical status epilepticus of sleep: describes seizure activity that becomes more frequent during sleep and is seen in more than half of a child's sleep EEG.
Sturge-Weber Syndrome: is neurocutaneous disorder (one that affects the brain and skin) identifiable by the "port-wine stain" (known as an angioma) on the forehead area around the eye. Children with this syndrome may experience seizures, weakness on one side of the body (hemiparesis), developmental delays and increased pressure in the eye (glaucoma).
Lennox-Gastaut Syndrome: is typically beginning in children between the ages of 2 and 6, and it is idiopathic — it has no known cause — and is commonly found in children with brain development problems or acquired brain damage.

Antiepileptic Medications

Antieplieptic medications do not cure epilepsy, but rather attempt to prevent seizures. Antiepileptic medications do not alter the underlying problem predisposing to seizures. General **Principles that doctors follow when prescribing antiepileptic medications:**

- starting with a low dose and slowly increasing to reach a maintenance dose (this helps to reduce or avoid side effects).
- aiming for control of seizures with one antiepileptic medication (monotherapy) where possible.
- giving a medication a good trial period to work before changing.
- spacing medication doses appropriately to maintain stable blood levels.
- slowly withdrawing antiepileptic medications if ceasing treatment.

Most patients with recurrent epileptic seizures require treatment. The exceptions are patients with provoked seizures and those with episodes separated by years.

Carbamazepine is effective for the treatment of partial and generalized tonic–clonic seizures but is not effective in patients with absence, myoclonic or atonic seizures.

Phenytoin is effective for the treatment of partial and tonic–clonic seizures.
Valproic acid is effective in patients with all types of seizures.

Phenobarbital is as effective as carbamazepine and phenytoin in abolishing partial and generalized tonic–clonic seizures.

Benzodiazepines are the most effective drugs in the treatment of *acute* seizures and *status epilepticus*. The benzodiazepines most commonly used to treat status epilepticus are diazepam (Valium). Clonazepam is effective in preventing absence seizures, myoclonic jerks, and tonic–clonic seizures.

Levetiracetam is effective against partial seizures (including secondary generalized tonic-clonic). Somewhat effective against primary generalized tonic-clonic seizures. Ineffective against tonic or atonic seizures. *Levetiracetam is safer to use during pregnancy than other epilepsy medicines*.

Valproic Acid has broad spectrum of effectiveness for a wide range of seizures.

Seizure Type	Commonly Prescribed Antiepileptic Medications
Focal seizures	carbamazepine, levetiracetam, phenytoin, sodium valproate
Generalised tonic clonic seizures	carbamazepine, levetiracetam, phenytoin, sodium valproate
Absence seizures	sodium valproate
Myoclonic, Tonic and Atonic seizures	clonazepam, levetiracetam, sodium valproate,

Side effects: There are **3** main types of antiepileptic medication side effects.

General side effects These include nausea, abdominal pain, dizziness, sleepiness, irritability, anxiety or mood changes.

Specific side effects Some side effects are peculiar to individual medications and only occur in some people eg. rash, blood problems, liver problems, severe behaviour disturbance.

Safety advices would you give a patient with a new diagnosis of epilepsy

It is important that the patient take medications regularly and avoid any triggers, as these will reduce the risk of having further seizures. Suddenly stopping the medication may lead to severe rebound seizures. The patient should be careful in the kitchen and during ironing clothes. Showers are safer than baths. It is safer not to climb ladders. It is better to use safety corners to cover any sharp edges around the home. If epilepsy affects the consciousness the patient should stop driving until, usually after a year of being seizure-free.

What issues in epilepsy and its treatment are of particular importance to young women

Many seizure drugs can keep birth control pills from working like they should, which can lead to an unplanned pregnancy. Other methods of birth control may be more effective in certain cases. Young women should also be careful about taking a multivitamin and extra folic acid because some epilepsy medications deplete the body of important vitamins, particularly folic acid.

Status epilepticus: emergency management

Stabilization of airway, breathing and circulation and termination of seizures are immediate goals. Intravenous benzodiazepines-diazepam is the first line drug recommended for termination of seizures. Diazepam infusion are useful for control of Refractory cases.