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Department of Biomedical Engineering

Course Name: 23BMT204 Biomedical Instrumentation

II Year : IV Semester

Unit III – Neurological Equipment

Topic : Epilepsy



Definition

- **“Epilepsy is a recurrent seizure disorder characterized by abnormal electrical discharge from brain, often in the cerebral cortex.”**

Or

- **“Epilepsy is a chronic seizures disorder with recurrent & unprovoked seizures.”**



Epidemiology

- **Agent factor:**
- Exposure to toxins, e.g. lead, infection & neurologic injury.
- Fever

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Cont...

- ❑ **Host factor:**
- ❑ Age: Most common onset of epilepsy is before the age of 20 years. It is higher during the first year of life & at the onset of puberty.
- ❑ Genetic factor (inheritance)
- ❑ CVA
- ❑ Birth hypoxia
- ❑ Brain tumor & abscess⁴
- ❑ Congenital abnormalities
- ❑ Trauma



Cont...

- ❑ **Environmental Factors:**
- ❑ Air pollution, i.e. carbon-mono-oxide & lead poisoning.
- ❑ Some factors or events may precipitate the seizures.
- ❑ Unskilled handling at the time of birth causing brain injury & birth asphyxia.
- ❑ Intrauterine infections.
- ❑ Emotional disturbances & environmental stressors.
- ❑ Drugs & alcohol intoxication.



Clinical Manifestations

- Clinical manifestation in epilepsy range from starting episodes to prolonged convulsions with loss of consciousness. The clinical manifestations vary according to the part of the brain involved.
- **Classification of seizures & related clinical manifestation:**
 1. Partial seizures
 2. Generalized seizures



Cont...

- ❑ **Partial seizures:** When seizures appears to result from abnormal activity in just one part of the brain.
- **Simple partial seizures:** They have elementary or simple symptoms & there is no loss of consciousness in this. The patient may experience only a finger or hand shake, mouth may jerk uncontrollably he/she may talk unintelligibly, may feel dizziness or may experience unusual or unpleasant sight, sound, odors or tastes.



Jacksonian epilepsy

- Organic lesion of the brain can cause local neurons to fire very rapid discharges. The rate exceeds approx. 1000per sec.
- When such waves of excitation spreads over the motor cortex, it causes progressive “March” of muscular contraction throughout the opposite side of the body. This called jacksonian epilepsy or jacksonian march (tingling or twitching begins in a small area & then march or spreads to the larger area of the body)



Generalized seizures

- ❑ **Generalized seizures (Grand Mal Seizures):**
Generalized seizures involve both the hemispheres of the brain. There is intense rigidity of the entire body, followed by alternate of muscles relaxation & contraction (generalized tonic-clonic contraction).
- ❑ There are following manifestation:

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➤ **Tonic phase:**

- Simultaneous contraction of the diaphragm & chest muscles which produce characteristic epileptic cry.
- Face may become pale, head turned to one side, eye fixed in one position & hands are clenched.
- Loss of consciousness. Tongue is bitten.
- Frothy discharge from the mouth.
- Ineffective breathing.
- Pulse becomes weak & irregular.
- This state may last for 30 seconds.

Vision Title 3



Cont...

- **Clonic phase:**
 - Jerky movement last for 1-2 minutes.
 - Incontinence of urine & stool.
 - The patient relaxes after jerky movements & goes into the deep sleep (coma) breathing is noisy.
 - This state lasts for 1-2 minutes.

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Petitmal epilepsy

Petitmal epilepsy is closely allied to grandma epilepsy.
It occurs in two forms

- i) Myclonic form
- ii) Absence form

Myclonic form

- **Symptoms** : Sporadic & Brief jerking movements usually on both sides of the body.
- In myoclonic form, a burst of neuronal discharges , lasting a fraction of second, occur throughout the nervous system.
- The person exhibits a single¹² violent muscular jerk involving arms or head. The entire process stops immediately , however the attack is over before subject loses consciousness



Absence type

Symptoms: Brief loss of consciousness (just few seconds) with few or no symptoms.

- It begins and end abruptly and might occur several times a day.
- It is characterised by 20s of unconsciousness, during which the subject has several twitch like contraction of the muscles, usually in head region
- There is a pronounced blinking of eyes, followed by return to consciousness and continuation of previous work