# NURS 821 Neurological Disorders

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Lecture 11

Part 6 CNS Disorders: Demyelinating Diseases and Seizure Disorders

## Multiple Sclerosis (MS)

- Definition: a relatively common disorder involving destruction of CNS myelin, with relative sparing of the peripheral nervous system
- Leading cause of neurologic disability in early adulthood, onset is usually between 20 – 40 years
- F=2x>M
- Caucasians are at greatest risk

## Multiple Sclerosis

Prevalence: highest in areas farther from the equator

Etiology: Unknown

Theories: relationship between MS and some environmental factor, most often viral that is encountered in childhood and, after years of latency evokes the disease; autoimmune response

- Risk follows individual even if they migrate to another region (provided they migrate after age 15)

Heredity: MS is about eight times more common in close relatives than in the general population

## Multiple Sclerosis

- **Precipitating factors**:
  - Infection
  - Trauma
  - Pregnancy
- **Clinical Features: I**nflammatory process limited to CNS. Lesion location determines clinical manifestations.

## Multiple Sclerosis Clinical Manifestations

- Fatigue, lack of energy, weight loss, and vague muscle and joint pains had been present several weeks or months prior to the onset of neurological symptoms
- May have a slow insidious onset and progression
- Or relapsing-remitting patterns of the disease (most likely to appear in patients who are less than 40 years old)

## Multiple Sclerosis

**Sensory disorders** – paresthesias may vary from one day to the next

**Visual complaints** – in 25% of patients

- Diplopia from brainstem lesions affecting the nuclei or fiber tracts of the extra ocular muscles and nystagmus
- Optic neuritis – loss of vision in one eye

## Multiple Sclerosis

**Spastic weakness of the limbs**

- Weakness of a limb on one side of the body or an asymmetric distribution in all four limbs is a common complaint
- May also c/o tired or heavy limb, foot drop, jumping leg, or spasms
- Reflexes may be hyperactive, and abdominal reflexes absent. These signs indicate involvement of corticospinal pathway

## Multiple Sclerosis

Cerebellar signs:

- Nystagmus
- Ataxia
- Intention tremors
- Balance disturbances
- Dysarthria

## Multiple Sclerosis

Bladder dysfunction:

- Lesions in corticospinal tracts may cause:
  - Hesitancy, urgency, frequency, are common and indicate a reduced-capacity spastic bladder
  - Acute retention and incontinence

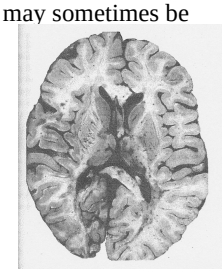
## Multiple Sclerosis

Disorders of mood:

- Many patients develop euphoria – this feeling is believed to be caused by involvement of the white matter of the frontal lobes
- Loss of memory, dementia

## Multiple Sclerosis

- MRI – Plaques may sometimes be visualized



## Epilepsy

- Definition: Brain disorder causing neurons to signal abnormally causing strange sensations, emotions, behavior, convulsions, muscle spasms, and/ or loss of consciousness
- Etiology: abnormal neuronal transmission or neurotransmitter (GABA) release resulting from:
  - Illness, brain damage, abnormal development or combinations of predisposing factors
  - Dietary linkage-ketogenic diet-high fat, low carbohydrates may prevent (NINDS,2000)
  - Exacerbations pre- and perimenses, adolescence, stress, sleep deprivation

## Seizure Disorders

- Relatively common
- 0.5% to 5% of the population have seizures
- Male > females
- Highest rate of onset during 1st year of life, declining toward adolescence, and gradually leveling off during remainder of life
- > 75% of epileptics have their first seizure before age 20

## Seizure Disorders

Etiology:

- A seizure is the result of excessive paroxysmal discharge from hyper excitable neurons (the epileptogenic focus)
- Can also arise from normal brain tissue under certain pathologic conditions

## Seizure Disorders

- The seizure itself is rarely damaging, but it can be a sign of a threatening disorder such as:
  - Metabolic derangement
  - Intracranial infection
  - Drug withdrawal
  - Drug intoxication
  - Hypertensive encephalopathy
  - Trauma

## Seizure Disorders Classification

1) Idiopathic, or essential epilepsy
   - No known cerebral lesion can be demonstrated
2) Symptomatic, or secondary epilepsy
   - Cerebral abnormality promotes the seizures response
   - Metabolic and nutritional disorder
   - Toxic factors
   - Encephalitis
   - Hypoxia
   - Neoplasm
   - Circulatory disturbances

## Seizure Disorders Pathophysiology

At cellular Level: certain biochemical phenomena characterize the epileptogenic focus
- Instability of the nerve cell membrane
- Hypersensitive neurons
- Polarization abnormalities
- Ionic imbalances that alter the environment of the neuron

## Seizure Disorders

- Metabolic changes
  - Increased metabolic needs
  - Electrical discharges of motor nerve cells increased
  - Cerebral blood flow is increased
  - Increased tissue respiration and glycolysis
  - Acetylcholine appears in CSF
  - Glutamic acid may be depleted

## Seizure Disorders Manifestations

- Depend on the location of the hyperexcitable neurons
- Seizure is manifested as any combinations of altered level of consciousness and disturbances in motor, sensory, or autonomic functions
  - Seizure may be isolated or repetitive

## Types of seizures

Partial (Jacksonian, or focal) seizures

- focus is often the temporal lobe
- Consciousness not generally impaired
- Focal onset – usually twitching of fingers or face, may progress to entire side
- Conscious but no recall of event
- Automatic purposeless movement (lip smacking, clapping hands)
- Mood changes
- Precipitated by music, blinking lights, etc.2. Generalized

## Types of Seizures

- Generalized Seizure
  - Characterized by the onset of bilateral, symmetric epileptic activity (not local)
  - These seizures include:
    - Absence, or petit mal
      - Bilateral, symmetric, and without local onset
      - Lapses of consciousness lasting seconds
      - May appear as a brief pause in conversation, a vacant stare, or rapid blinking of the eyes
      - Almost exclusively in children, may disappear at puberty or be replaced by tonic-clonic epilepsy

## Generalized Seizures (cont'd)

- Tonic-Clonic (Grand Mal)
  - Classic seizure of epilepsy
  - Generally preceded by an aura
  - Loss of consciousness
  - Generalized tonic and clonic muscle movement
  - May bite tongue, be incontinent of bladder and/or bowel
  - Mental confusion, amnesia of event

## Febrile Tonic-Clonic seizure

- Frequently referred to as "fever convulsions"
- Most common in children under 5 years Theory: caused by rapid onset of hyperthermia related to a viral or bacterial infection
- Short duration
- Familial predisposition
- In some instances seizure activity continues beyond early childhood and child may have nonfebrile seizures later in life