25 Spasticity

CNS

Sources:

Females slides

Hypertonicity

increased resistance to passive lengthening (passive stretch) of a muscle.

Spasticity

- **is velocity dependent:** the faster you stretch the muscle the greater the resistance
- associated with **the upper motor syndrome.**

When there is a **loss of descending inhibition** to brain stem excitatory centers (pontine RF+ vestibular):
Vestibulospinal & reticulospinal excitatory signals cause muscles to become overactive & spastic .

1- increase in tonic static **stretch reflexes (muscle tone)**

2- Exaggerated tendon jerks, resulting from **hyper-excitability of the dynamic stretch reflex**

Rigidity

- **is not velocity dependent**
- associated with **basal ganglia disease such as Parkinson's disease**
- present in both agonist and antagonist

Causes of Rigidity

1-Parkinsonism rigidity

a-Cog-wheel rigidity

feels the resistance rhythmically when applying a passive movement.

b-Lead-pipe rigidity

Lead pipe rigidity describes a **constant resistance where when moving a joint**

2- Decerebrate and decorticate rigidity

Decerebrate: extension of head & 4 limbs
Decorticate: extensor rigidity in legs & moderate flexion of arms if head unturned

Features of UMN Syndrome:

What actually happened in UMN syndrome?

- The gamma motor neurons **are free from** the descending inhibitory influence **(medullary RF, red nucleus, basal ganglia)**
- resulting **in unantagonized excitatory input (pontine RF, vestibular N)** to gamma motor neurons causing hypertonia & spasticity

(1) Weakness and decreased muscle control .
(2) No remarkable muscle wasting , but disuse atrophy
(3) Spasticity* & hypertonia (due to hyperactive gamma activity)
(4) Clonus Repetitive jerky motions (clonus)
(5) Exaggerated tendon jerks
(6) Extensor plantar reflex*
(7) Absent abdominal reflexes

Causes of spasticity:-A-(UMNs) syndrome include :

- (1) Cerebral palsy
- (2) Stroke
- (3) Spinal cord injury
- (4) Multiple Sclerosis
- (5) Acquired brain injury (trauma , etc)

- **" clasp-knife spasticity "= increased resistance at the beginning of muscle stretch due to increased extensor muscle tone then a sudden collapse in resistance due to inhibition of extensor motor neurons by GTOs (Golgi tendon organs)**
- **Babinski sign (dorsiflexion of the big toe and fanning out of the other toes)**

Cerebral palsy	**Caused by brain damage due to lack of oxygen, as that cause damage to the motor control centers of the developing brain** **- it can occur:** **1. during pregnancy** **2. during stressed childbirth** **3. after birth up to about age three by meningitis**
Multiple sclerosis	**-is an auto-immune demyelinating disease ,in which the body's own immune system attacks and damages the myelin sheath of myelinated nerves mainly of brain, SC ,and optic nerve** **• Loss of myelin sheath (demyelination) prevents axons from Saltatory conduction of action potentials causing muscle weakness & wasting.** **• Disease onset usually occurs in young adults, and it is more common in females .** **• The disease can attack any part of the CNS , and when it causes demyelination of descending motor tracts in the brainstem & spinal cord , the subject develops spasticity and other signs of UMNS.** **• The disease frequently remits and relapses because of remylination & restore of function** **Treatment: intravenous corticosteroids can improve symptoms**

Stroke	**Causes :** **a-Haemorrhagic stroke as in cerebral hemorrhage** **b- Ischemic stroke as in thrombosis or embolism in brain** **-Both cause death of brain tissues results in paralysis in the opposite half of the body.** **• A lesion in Corona Radiata on one side can cause Monoplegia in a contralateral limb (UL or LL ,according to site).** **• A lesion in the Internal Capsule on one side may cause Hemiplegia or Hemiparesis on the contralateral side**

Stages of complete transection and hemisection of spinal cord has been explained in UMN and LMN lesions lecture

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CNS Block