



كلية الطب البشري
Faculty of Medicine

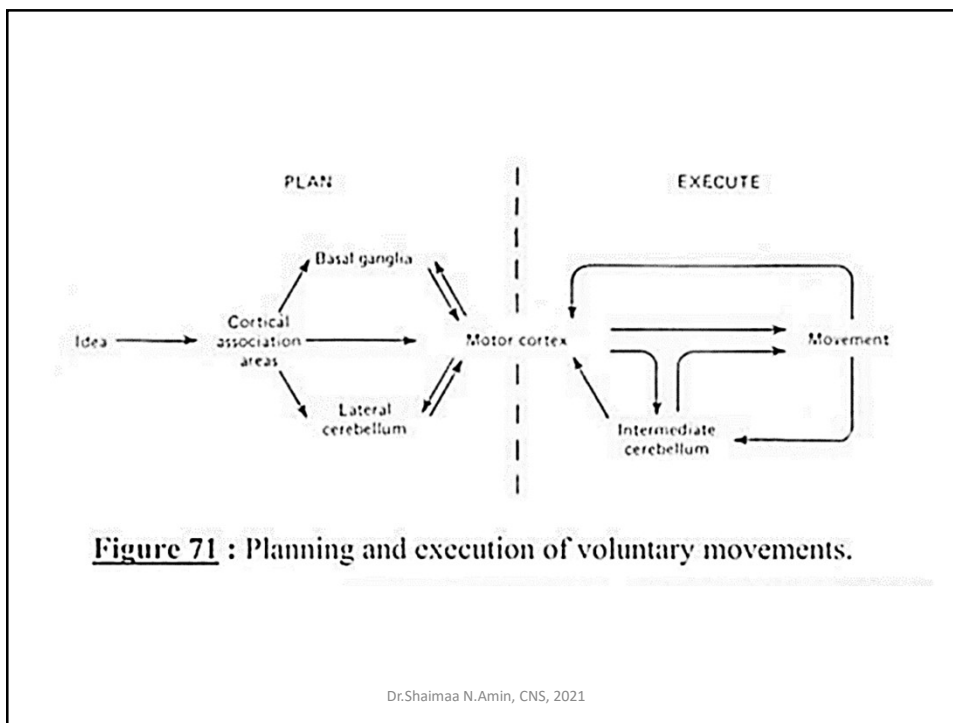


CNS Module-Spring 2021 Physiology Lectures

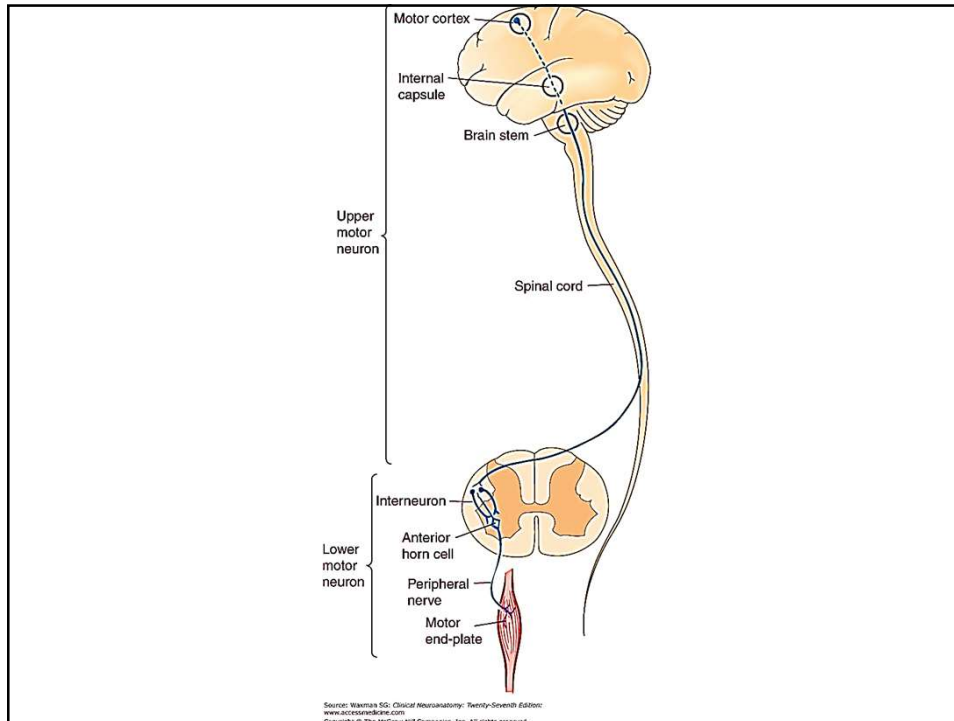
Topic 6-Lecture 13&14 UMNL&LMNL

Presented by:
Dr.Shaimaa Nasr Amin
Associate Professor of Medical Physiology

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	PYRAMIDAL SYSTEM	EXTRAPYRAMIDAL SYSTEM
Origin	Cortical only	Cortical (much wider) and extracortical
Tract	Mononeuronal	Multineuronal
Pathway	Direct activation pathway	Indirect activation pathway
Crossing	About 90%	About 50 %
Termination	Cranial nerve nuclei and alpha neurons in the spinal cord	Alpha and gamma neurons in the spinal cord only (not at the cranial nuclei)
Location	Medullary pyramids, and in lateral column of spinal cord mainly	Outside the medullary pyramids, and in lateral and ventral columns of spinal cord
Time of function	Only after the first year of life	During and after the first year of life
Function	Initiates fine skilled voluntary movements and increases the muscle tone	Initiates gross and associated movements, decreases the muscle tone and controls autonomic functions

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Upper and Lower motor Neuron lesion

1. Cause
2. Paralysis
3. Muscle tone
4. Tendon reflexes
5. Superficial reflexes.
6. Muscle wasting

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Cause:

- Cerebrovascular accidents (strokes) **due to :**
- 1- hemorrhage or
 - 2- thrombosis
- in the posterior limb of the internal capsule.
- There is damage of both pyramidal and extrapyramidal fibres.

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Cause:

Is due to :

- 1- lesion of the lower motor neurons as in poliomyelitis.
- 2- damage of motor nerves e.g. diabetes mellitus, and alcoholism.

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Characters

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1. Paralysis:

Occurs on the opposite side of the body i.e. contra lateral hemiplegia.

It is widespread affecting lower half of the face, upper limb and lower limb.

Recovery is poor

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1. Paralysis:

Occurs in the muscles supplied by the affected segment only e.g. muscles of the limb only, on the same side of the lesion.

Recovery may occur.

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2. Hypertonia

The paralyzed muscles show increased tone of the spastic type. (**Clasp Knife Type**).

Hypertonia is due to ???

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2. Hypotonia or atonia:

- The paralyzed muscles show decrease or loss of tone, referred to as flaccid paralysis.
- Hypotonia is due to interruption of the stretch reflex.

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	Gamma rigidity	Alpha rigidity
Cause	Increased gamma discharge	Increased alpha discharge
Muscles affected	Antigravity muscles	All muscles
Resistance to movement	Uni-directional	Bi-directional
Type of rigidity	Clasp-knife	Lead-pipe or cogwheel
Effect of velocity	Increases with velocity	Not velocity-dependent
Tendon jerks	Exaggerated and clonus may also be present	Not necessarily exaggerated
Common diseases	Upper motor neuron lesion and decerebrate rigidity	Parkinsonism

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Clasp Knife spasticity



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3. Exaggerated Tendon Reflexes.-

- Deep reflexes are exaggerated on the affected side .g. exaggerated knee jerk and ankle jerk, and are due to the release of the stretch reflex from cerebral inhibition.
- Clonus is present (see before).

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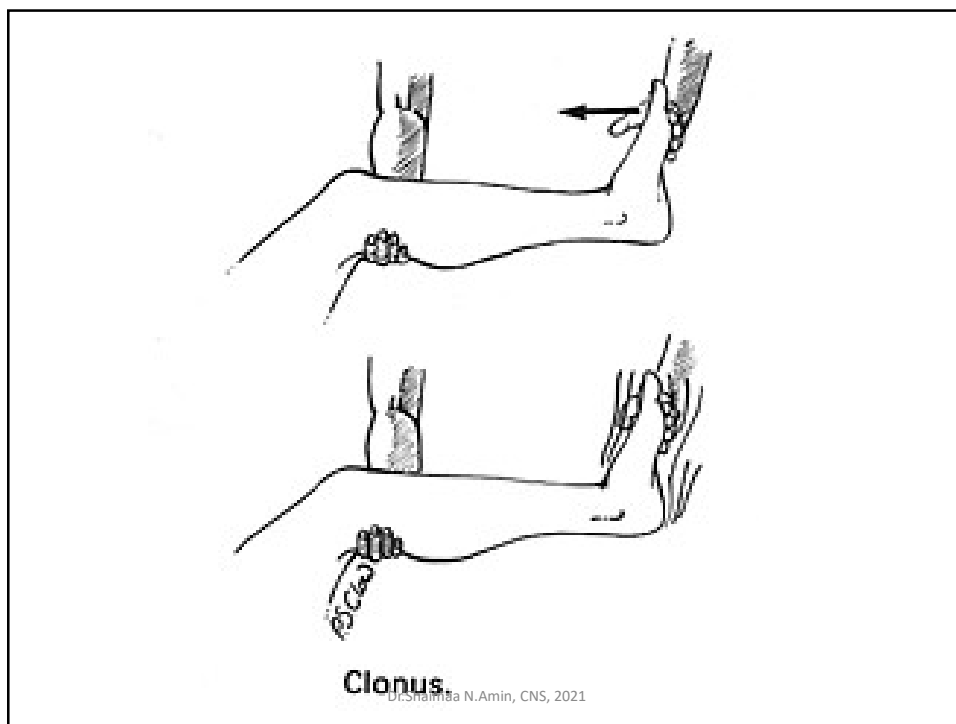
3. Absent Deep Reflexes.

This occurs in the muscles supplied by the affected segments or motor nerves.

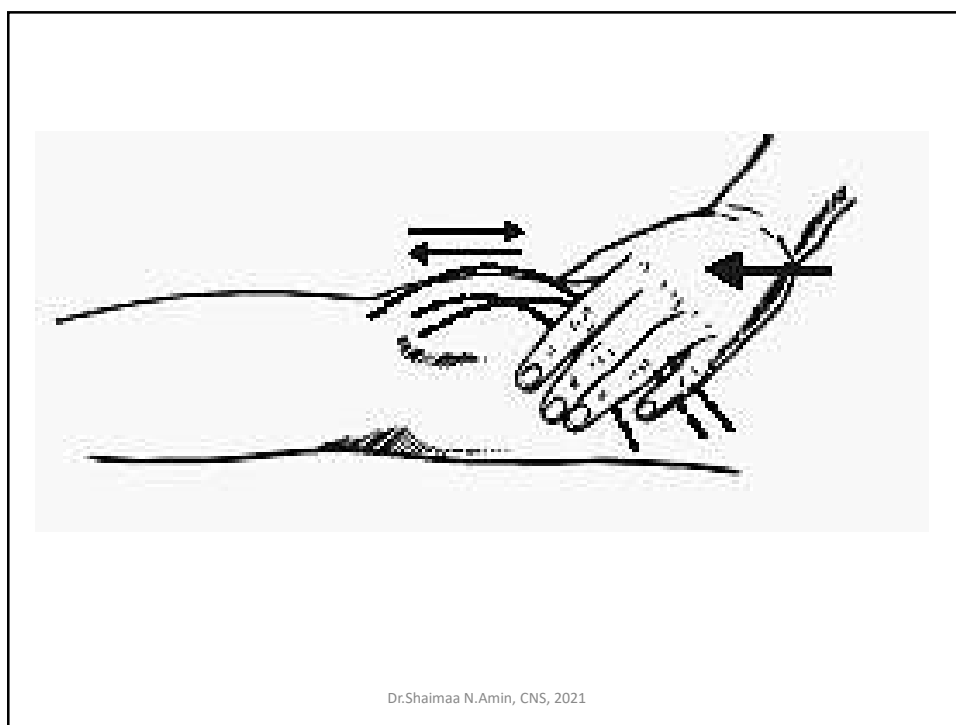
Have you done Jendrassik maneuver before reporting areflexia??

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Ankle Clonus



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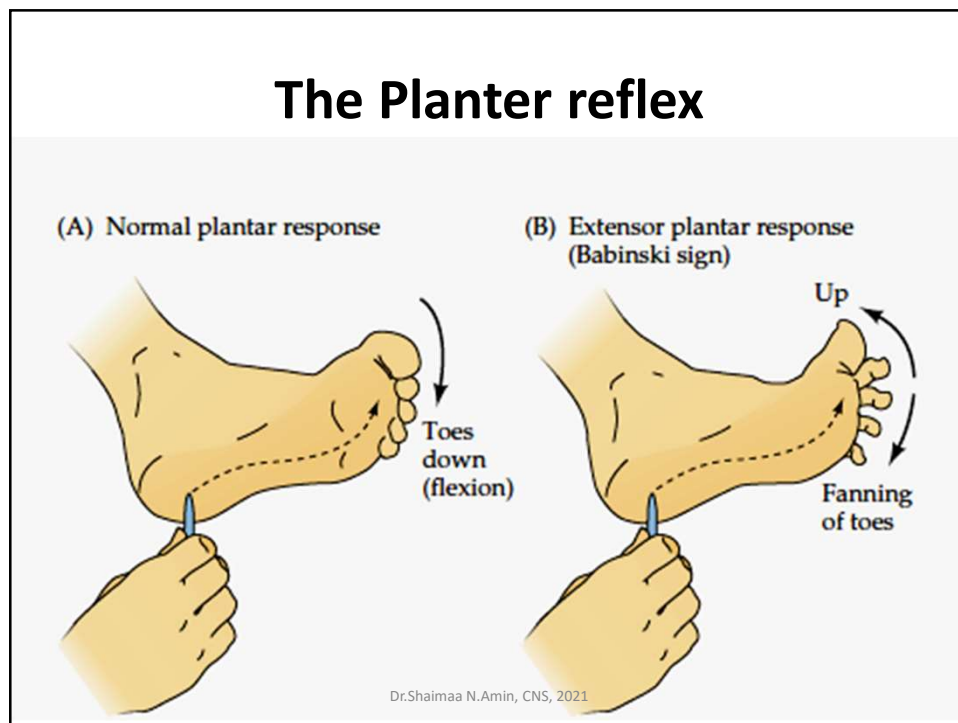
Figure 1-33 Dr.Shaimaa N.Amin, CNS, 2021
The Jendrassik maneuver.

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<u>UMNL</u>	<u>LMNL</u>
<p>4. Loss Of Superficial Reflexes</p> <ul style="list-style-type: none"> Occurs on the affected side, due to loss of supra-spinal facilitation. plantar reflex becomes extensor, known as a positive Babinski's sign. 	<p>4. Loss Of Superficial Reflexes</p> <p>Seen in the affected segments only.</p>

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<p style="text-align: center;"><u>UMNL</u></p> <p style="text-align: center;"><u>5. Absence Of Significant Muscle-Wasting :</u></p> <p>This is because :</p> <ol style="list-style-type: none"> 1- paralyzed muscles are still innervated and can contract reflexly. 2- Also spasticity saves them from disuse. 	<p style="text-align: center;"><u>LMNL</u></p> <p style="text-align: center;"><u>5. Marked Muscle-Wastin) :</u></p> <p>The affected muscles show marked atrophy <u>due to</u> the inability of the muscles to contract neither reflexly nor voluntarily.</p>
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Cervical Spine Injury: Flexion and Flexion-Rotation

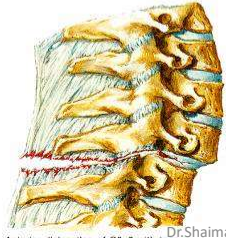
Mechanism



Head-on collision with stationary or moving object. Occupant not restrained by seat belt; head strikes steering wheel, windshield or roof. Head hyperflexed on trunk.



Blow to back of head from falling against hard surface when balance is compromised



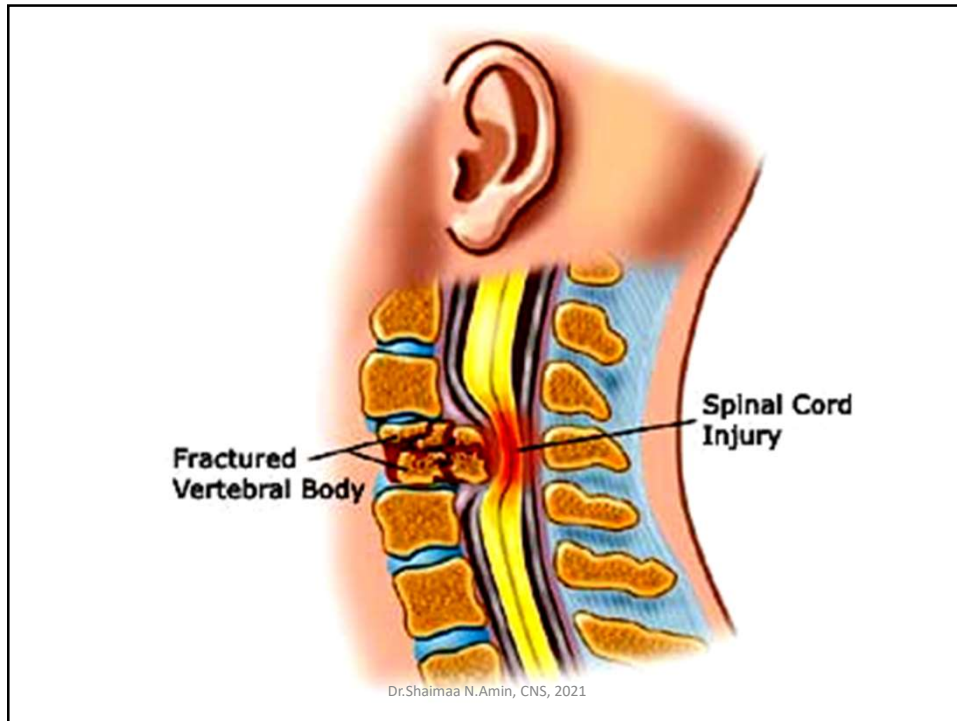
Anterior dislocation of C5-6 with tear of intervertebral ligament, facet capsules and posterior fibers of intervertebral disc.



X-ray film (lateral view) showing bilateral interfacet dislocation at C5-6

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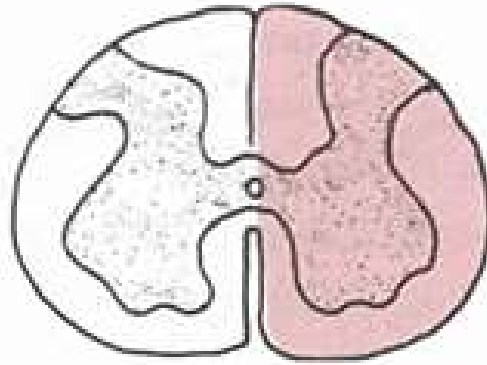


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Hemisection of the spinal cord

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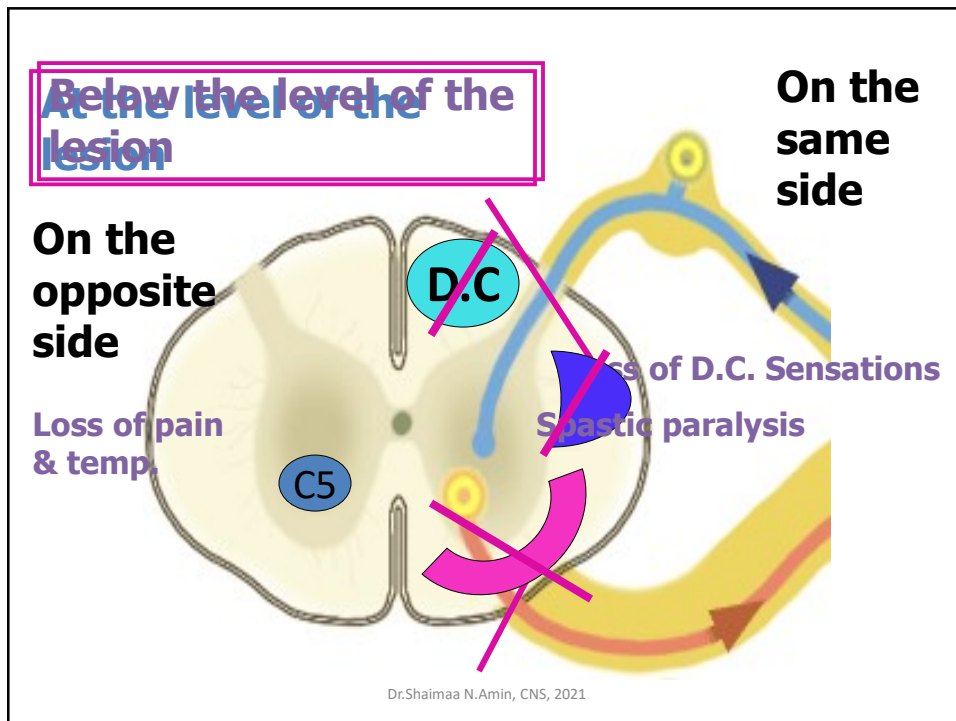
Brown Sequard Syndrome (Hemisection of the spinal cord)



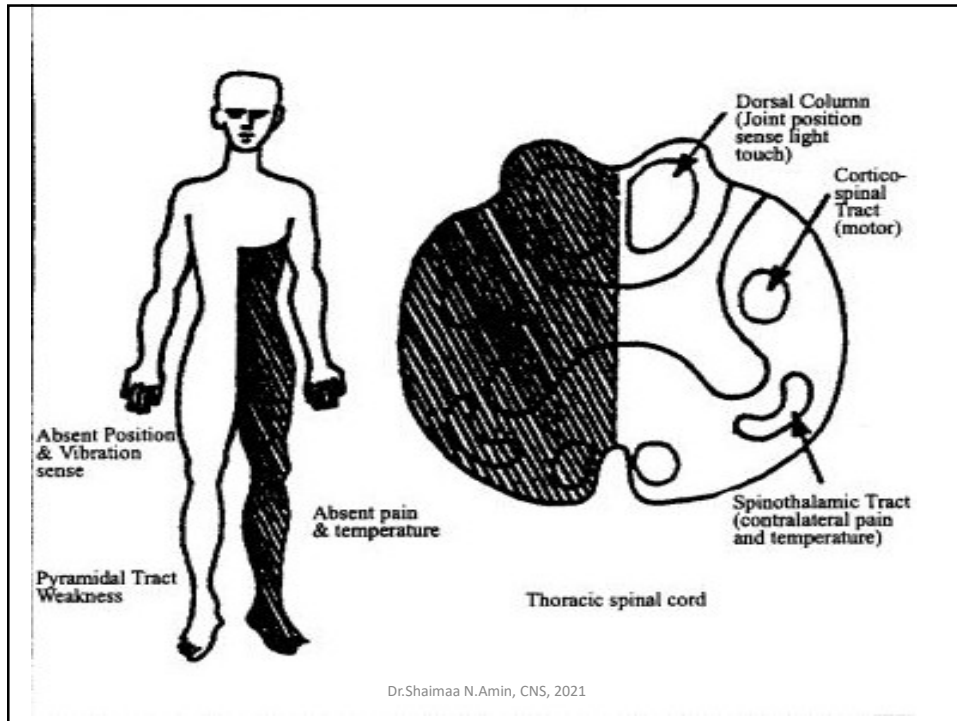
Spinal hemisection

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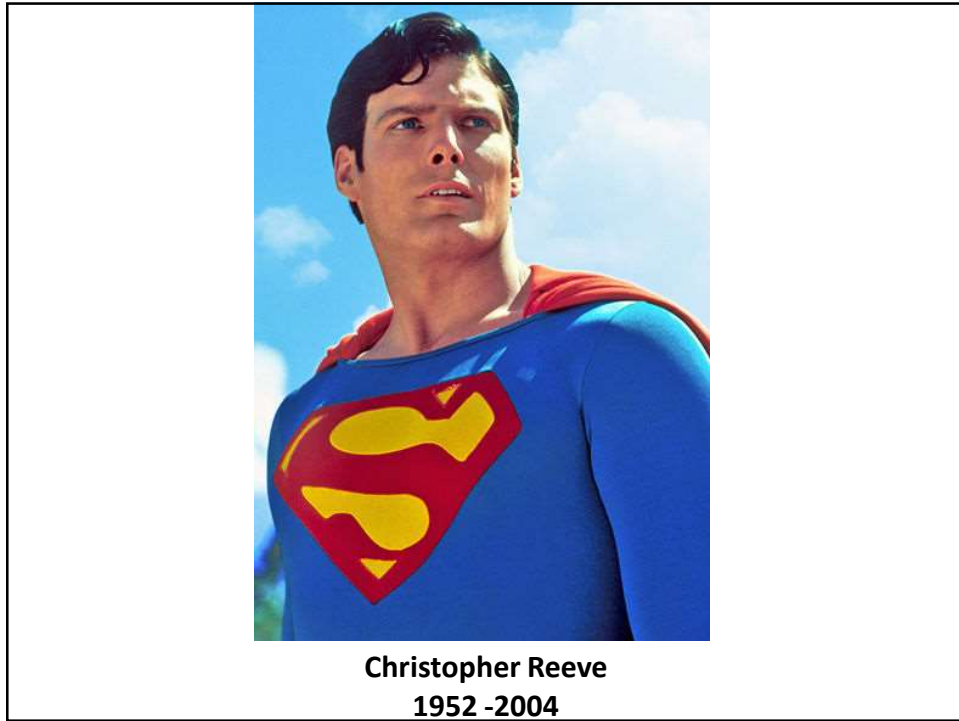
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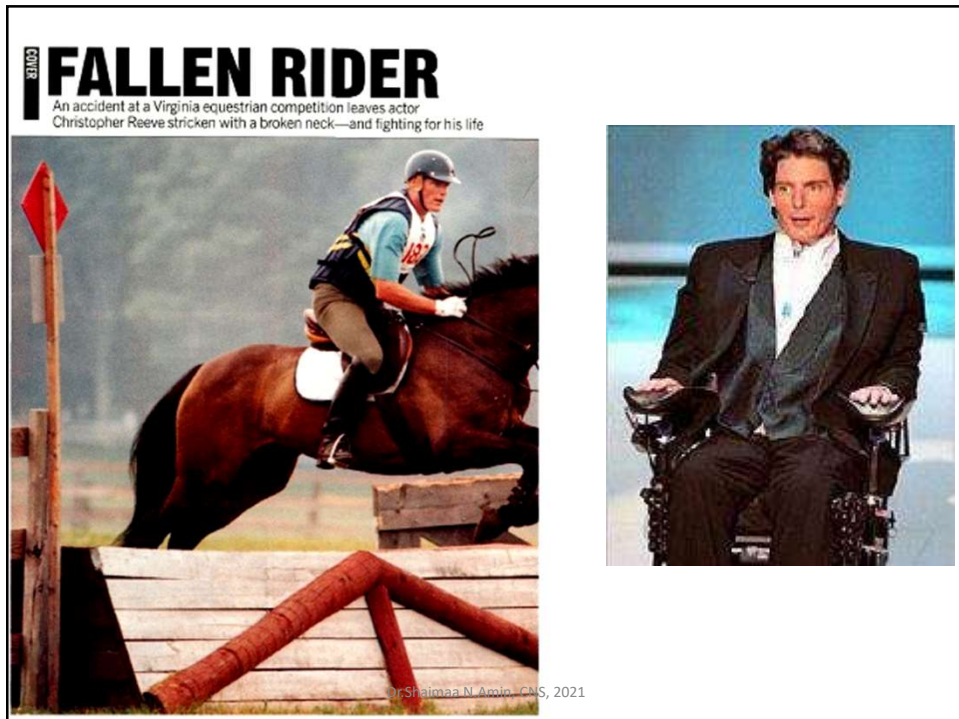
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Complete transection of the spinal cord

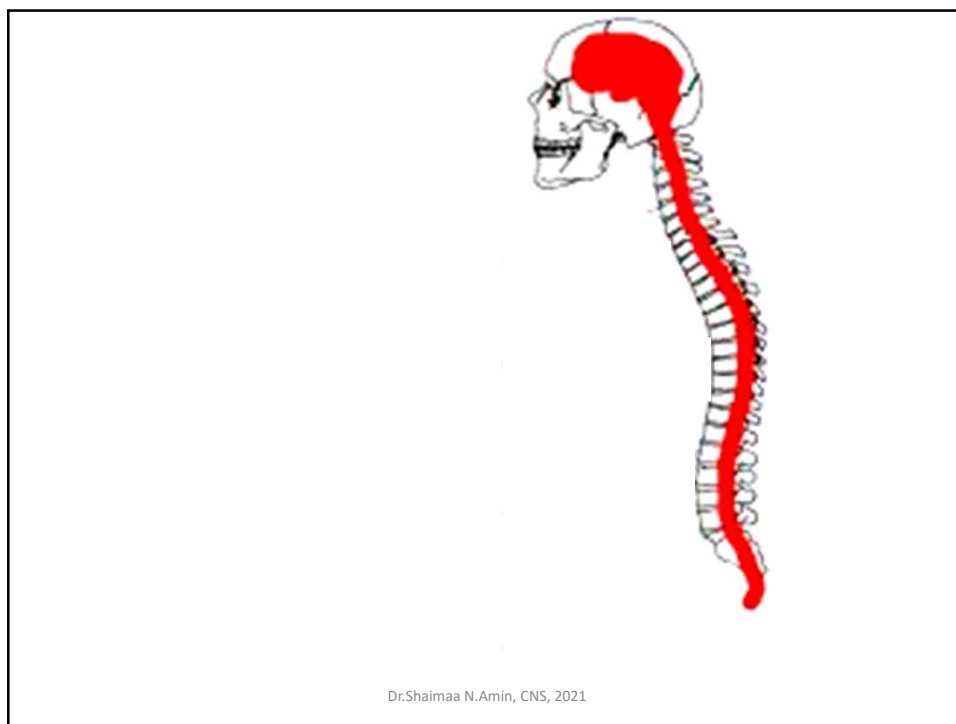
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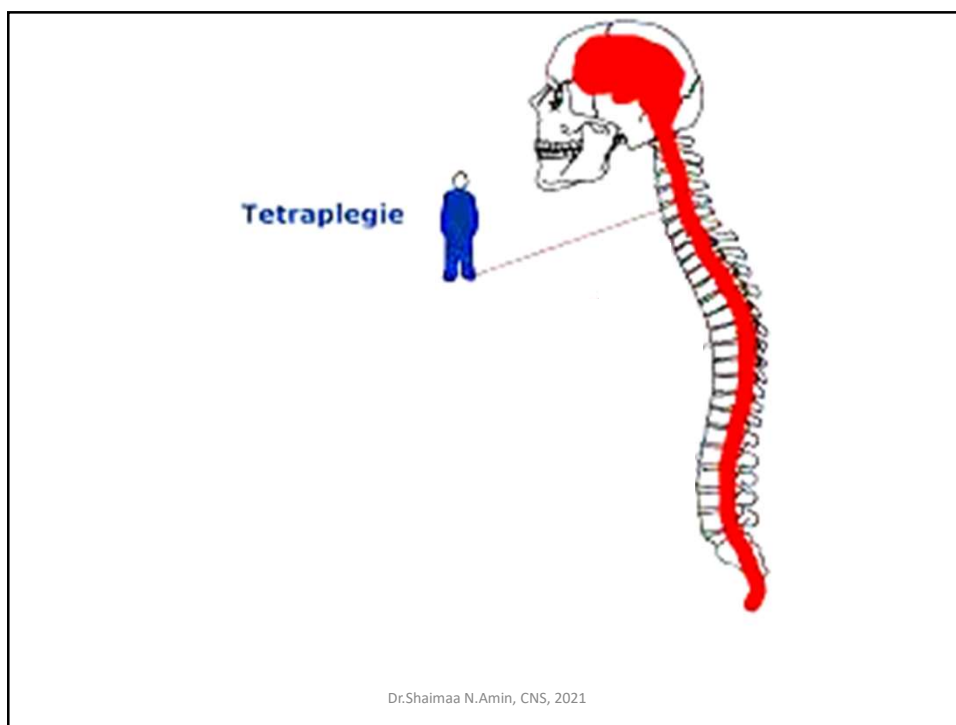
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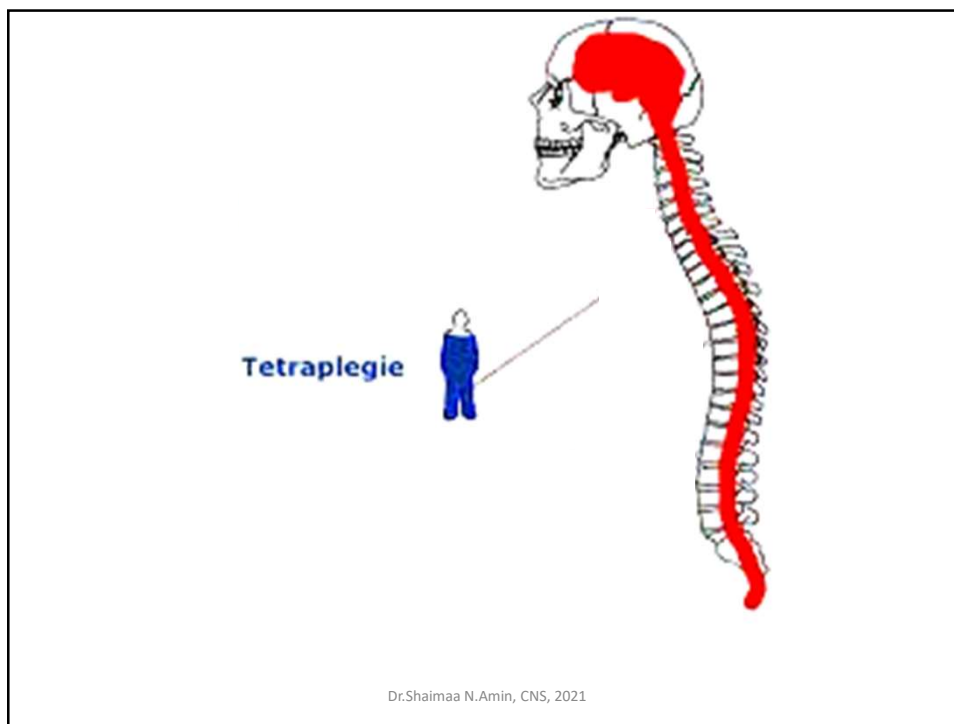
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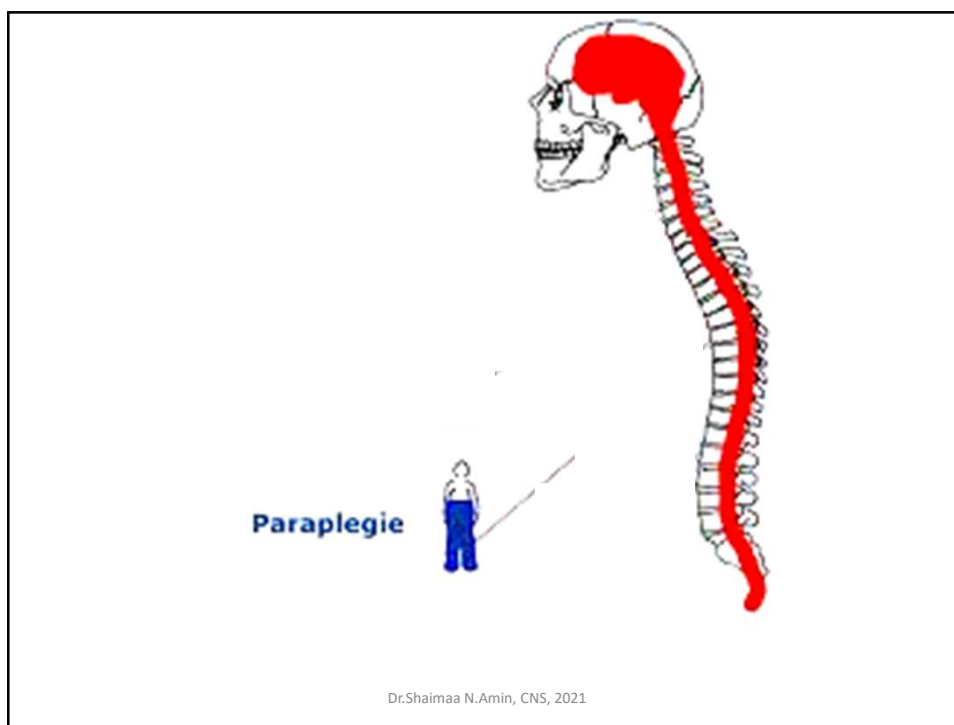
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Stages after spinal cord lesion

A. Stage of spinal shock

B- Stage of recovery of reflexes

C- Failure of reflex activity (rare) .

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A -Stage of recovery of spinal shock

Duration of spinal shock

- Varies in duration depending on the degree of encephalization .
- Usually occupies a period of 2-6 weeks in human. (human>dog>cat>rat>frog).

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Characterized by the following features, all of which occur below the level of the lesion:

- 1- Loss of all reflexes (superficial, deep and visceral).**
- 2- Permanent Loss of all sensations .**
- 3- Permanent Loss of all voluntary movements.**

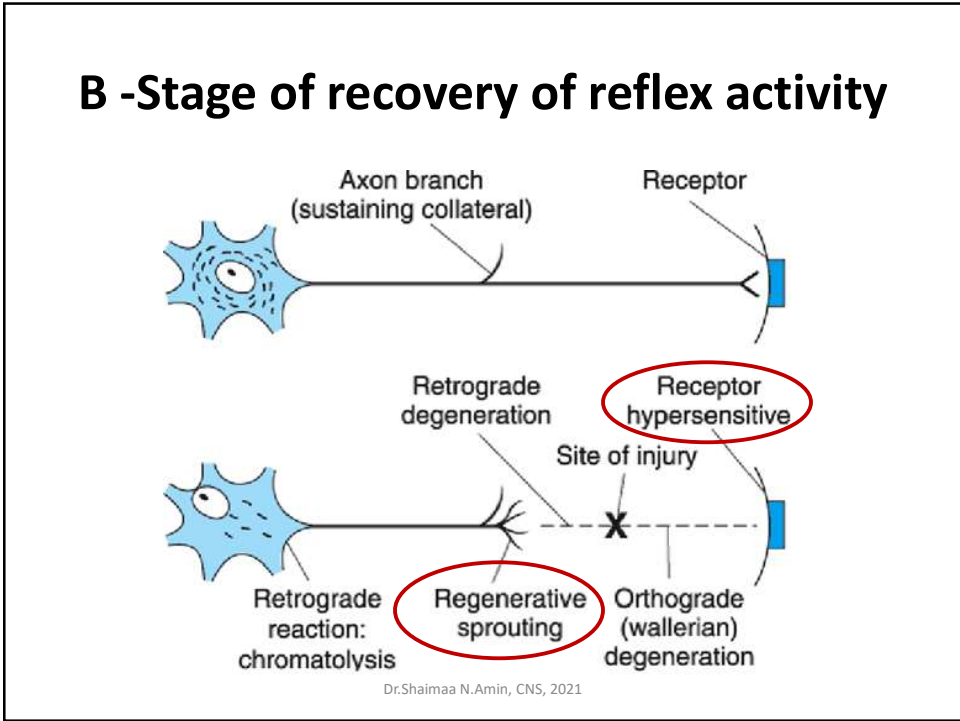
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Micturation reflex: Retention with overflow

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2- Return of spinal reflexes :

a- Flexor reflexes return earlier than extensor ones.

Planter reflex ? +ve Babinski sign ???

Normal planter reflex	Extensor planter reflex (Babinski's sign)

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3- Return of visceral reflexes

automatic evacuation, **but** voluntary control over micturation and sensation of bladder fullness are **permanently lost**.

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4- Mass reflex

A minor painful stimulus to the skin of the lower limbs will cause:

- 1- Flexion withdrawal of the limb.**
- 2- Evacuation of the bladder and rectum.**
- 3- Sweating of the skin.**
- 4- Rise of blood pressure.**

intentional mass reflex → MICTURATION & DEFECATION

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5- Sexual reflexes

Genital manipulation produces :
erection and even ejaculation.

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Patients can be rehabilitated by proper
management and can them enter into a more
advanced stage of recovery

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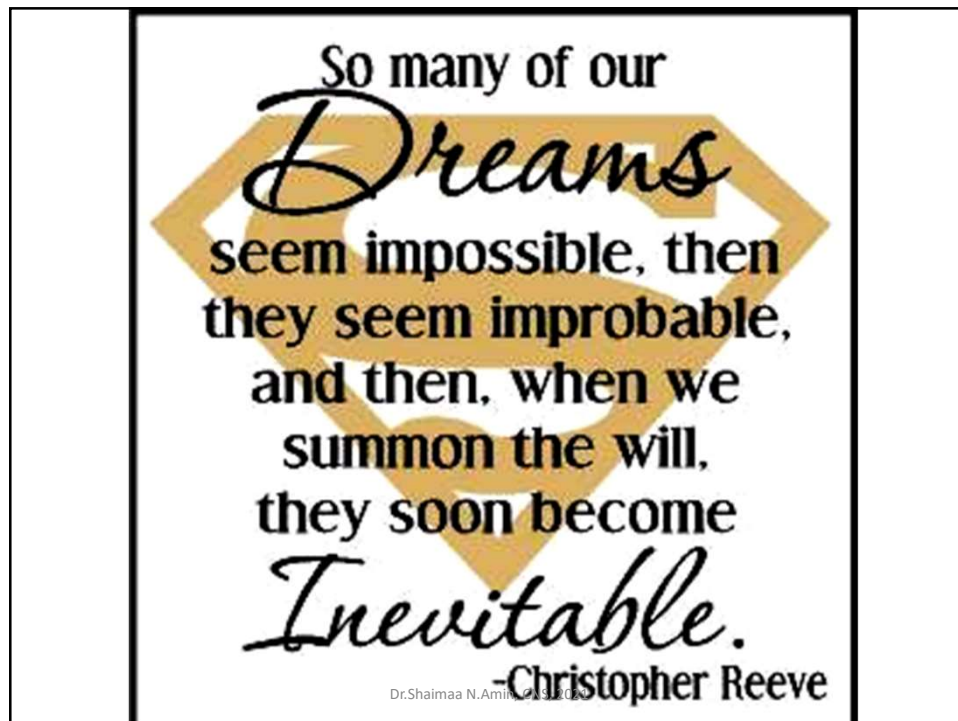
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Advanced stage OF Recovery

- 1- The tone in extensor muscles gradually returns and becomes greater than in flexors "paraplegia in extension".
- 2- Positive supporting reflex becomes well developed and the patient can stand without support. (But he will never walk).

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