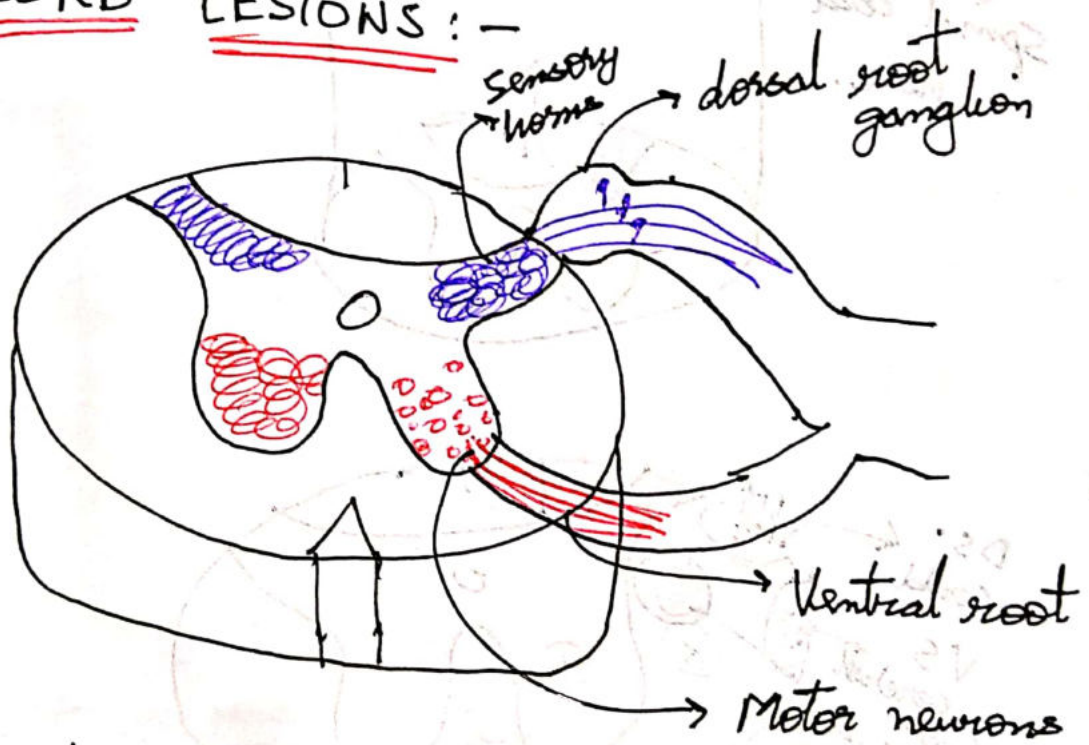
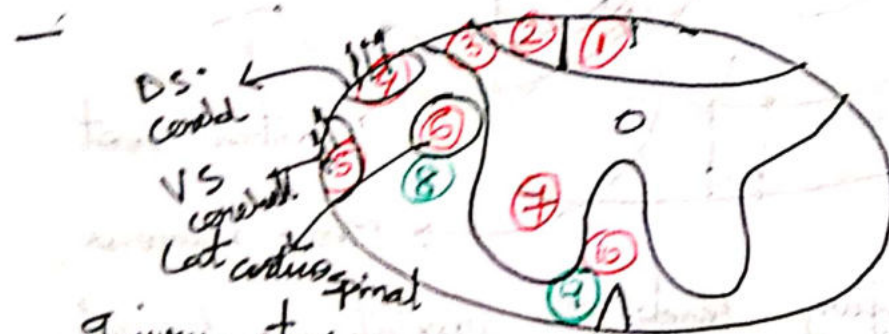
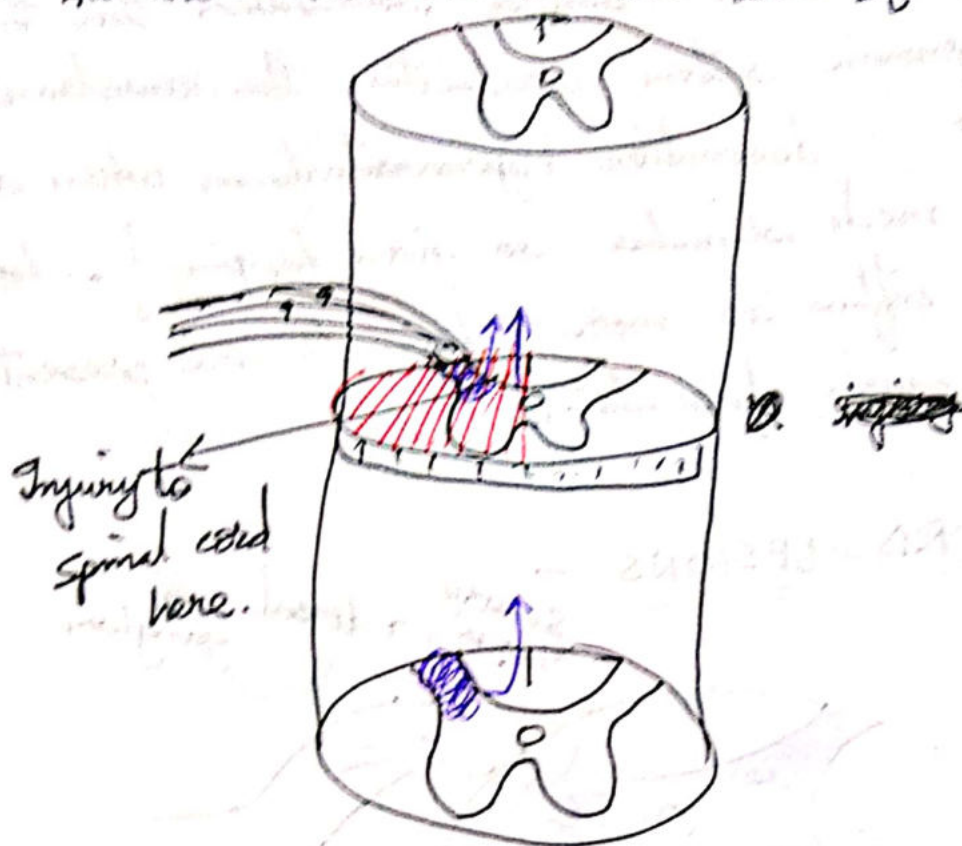


SPINAL CORD LESIONS :-



- Fasciculus gracilis injury leads to ipsilateral loss of
 - ① 2 pt discrimination
 - ② Sense of position
 - ③ " " vibration
 - ④ " " fine touch
- Fasciculus cuneatus injury leads to ipsilateral loss of these senses from upper part of body.

(2) All the sensations at the level of lesion are lost



- Injury at 1 - loss of dorsal column sensation from lower part ipsilaterally below lesion
- Injury at 2 - loss of DC sensations from upper part ipsilaterally below lesion
- Injury at 3 - All sensations at the level of lesion are lost ipsilaterally

Injury at 5 :- Ipsilateral lower limb dysfunction
contralateral lower limb dysfunction

Injury at 7 :- Ventral horn neurons injured - lower motor neuron lesion at level of lesion

Injury at 6 :- upper motor neuron lesion in lower parts ipsilaterally.

In the spinal cord whenever a particular area is injured the level of ~~the~~ injury shows hyporeflexia or areflexia and flaccidity, while below the injury there is hyperreflexia & spasticity.

Value of knee jerk - L2, 3, 4

Ankle jerk - S1

Injury at 8 :- Ascending ^{Lat} spinothalamic tract affected
Pain & temp sensations lost on contralateral side.

Injury at 9 :- Ant spinothalamic tract affected
Contralateral crude touch sensations are lost.

loss of Pain & Temp - reg :- syringomyelia
central canal dilates anteriorly

Motor Lesions

①



Lesion in Anterior horn

Polio myelitis

- This is motor lesion
- lower motor neuron lesion
- Causes :-

1.) Virus - Polio virus [Polio myelitis]

- Clinical features - purely motor - LMNL
severe loss of muscles and power
Hypo reflexia, hypotonia, fasciculations

②



Patient is infantile
and family history of such
lesions is there

Herdig Hoffman disord

- Inherited disorder
- Lesion of Anterior horn
- Progressive Infantile muscular atrophy



Kugelberg Walander dzg

- Similar to 2nd but clinical manifestations appear at relatively older age - 3-10 yrs
- Juvenile hereditary lower motor neuron disease

(4)



Hereditary spastic Paraplegia

- Bilateral degeneration of corticospinal pathways
- Hereditary is family history
- degeneration can be before or after demyelination
- Upper motor neuron type lesion

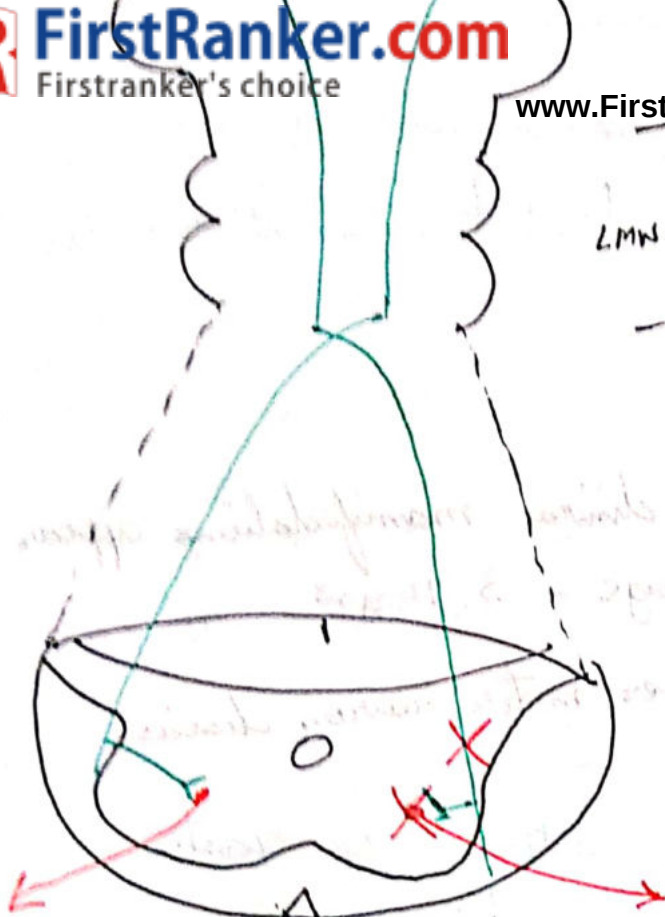
- Spasticity
- Clonus
- Hyperreflexia
- Babinski's sign upgoing

spastic paralysis.

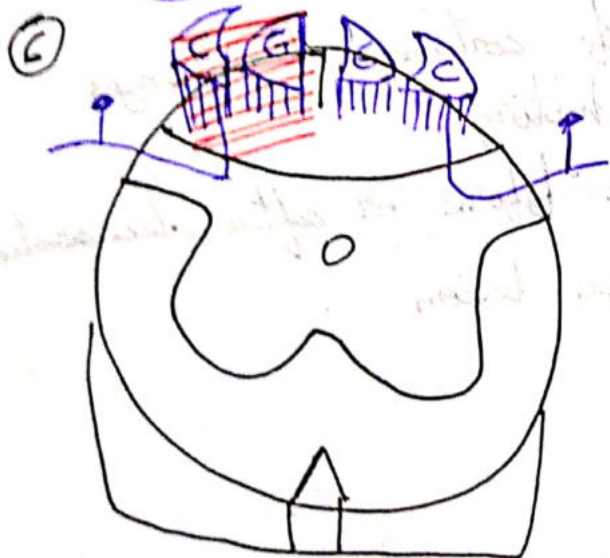
Motor neuron disease

LMN - Atrophic lateral sclerosis → UMN

- lower motor as well as upper motor neuron lesion manifestations are seen



Sensory lesions



- Lesions in Fasciculus gracilis and F. cuneatus of rt side

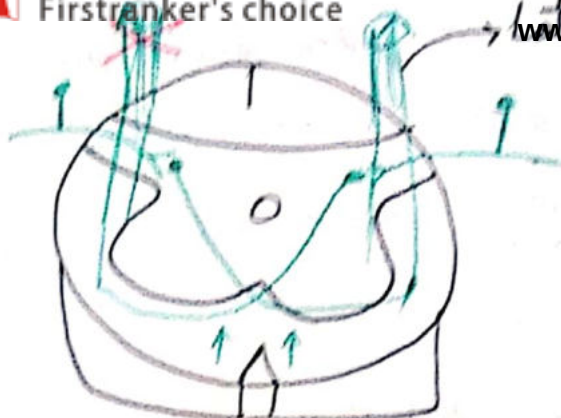
- Ipsilateral dorsal column sensations - lost

- If such lesions are bilateral - below the lesion there is bilateral loss of dorsal column sensations

Dorsal column syndrome

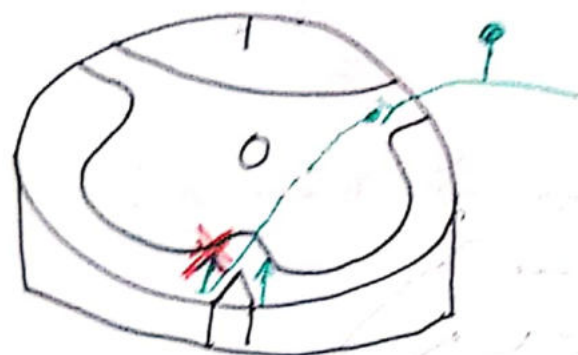
- But Anterolateral sensations remain intact
- Major cue to CNS for proprioception is lost

①



- If lesion is unilateral - contralateral loss of pain & temp senses one segment below the lesion.

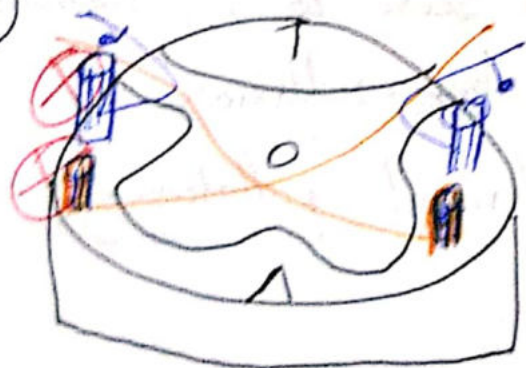
②



Loss of Ant. spinothalamic tract
- contralateral loss of crude touch & 4-5 segments below the lesion.

Note :- Lateral pathways cross obliquely
Anterolateral fibres obliquely slightly go upwards and then cross.

③



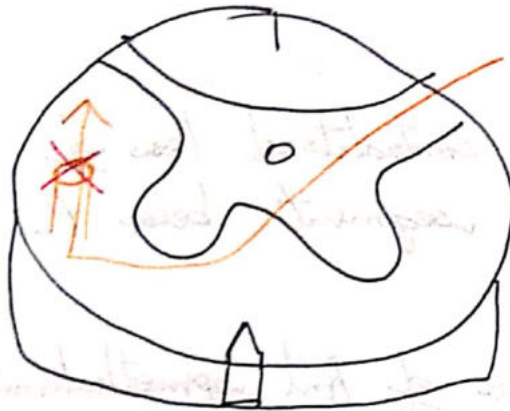
Rt lower limb dystonia

Blue - dorsal spinothalamic
orange - ventral

If there is lesion in dorsal spinothalamic tract
→ ipsilateral loss of coordination of lower limb movements.

Note :- Even the same type of information is ascending thru dorsal & ventral spino-cerebellar pathways but they are not carrying same amt of info.

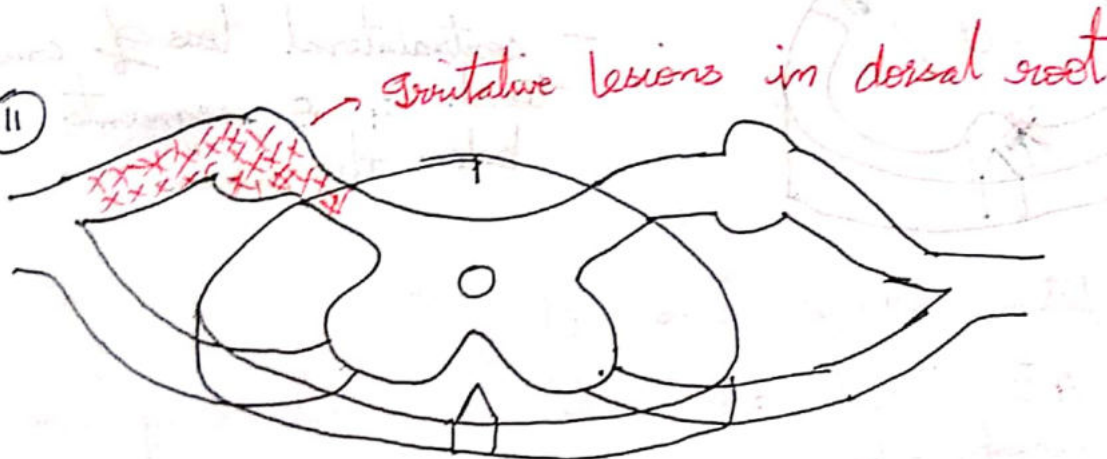
(10)



Ventral spino-cerebellar

Contralateral lower limb dystonia.

(11)

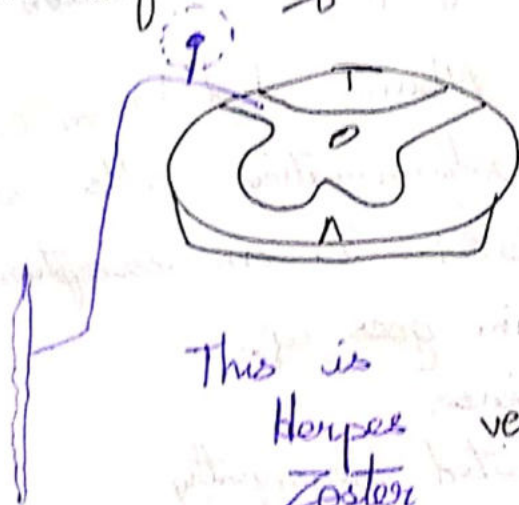


- In a particular dermatome there is hyperaesthesia and hyperalgesia, even hyperreflexia
- All sensations are enhanced pathologically in that dermatome.



- There is complete deafferentation.
- There is loss of all Anterolateral & dorsal column sensation of the particular dermatome.
- There is loss of reflexes.

(13) Viral infection of dorsal root ganglia - Acute inflammatory



This is
Herpes
Zoster

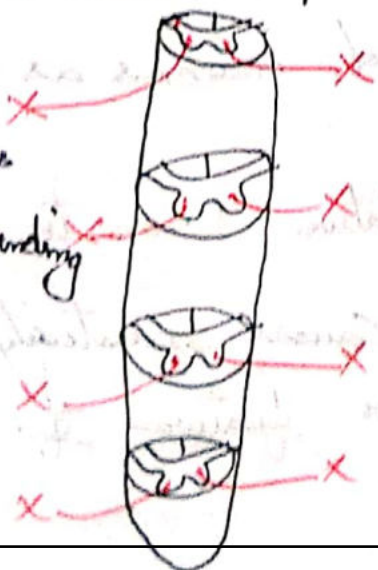
Involves specific dermatome
Most commonly involves
T5 - T10

Produces pain, itching,
burning sensation with
vesicular ~~vesicular~~ eruption,
Hyperalgesia.

(14) G.B syndrome - post infectious polyneuritis

Progressive
demyelination
which progresses
upwards - ascending
paralysis

Motor neurons
most affected



Most of the patients have
history of respiratory
infection, GI infection

Antigens of microbes
similar to antigens
associated with schwann cell
Antibodies may act against
schwann cells.

- Non recurring disease.
- Does not involve CNS
- Inflammatory cells do not enter sub arachnoid space in significant number but some proteins may enter.
- In CNS diseases - Protein levels in CSF goes up
- GBS - Albumino Cytological dissociation

Note :- Whenever Albumin lvl $\uparrow$ in CSF the lvl of inflammatory cells also $\uparrow$ but GBS is an exception only albumin goes up.

⑮ Charcot Marie Tooth disease

- Most common inherited neuropathy
- Peroneal Nerve is most commonly involved
- It may involve anterior motor horn cell.
- Can involve dorsal columns as well.

⑮



irritative lesion to Anterior root
 $\hookrightarrow$ Causes spasticity without other features of UMN lesion

side - from here it starts protruding
They may irritate the rest of

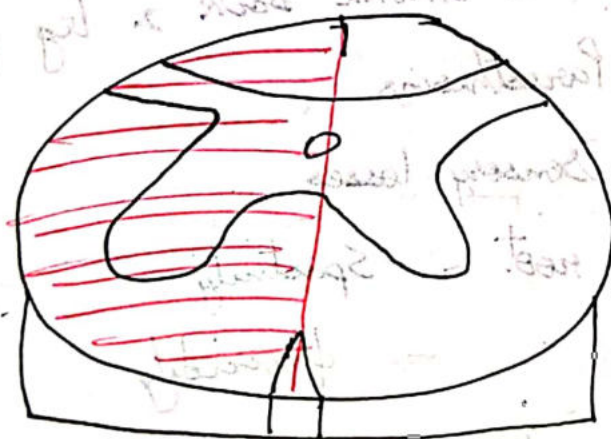
- Clinically, most commonly found around C_6 and $L_5 \rightarrow 90\%$
- Initially the herniation may irritate the roots but if this condition is prolonged - damages the roots
- Irritation of roots - spinal nerve root symptoms
 - ① Severe chronic back & leg pain
 - ② Paresthesias
 - ③ Sensory losses
- Irritation of root - Spasticity
damage .. - flaccidity

⑫ Osteophytes or vertebra becomes improperly calcified
- Most common in amphibians

- Most common in cervical region
- Cervical spondylosis with myelopathy
- These abnormal bones press spinal cord & spinal nerve roots.
- Most common myelopathy - Pathology of spinal cord

- Complaint of stiff neck, arm pain, weakness of arm if prolonged.
- If the osteophytes becomes too advanced they may interrupt corticospinal pathways to legs
legs - UMNL type symptoms
arms - LMNL "
- Bony osteophytes or calcified disks compress the nerve roots & spinal cord.

(19) Hemisection of Spinal cord - Brown Sequard Syndrome



- Ipsilateral loss of dorsal column sensations
- Ipsilateral lower limb dystonia due to dorsal spinocerebellar tract
- Contralateral lower limb dystonia due to Ventral spinocerebellar tract.
- Lat Spinothalamic ^{contralateral} loss of Pain & Temp 1 segment below lesion

- LMNL type of lesion at the lvl of hemisection.
- All sensory input lost at the lvl of lesion
- Complete Anaesthesia at the lvl of lesion
- contralateral anterolateral sensations lost below lvl of lesion.
- If T₁-T₂ are involved - ipsilateral horner's syndrome.

20) Complete section of Spinal cord

If C₁-C₂-C₃ are sectioned - Exitus letalis
Death may occur.

21) Complete transection :- C₄-C₅
Patient have quadriplegia

22) Below T₁ complete transection

Spastic paraplegia - lower limbs UMNL

Note:- Complete transection also causes

- Complete Anaesthesia below lesion
- Spastic paralysis below lesion
- Visceral muscles also affected - urinary & fecal incontinence with reflex emptying
- Anhidrosis loss & loss of Vasomotor tone below lvl of lesion



- Infarction of Ant $\frac{2}{3}$ rd of SC but sparing of dorsal columns & dorsal horn.
- At lvl of lesion - LMNL
- Below " " " - UMNL
- Bilateral loss of Anterolateral senses below lvl lesion.
- Bilateral dystonia
- If lesion $T_1 - T_2 \rightarrow$ Horner's syndrome.

24) ② Epidural syndrome
Lesion at tip of conus medullaris.

$S_3 - C_6$

25) ③ Epidural syndrome :- $L_4 - S_2$

26) ① Filum Terminale syndrome

- Filum becomes thickened - spinal cord is
 $\hookrightarrow$ unduly pull lower part of SC tethered

27) ④ Cauda Equina Syndrome

Bilateral foot deformities

- 25 ⇒ Conus syndrome ← due to intramedullary tumour
or metastasis
or hemorrhagic infarct.
- Paralytic bladder
 - Males - impotence
 - Bilateral sensation loss and anogenital signs
 - ★ lower limbs are spared

- 26 ⇒ Epidural syndrome
- All symptoms of conus syn + lower limbs are also affected
 - ★ Rectum & Bladder can reflexly evacuate.

- 27 ⇒ Cauda equina syn
- unilateral lesion
 - sphincters not affected
 - lower limbs - sensory & motor problems.

- 28 Sub acute combined degeneration
- Chronic deficiency of Vit B-12
 - Both Asc & descending tracts invol.
 - demyelination of fibres
 - Gray matter spared
 - Dorsal column sensations may be lost
 - Dystonia ← dorsal cerebel - ipsi
Ventral Cerebel - contra

- Outcoming & Incoming fibres from cerebellum disturbed
- Abnormal protein called prion is prod
- This is made due to trinucleotide repeat (1) GAA
- Reduced lifespan of Purkinje cells
dentate nucleus may degenerate
Spinocerebellar pathways may degenerate.

(30) Syringomyelia :-

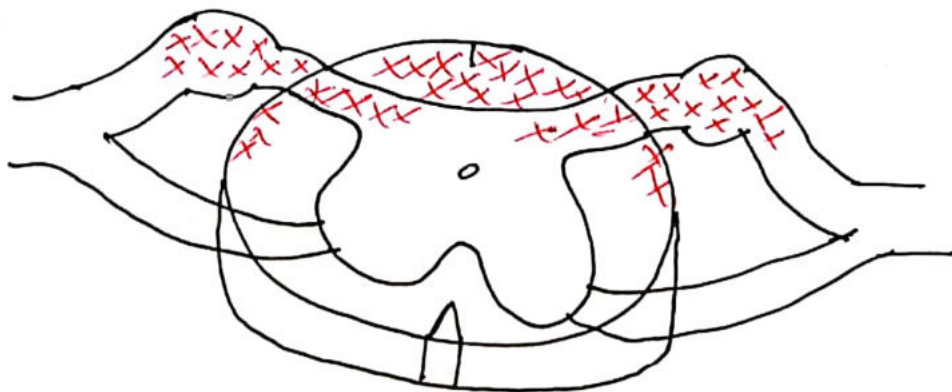
- Abnormal dilatatory or cavitory lesion
- Usually involves cervical spinal cord.
- Disturbs Anterior commissure - Pain & Temp fibres are interrupted - Bilateral loss of pain & temp & Repeated burns in fingers without patient knowing it.
- If lesion extends into anterior horn - flaccid paralysis - wasting of muscles
- If lesion spreads more laterally - corticospinal tract x - spastic paralysis below lesion
- At T1 lvs - it produces bilateral horner's disease.

- Oligodendrocytes are damaged
- strictly central demyelinating [optic tract also involved
- Medial longitudinal fasciculus demyelination - 3rd & 6th CN lose connection.
- Involves Ascending & descending tracts of ~~SC~~ only in SC.

Note :- The fibres which are crossing through Ant commissure

- ① lat. spinothalamic
- ② Ant. spinothalamic
- ③ Ant corticospinal

③2 Tubes dorsalis - Tertiary stage of Syphilis



- dorsal roots, columns & gray horns are involved
- Complete Anesthesia at lvl of lesion
- Visceral senses are also lost.
- loss of dorsal column sensations below lesion.