

# **SPINAL CORD**

# IMAGING METHODS TO EVALUATE SPINAL CORD



# X-RAYS (RADIOGRAPHS)

- ▶ Often the first diagnostic imaging test
- ▶ Small dose of radiation to visualize the bony parts
- ▶ Can detect

Spinal alignment and curvature

Spinal instability – with flexion and extension views

Congenital (birth) defects of spinal column

Fractures caused by trauma

Moderate osteoporosis (loss of calcium from the bone)

Infections

Tumors







**IS THIS FILM AN ADEQUATE LATERAL FILM?**

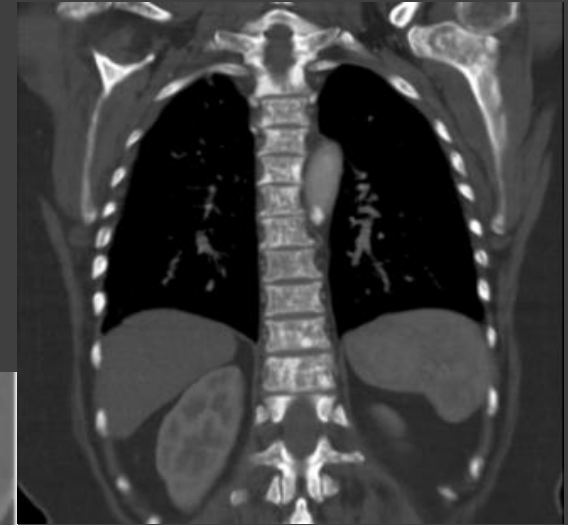
# COMPUTERIZED TOMOGRAPHY (CT SCAN)

- ▶ Uses radiation
- ▶ Entire spine can be imaged within a few seconds
- ▶ Detailed information regarding bony structures
- ▶ Limited information about spinal cord & soft tissues
- ▶ Obtain 2-D images → can be processed to 3-D images



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# Normal C-Spine with CT



Axial

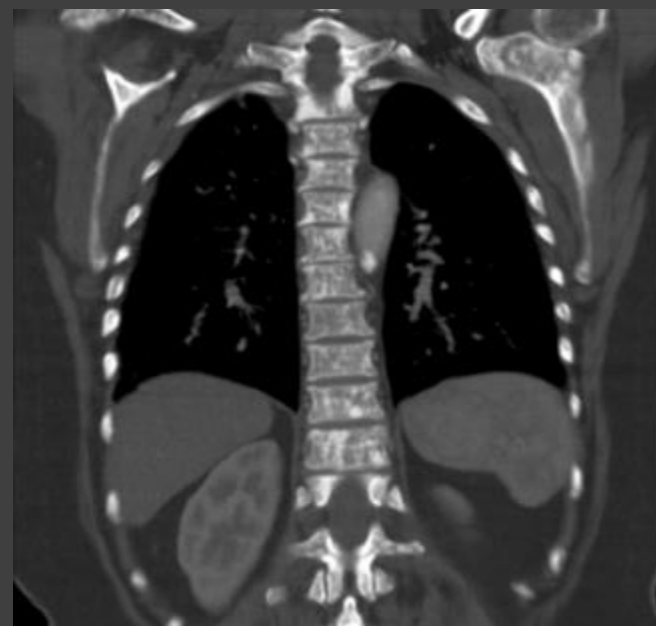


Sagittal



Coronal

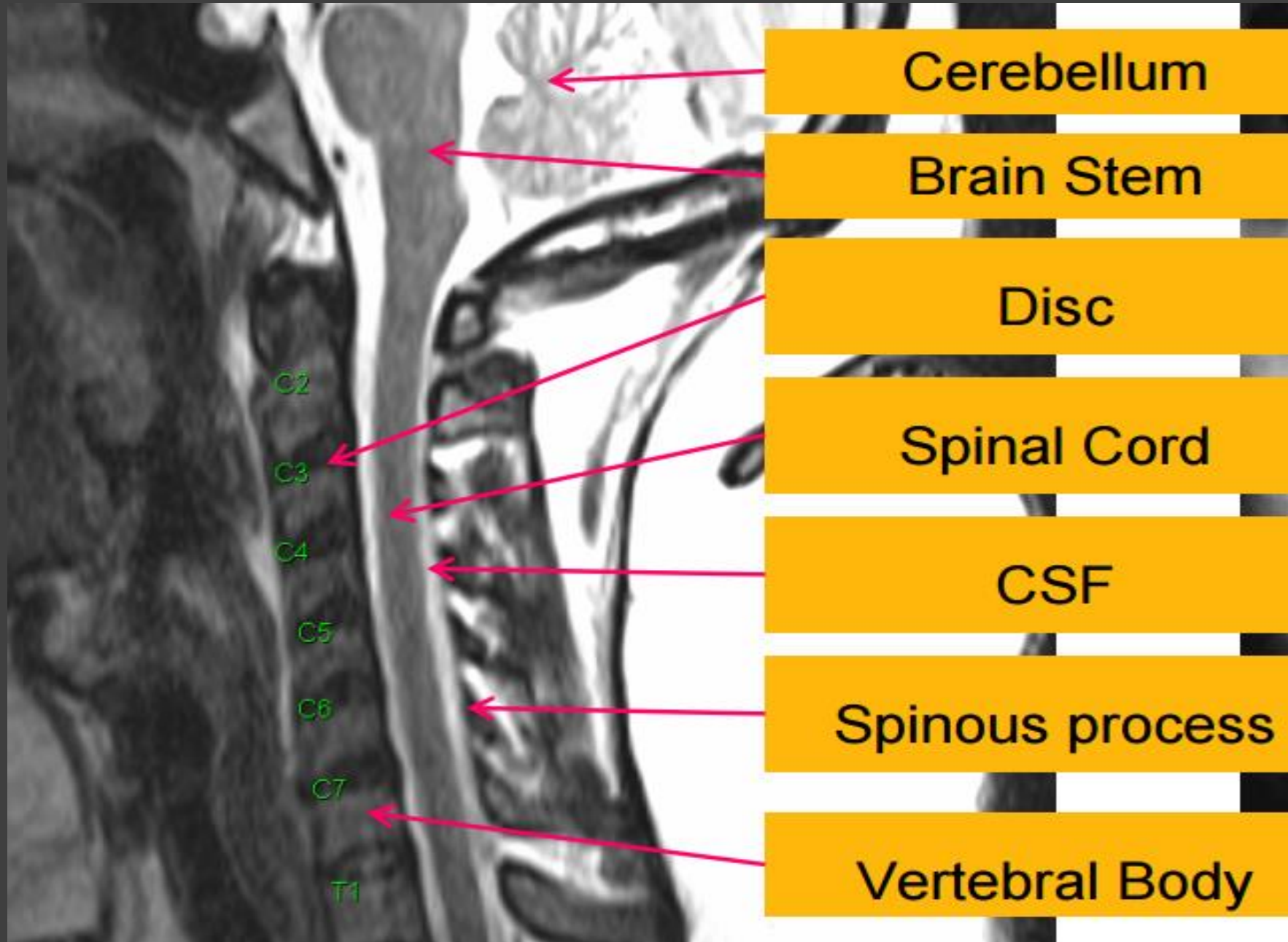




# MAGNETIC RESONANCE IMAGING (MRI)

- Gold standard of imaging for spinal cord disorders
- No radiation
- Can identify abnormalities of bone, soft tissues and spinal cord
- **Limitations:** Claustrophobic patients, uncooperative and children may need sedation or general anesthesia
- **Contraindications** include implanted devices e.g. cardiac pacemakers and electromagnetic devices





	Indications	Advantages	Disadvantages
X-Ray	Trauma Intra-operative localization	Inexpensive Widely available Quick Portable	Radiation exposure Difficulty in interpretation High rate of false-positive findings
CT	Trauma	Visualization of bony structures Widely available Quick	Less useful at showing soft tissue structures Radiation exposure Cost
MRI	Patients with "red flags" Radiculopathy Tumor Myelopathy	Visualization of soft tissue structures (e.g. relationship of disc to nerve) No radiation exposure	Contraindications: presence of ferromagnetic implants, cardiac pacemakers, intracranial clips, Claustrophobia Availability Cost\$\$\$

# ABNORMALITIES OF SPINAL CORD



- Trauma



- Congenital



- Demyelination



- Tumors

# TRAUMA

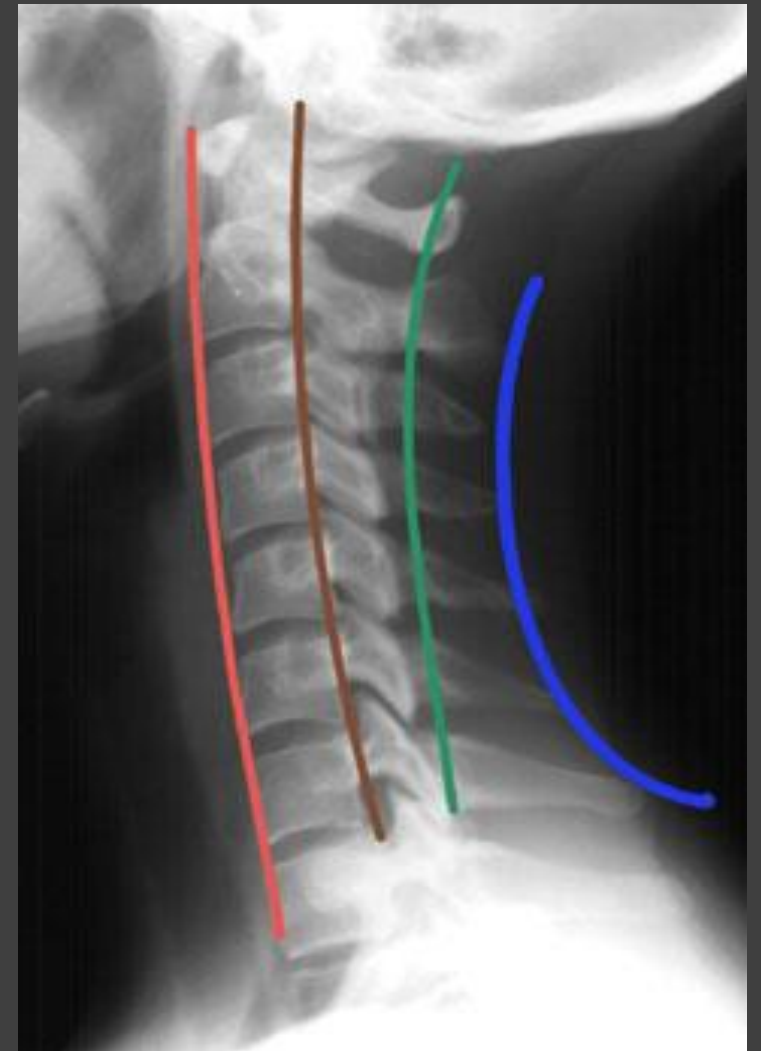
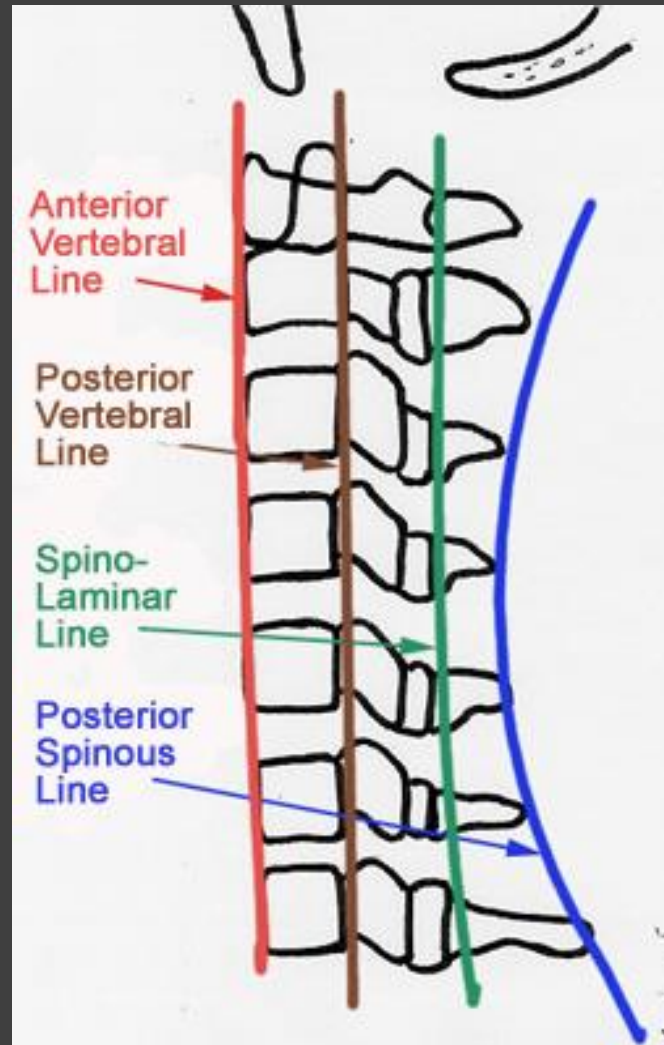
Plain films are usually the first imaging method used in minor trauma.

If fractures, or other bony defects, are suspected, **CT images** can provide very detailed information.

When soft tissue / spinal cord injury is suspected, **MRI is the imaging method of choice.**

# ASSESS FOUR PARALLEL LINES.

1. Anterior vertebral line
2. Posterior vertebral line
3. Spinolaminar line
4. Posterior spinous line



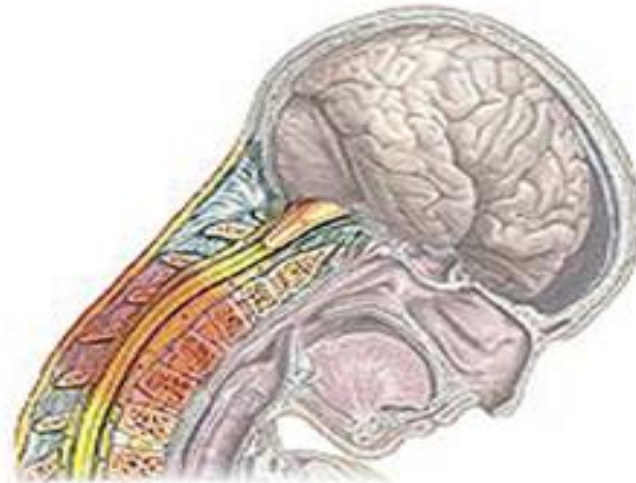
# MECHANISM OF INJURY

Hyperextension



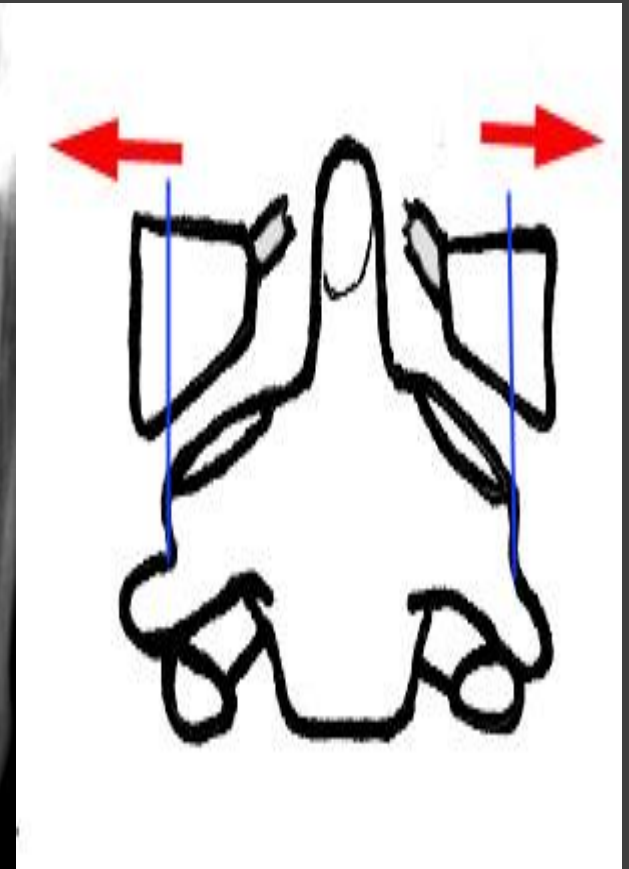
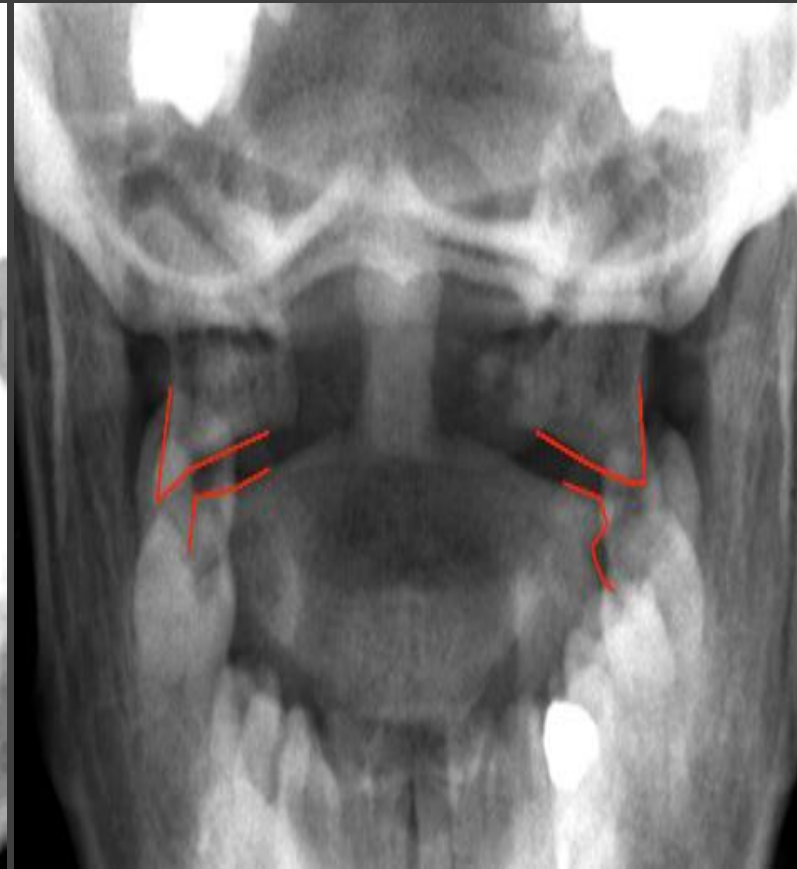
Sprain or strain of  
cervical tissues

Hyperflexion

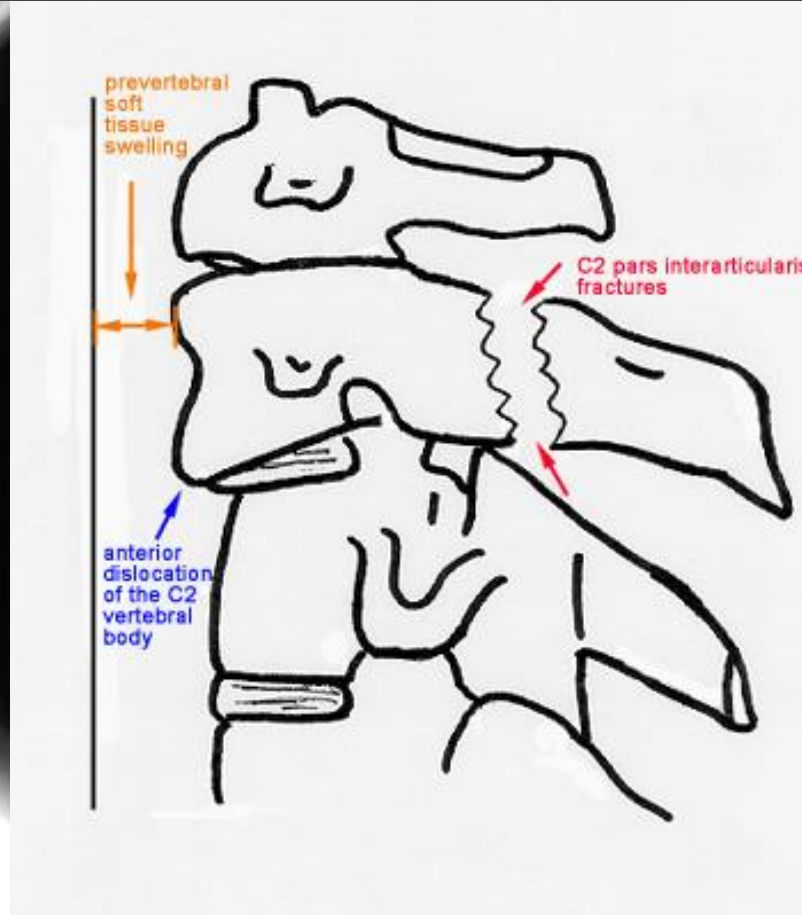




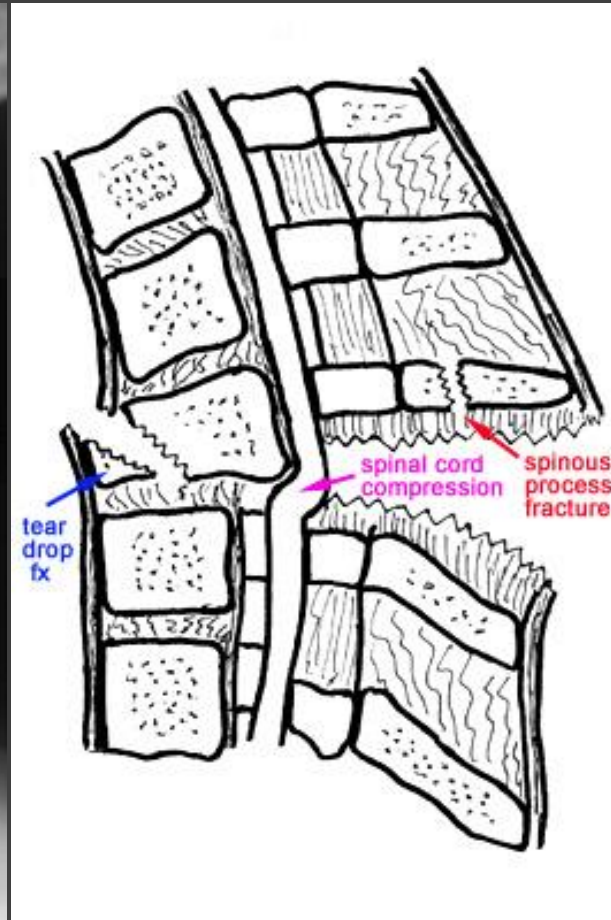
# COMPRESSION FRACTURE



# HANGMAN'S FRACTURE

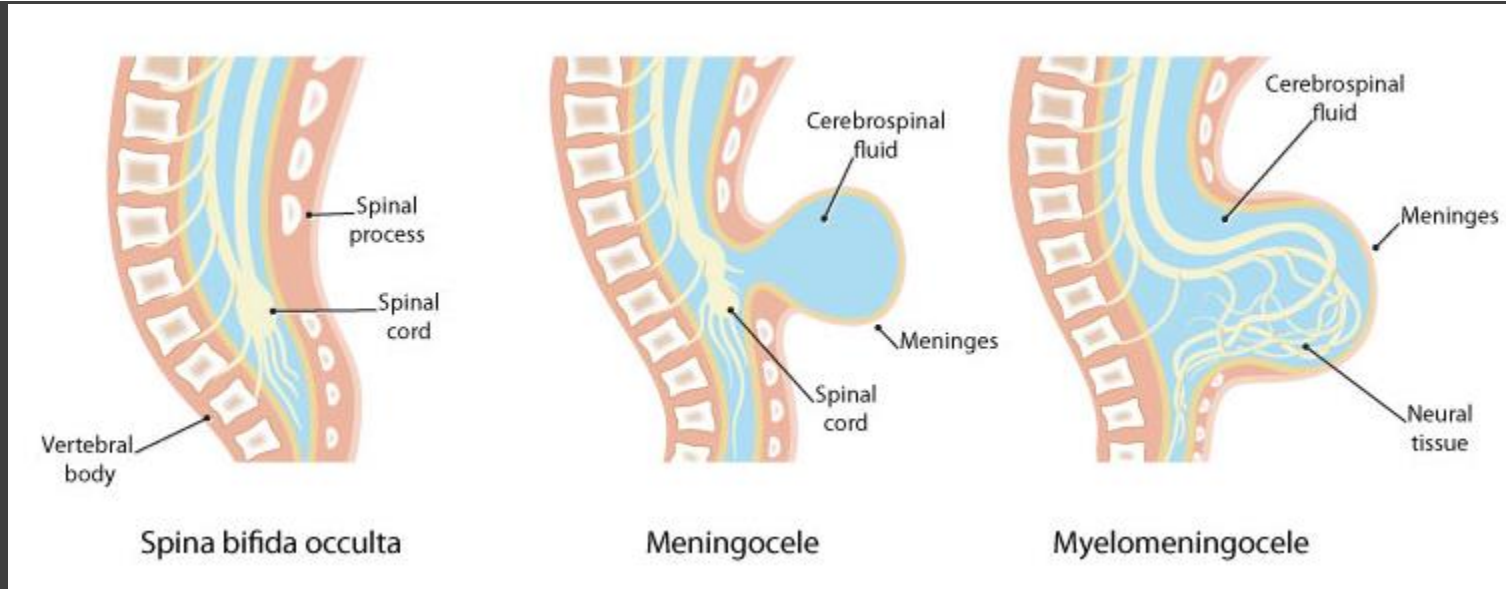
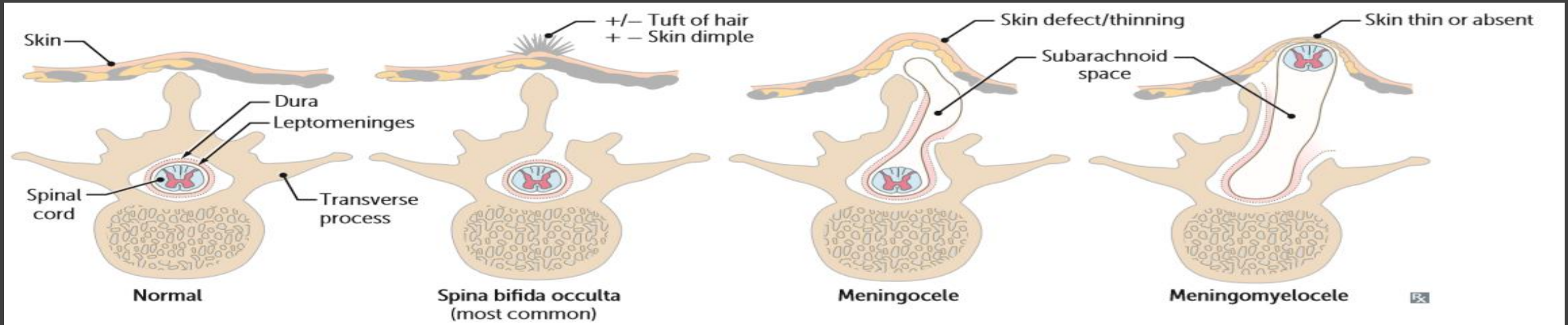


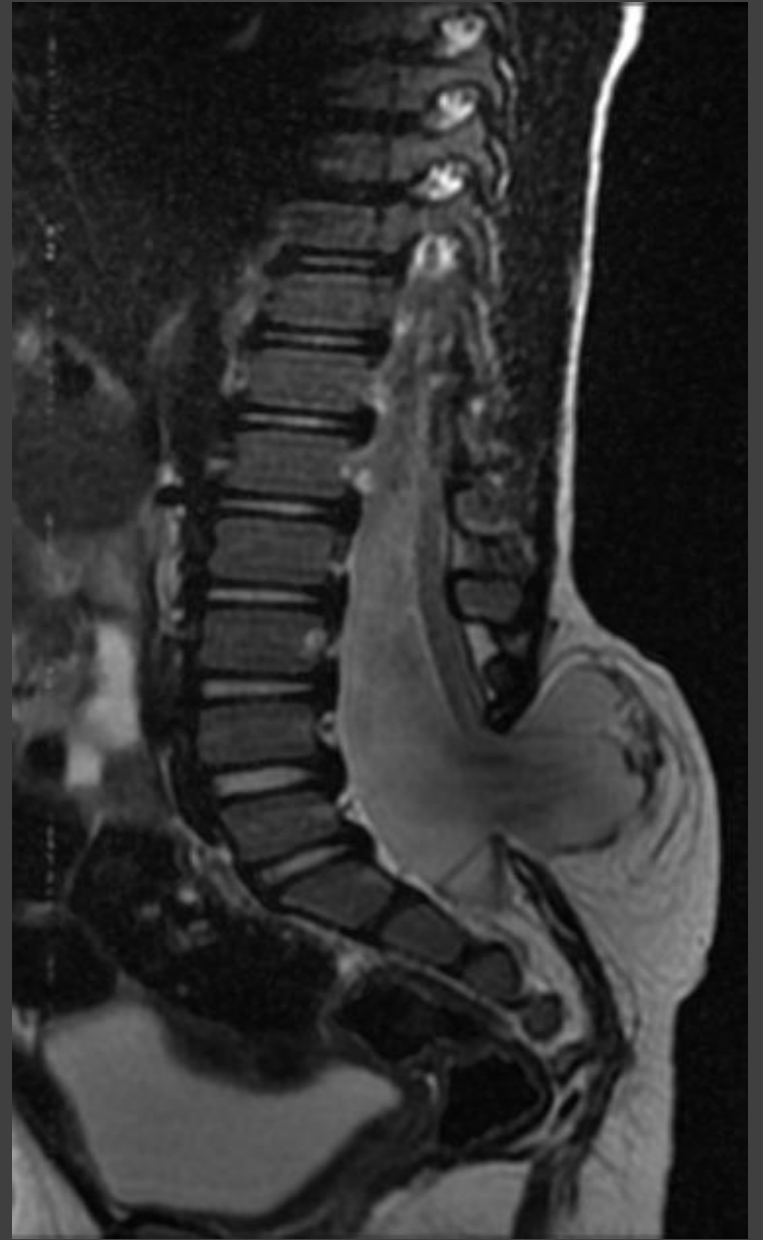
# HYPERFLEXION



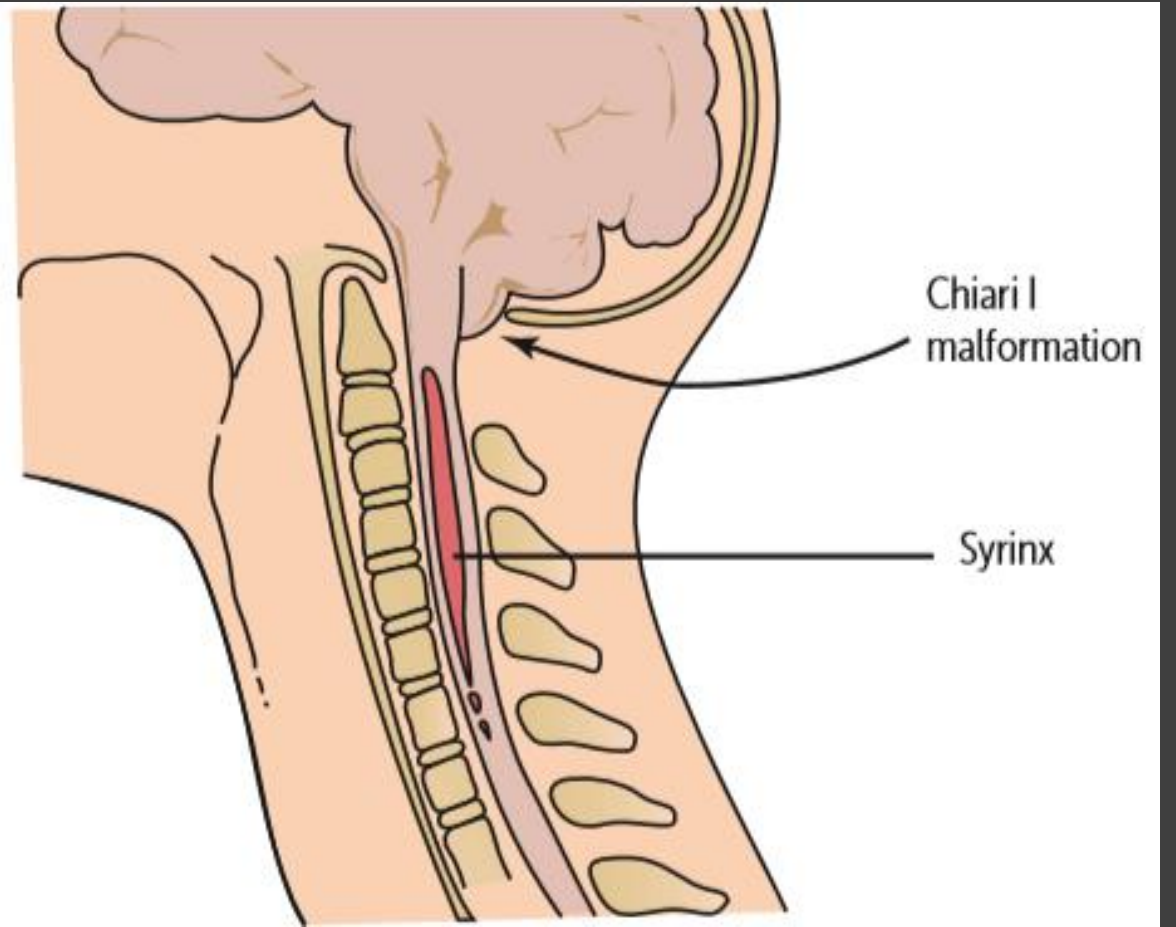
# **CONGENITAL ANOMALIES**

# SPINA BIFIDA





# SYRINGOMYELIA



# DEMYELINATION



# MULTIPLE SCLEROSIS

- **Multiple sclerosis (MS)** is a relatively common acquired chronic relapsing demyelinating disease involving CNS.
- Characteristically disseminated lesions with resolution – recurrence pattern



# Transverse Myelitis

Inflamed cord of uncertain cause

Viral infections

Immune reactions

Idiopathic



# TM VS MS

## MS lesions in spinal cord are

more likely multiple

don't cover the entire section on axial images

often < 2 vertebral body heights in sagittal plane

## Transverse myelitis lesions

Often one big lesion

>3 vertebral body heights in sagittal plane

Covers entire spinal cord in axial plane

No brain lesions

**Monophasic**



# TUMORS

# CLASSIFICATION

- **Intramedullary lesions**

its location is determined within the cord.

- **extramedullary lesions**

May be related to nerve roots and may extend into the neural foramen  
(e.g. schwannomas and neurofibromas)

or they may have a broad dural attachment (e.g. meningiomas).

# ASTROCYTOMA



# Ependymoma



**THANK YOU**