

# Spinal Cord

(CNS BLOCK, RADIOLOGY)

# Objectives

- Anatomy of spinal cord.
- Anatomy of vertebral column.
- Identify, and distinguish between, common types of Radiographic Images.
- You should also be able to recognize some RADIOLOGICAL presentation of spinal cord **diseases**.

# Imaging the Spine

X-Ray



CT



MRI



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

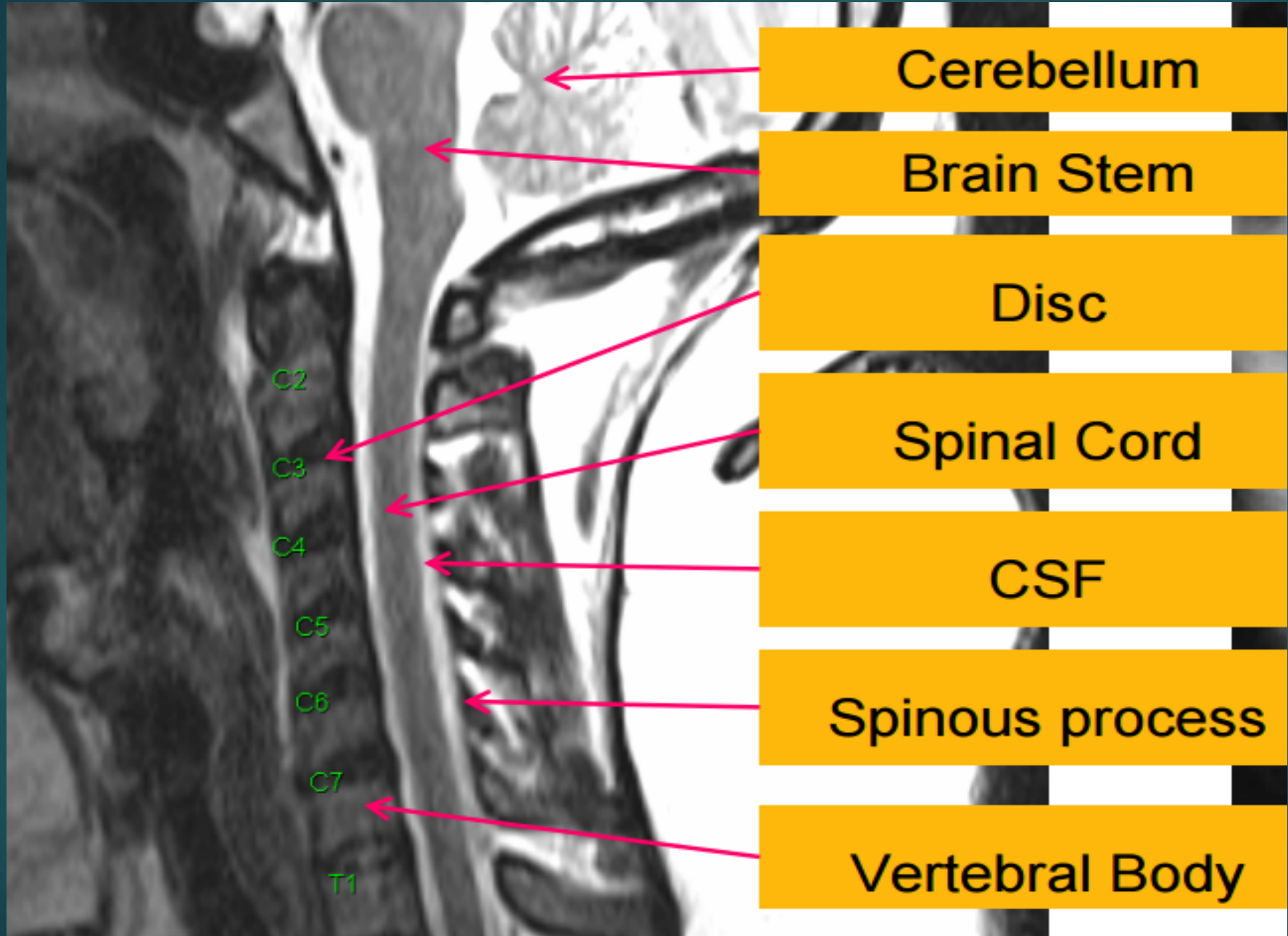


# Magnetic Resonance Imaging (MRI)

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







Cerebellum

Brain Stem

Disc

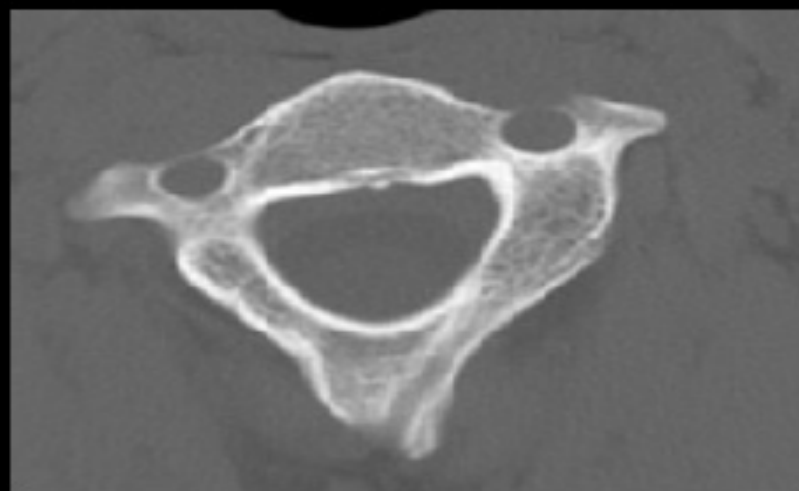
Spinal Cord

CSF

Spinous process

Vertebral Body

# Normal C-Spine with CT



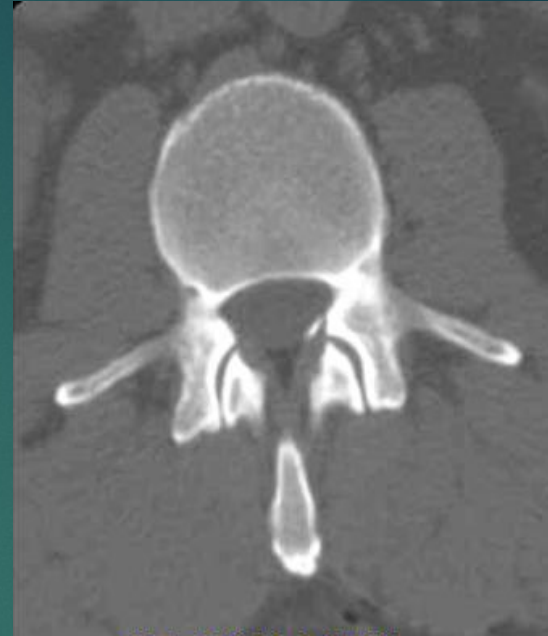
**Axial**



**Sagittal**



**Coronal**



	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 visualizing soft tissue structures Radiation exposure Cost
MRI	Pts with "red flags" case 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 Not widely available Cost\$\$\$

# Abnormalities Of Spinal Cord



- Trauma



- Congenital



- Demyelination



- Tumors

# Trauma

Plain Radiographs (**x-rays**) are usually the first series of images to be ordered by the physician.

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

When soft tissue injury is suspected, **MRI is usually the imaging technology of choice.**

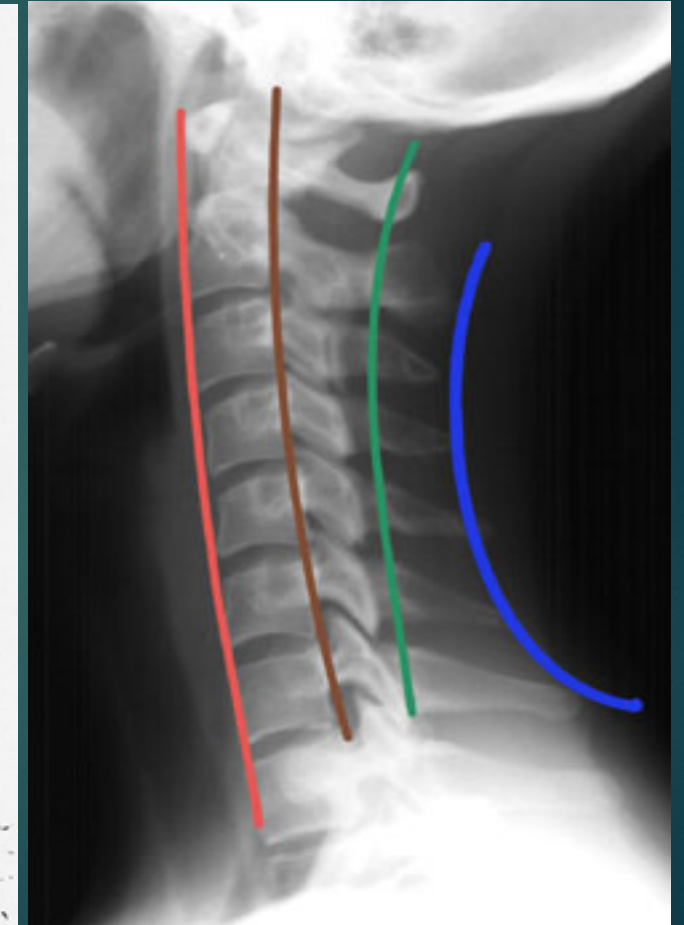
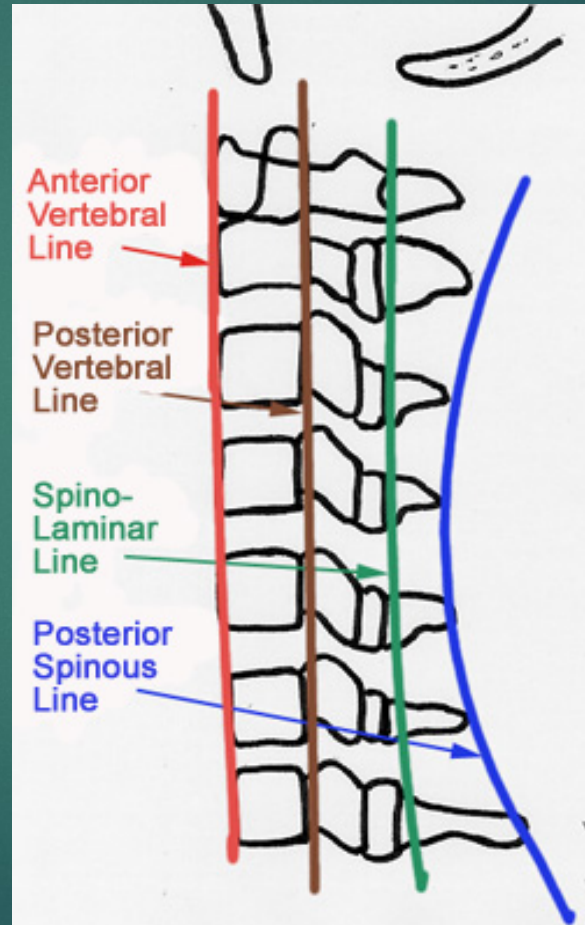
# Assess four parallel lines.

1. Anterior vertebral line

2. Posterior vertebral line

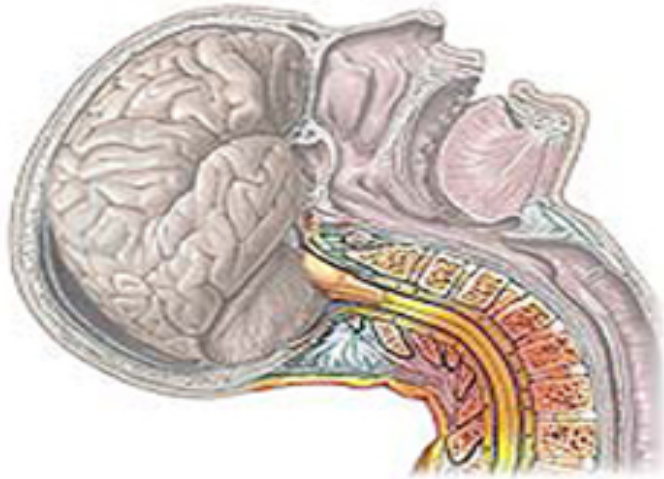
3. Spinolaminar line

4. Posterior spinous line



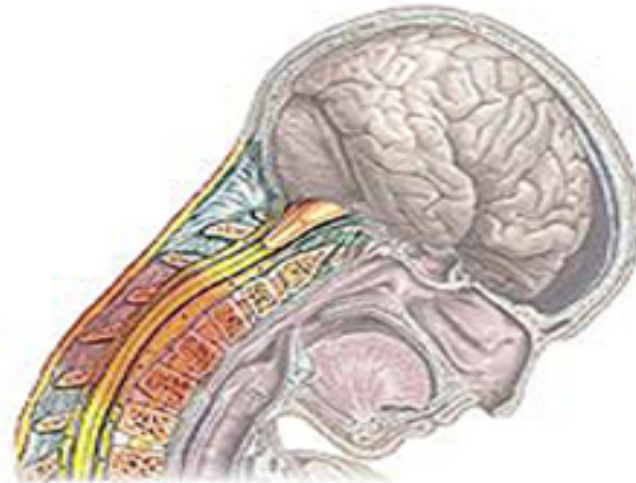
# Mechanism Of Injury

Hyperextension



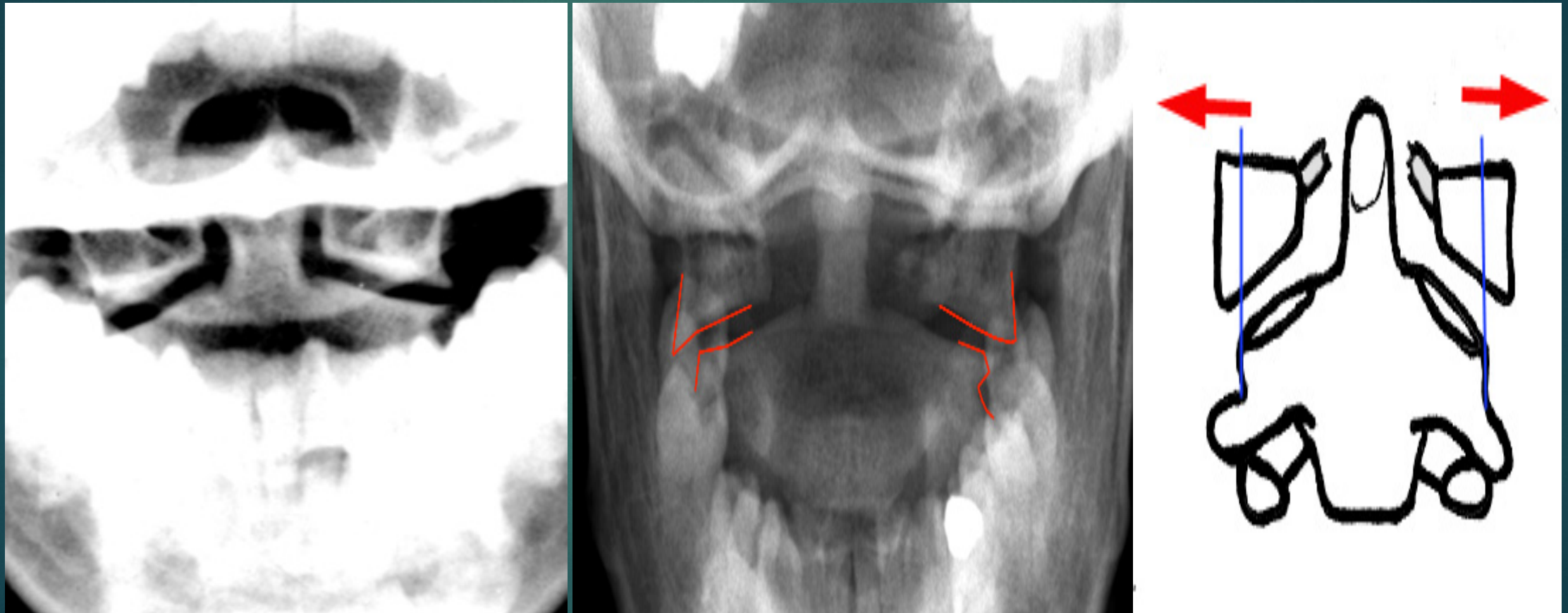
Sprain or strain of  
cervical tissues

Hyperflexion

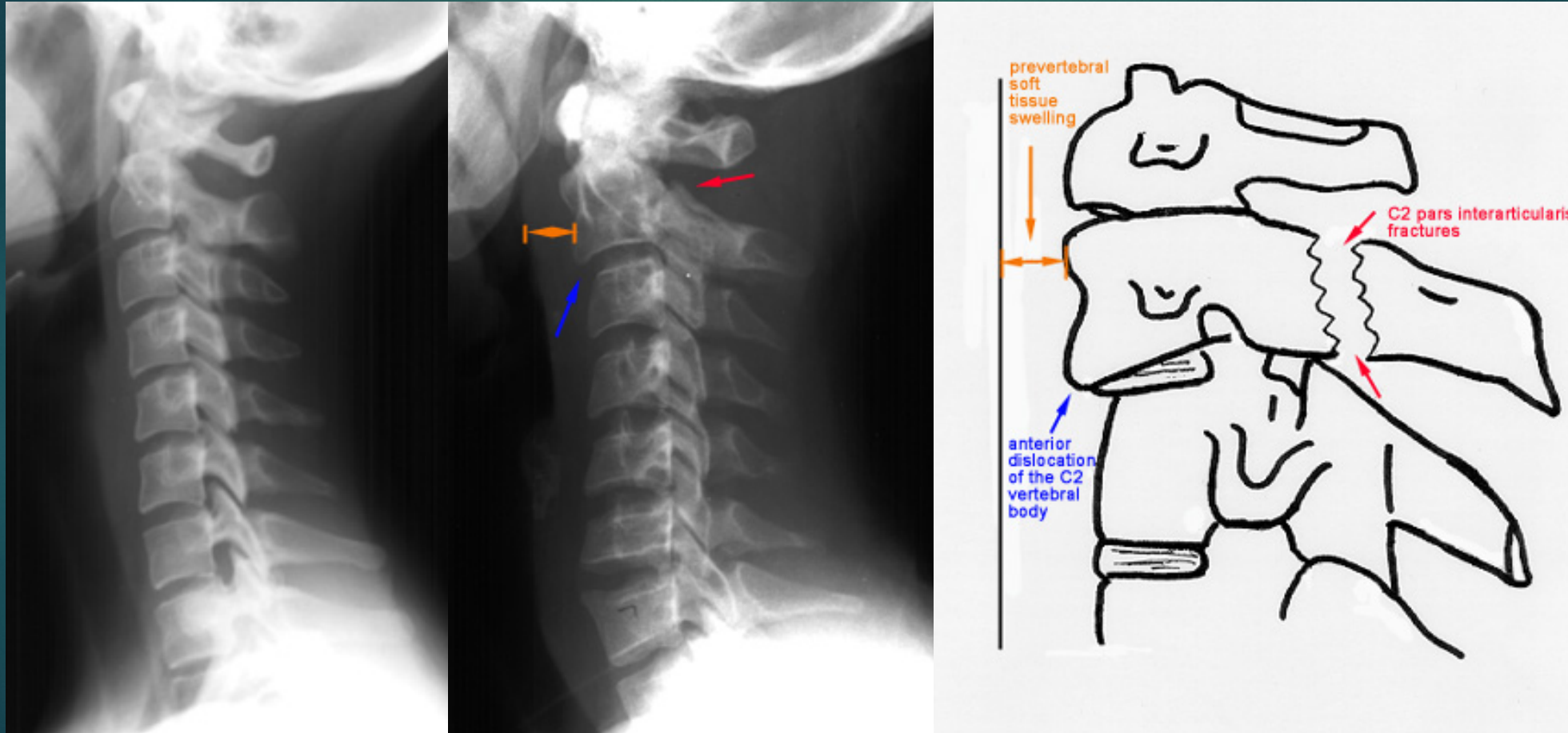




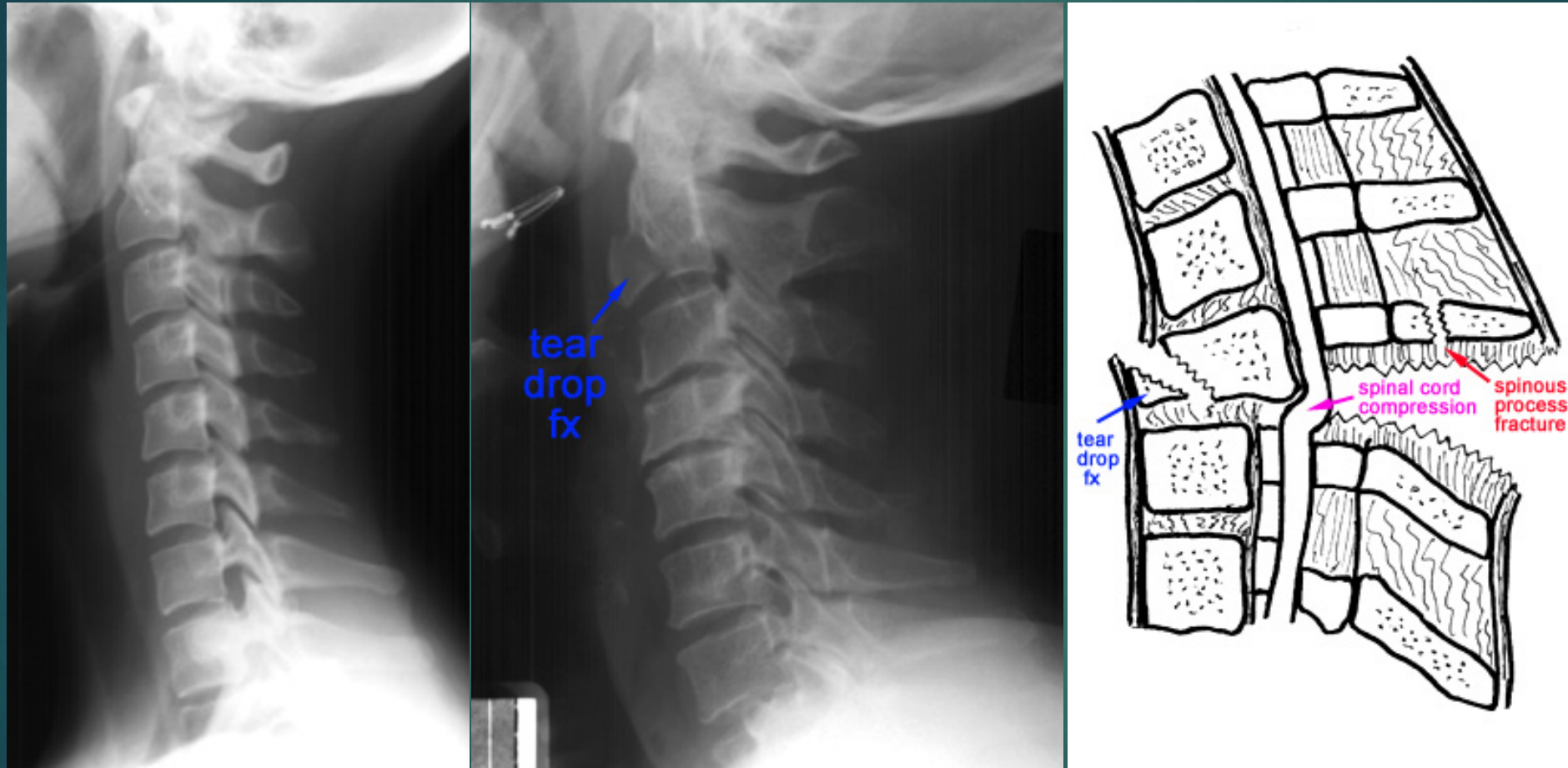
# Compression Fracture



# Hangman's Fracture

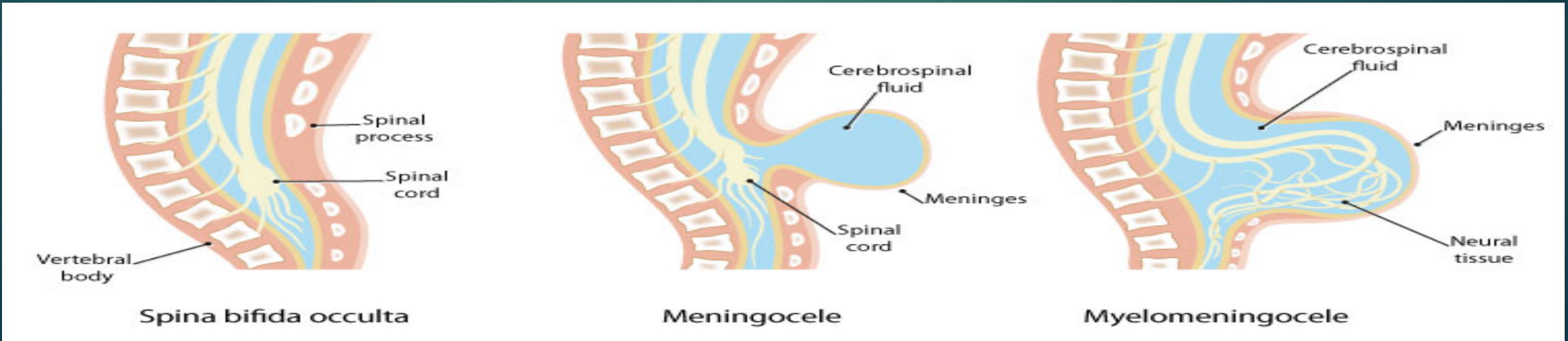
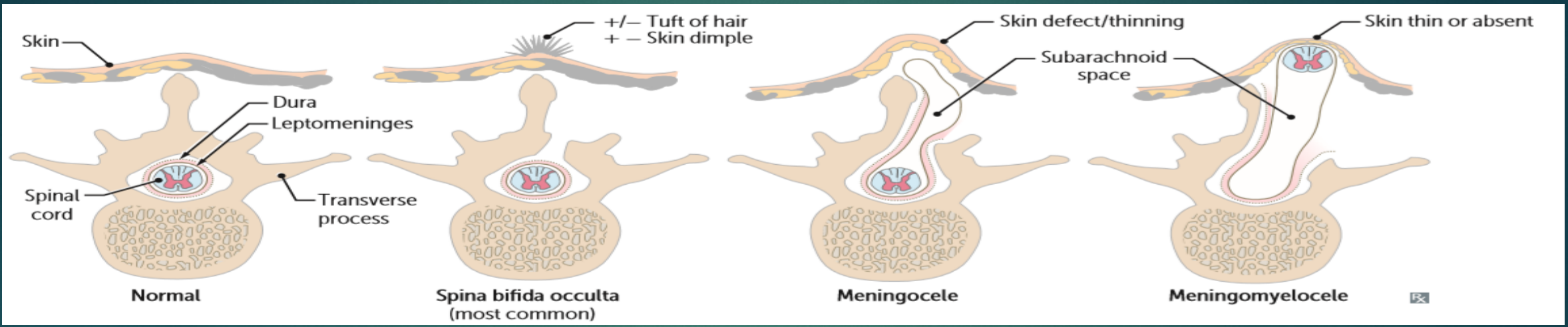


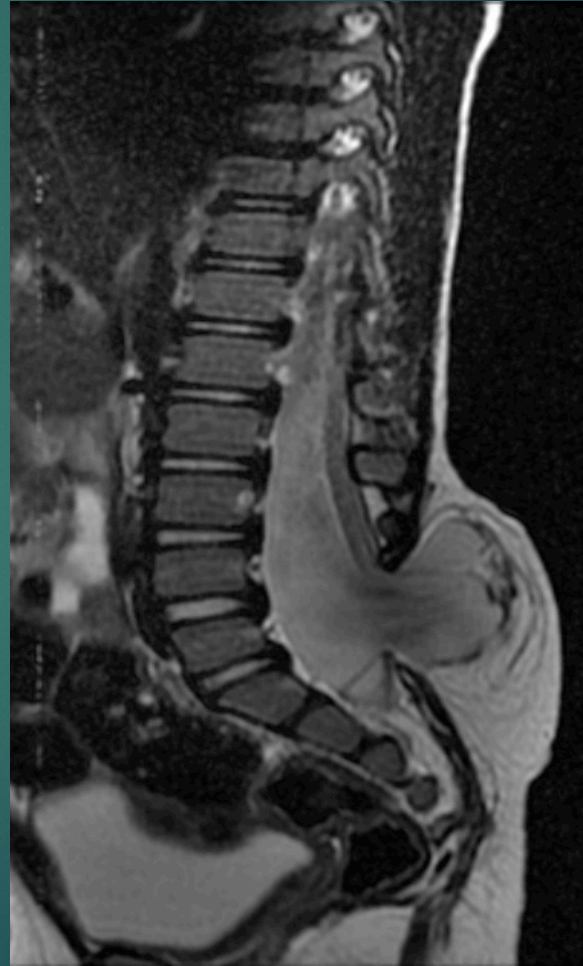
# Hyperflexion



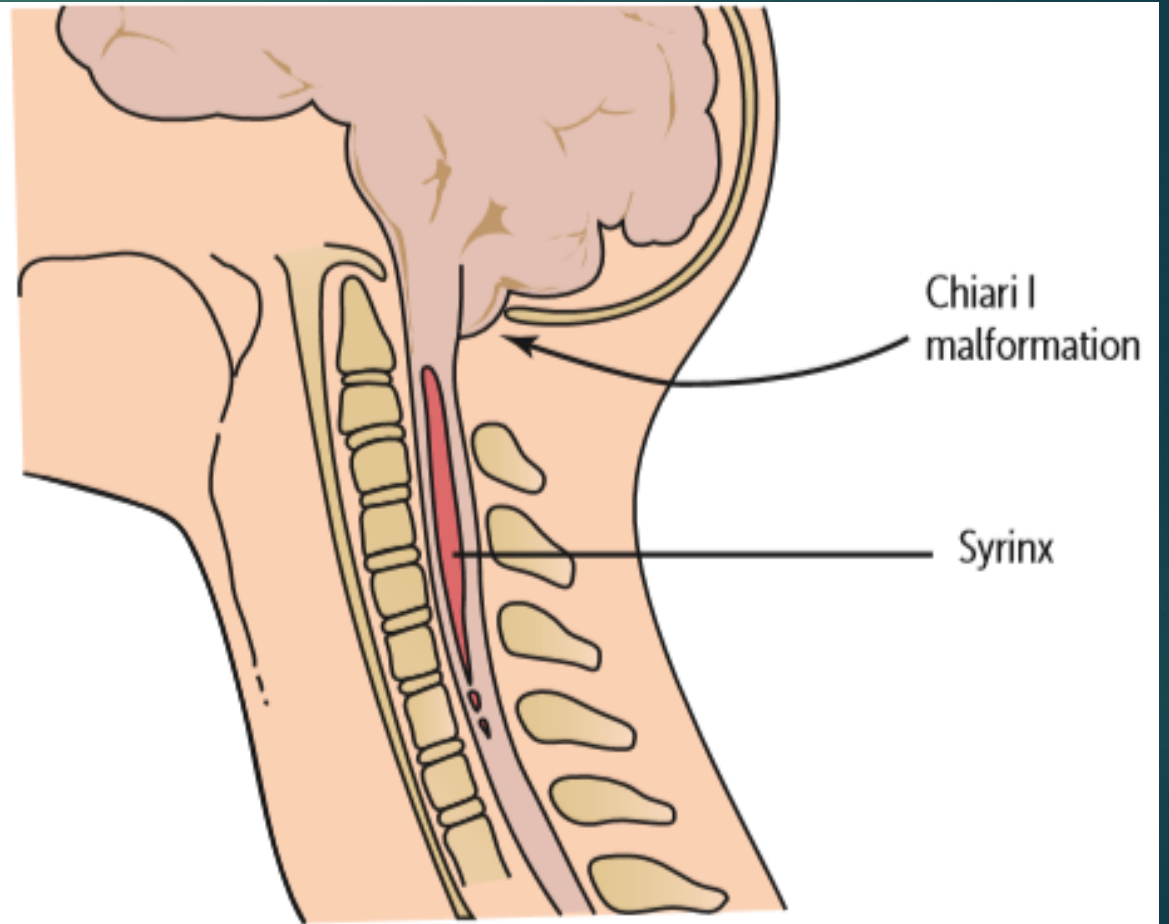
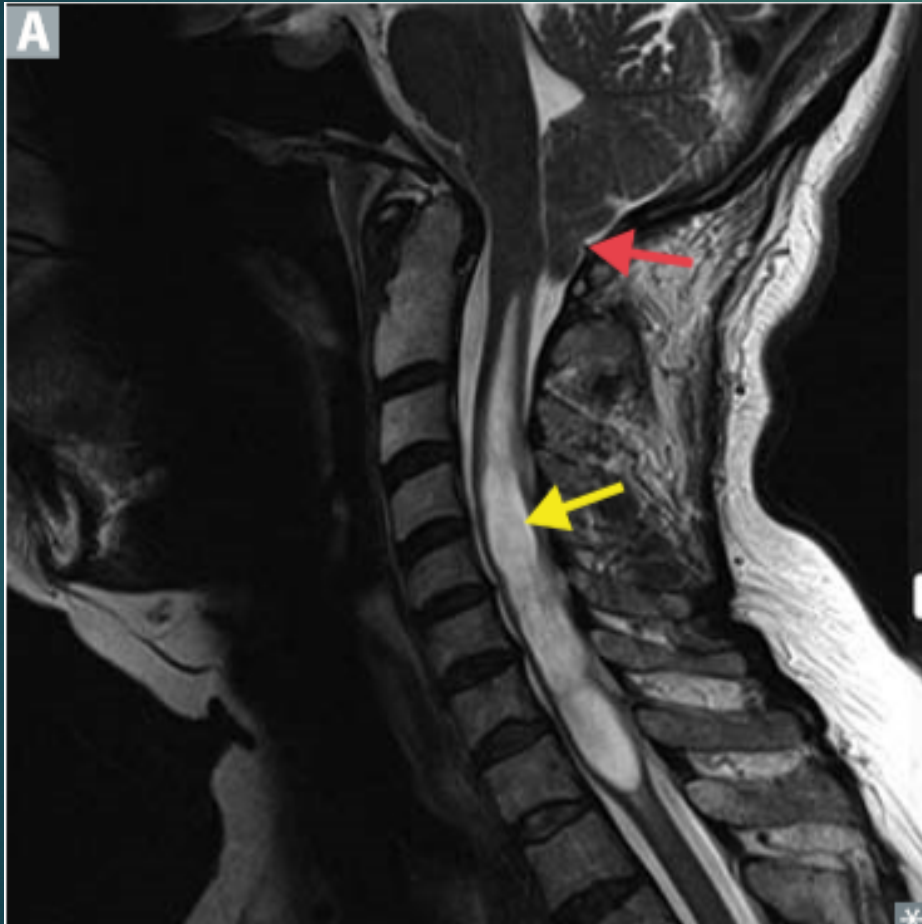
# Congenital Defects

# Spina bifida





# Syringomyelia



# Demyelination



# Multiple Sclerosis

- ▶ **Multiple sclerosis (MS)** is a relatively common acquired chronic relapsing demyelinating disease involving the central nervous system.
- ▶ Characteristically disseminated not only in space but also in time



# Transverse Myelitis

Inflamed cord of uncertain cause

Viral infections

Immune reactions

Idiopathic

Myelopathy progressing over hours to weeks



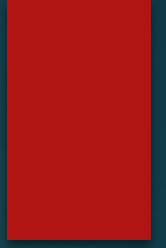
# TM VS MS

MS lesions in spinal cord  
are more likely multiple, focal and peripherally located  
don't cover the entire section on axial images  
often < 2 vertebral body heights on sagittal images  
are disseminated in time and space

Transverse myelitis lesions  
extend over >3 vertebral body heights on axial images  
often > 4 vertebral body heights on sagittal images  
no brain lesions



# Tumors



# Classification

- ▶ **Intramedullary lesions**

- ▶ its location is determined within the cord.

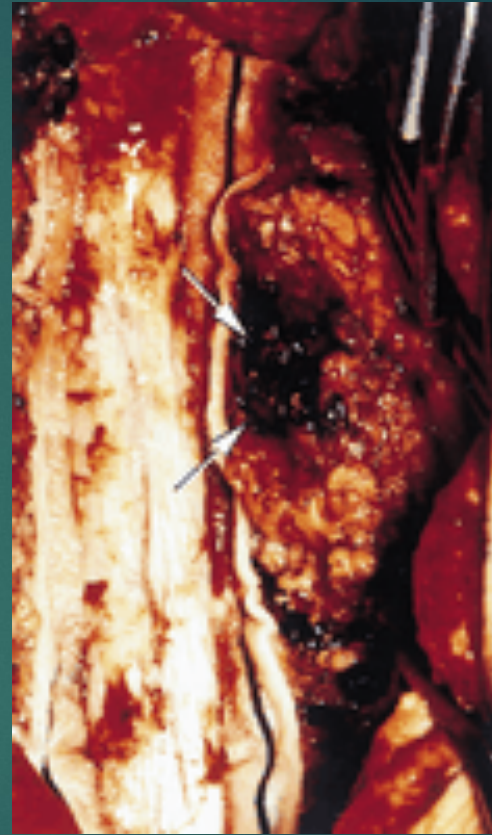
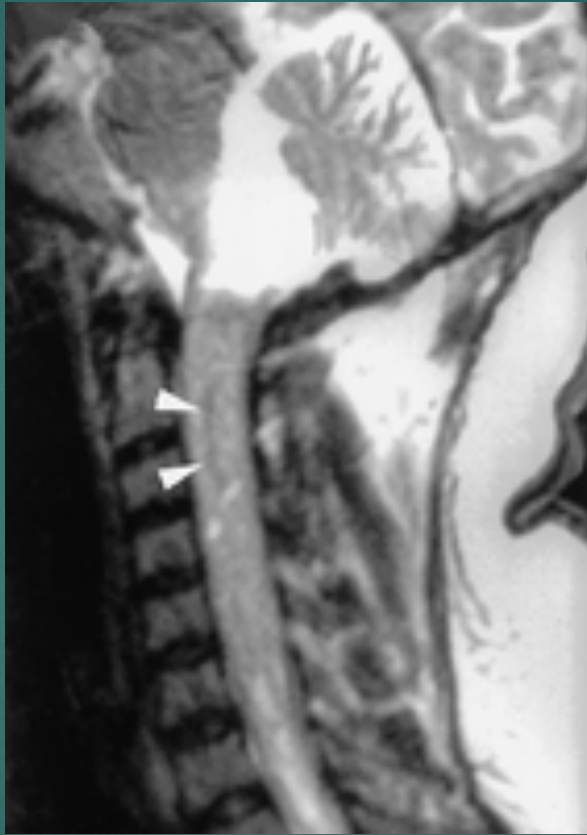
- ▶ **extramedullary lesions**

- ▶ May be related to nerve roots and may extend into the foramen (e.g. schwannomas and neurofibromas) or they may have a broad dural attachment (e.g. meningiomas).

# Astrocytoma



# Ependymoma



Thank you