Spinal Cord

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

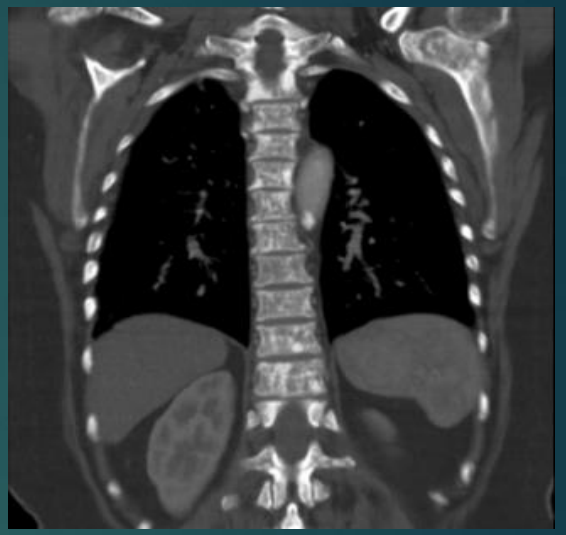
Is this film an adequate lateral film?

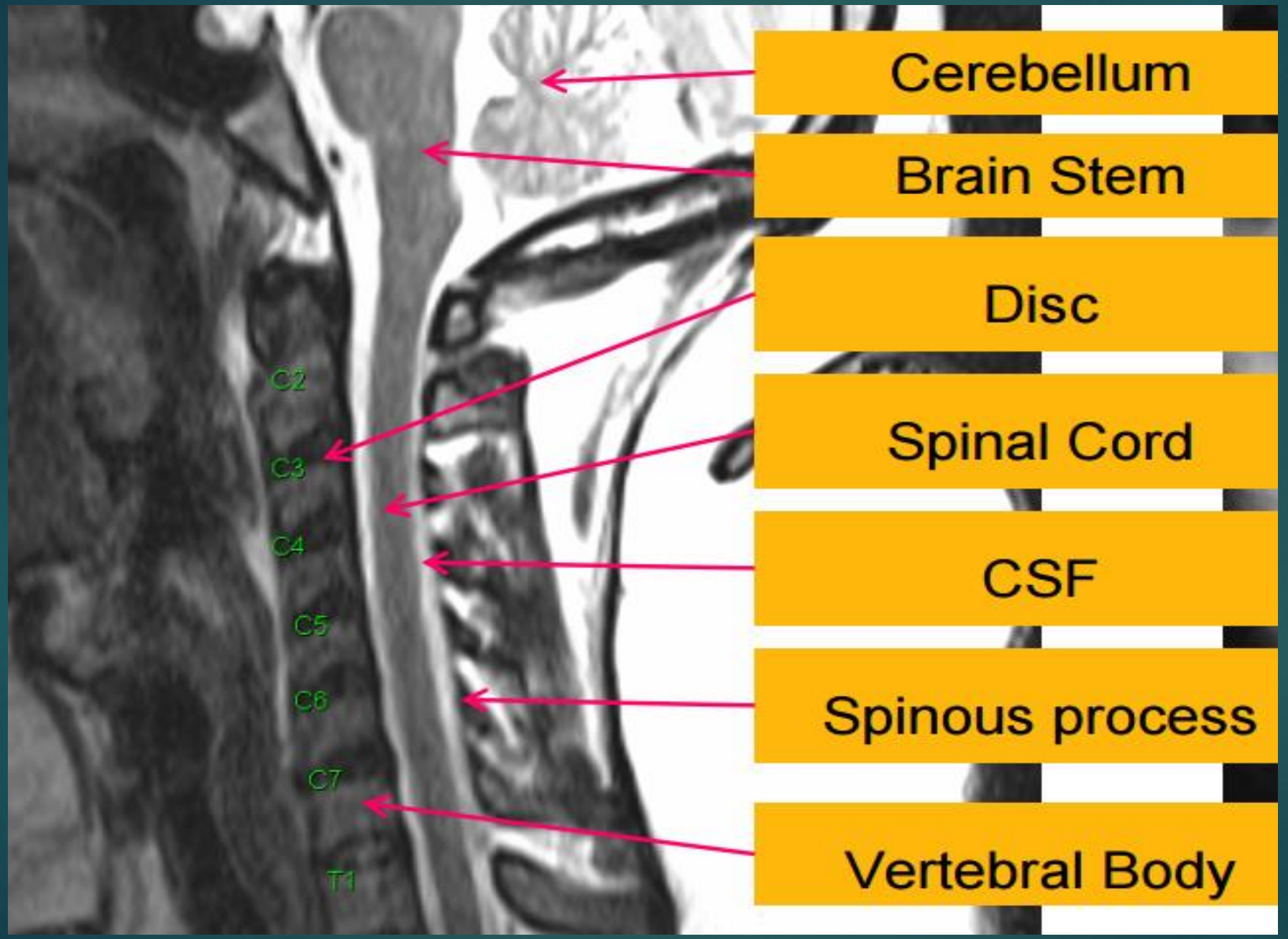
COMPUTERIZED TOMOGRAPHY (CT SCAN)

- 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

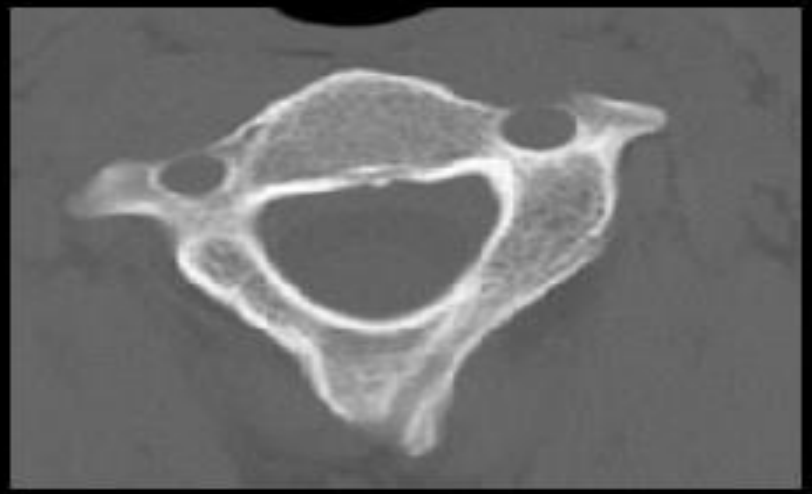
Magnetic Resonance Imaging (MRI)

- 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

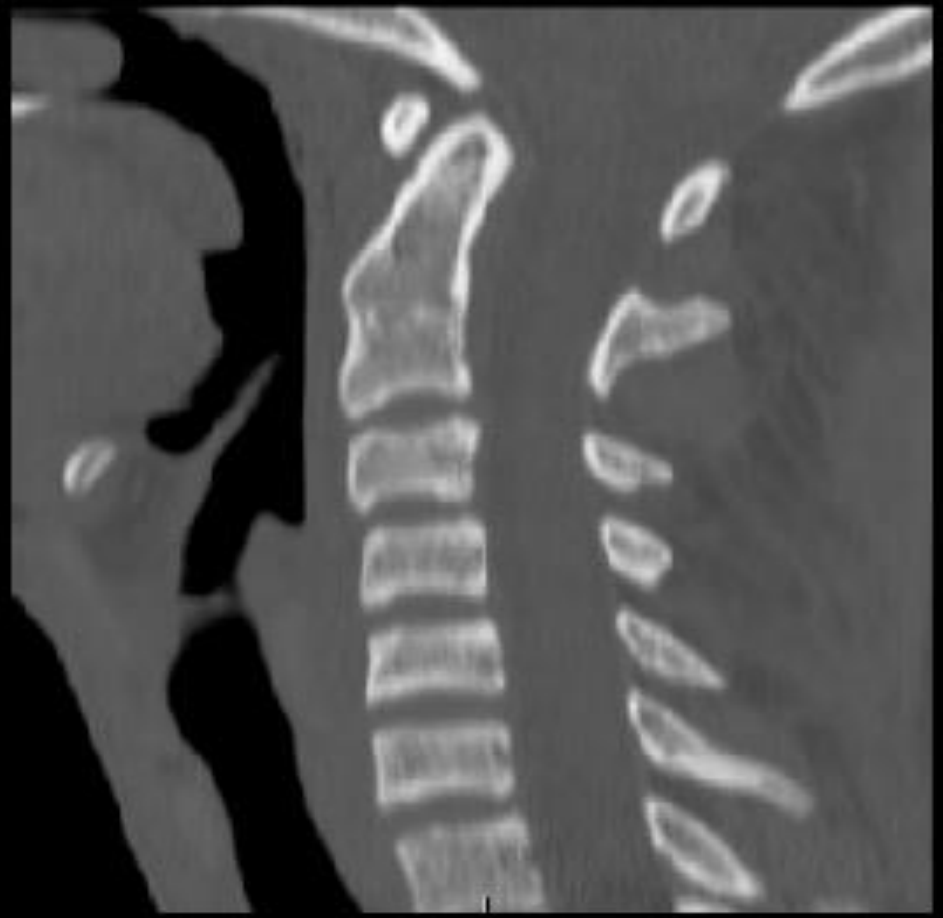



Cerebellum
Brain Stem
Disc
Spinal Cord
CSF
Spinous process
Vertebral Body
C2
C3
C4
C5
C6
C7
T1

Normal C-Spine with CT

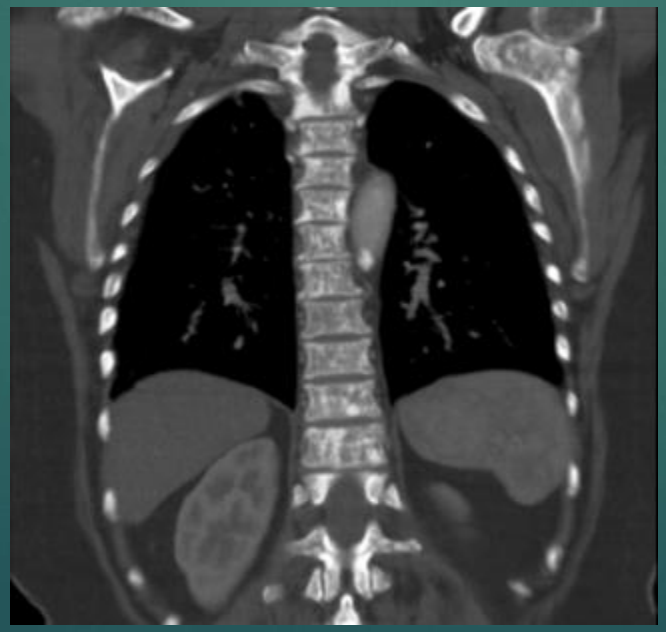


Axial



Sagital

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.

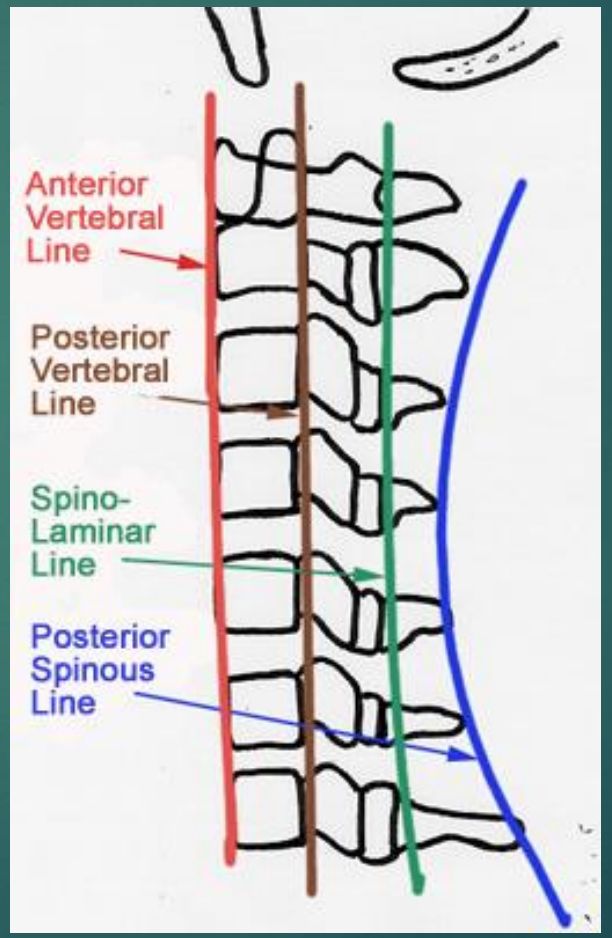
Assess four parallel lines.

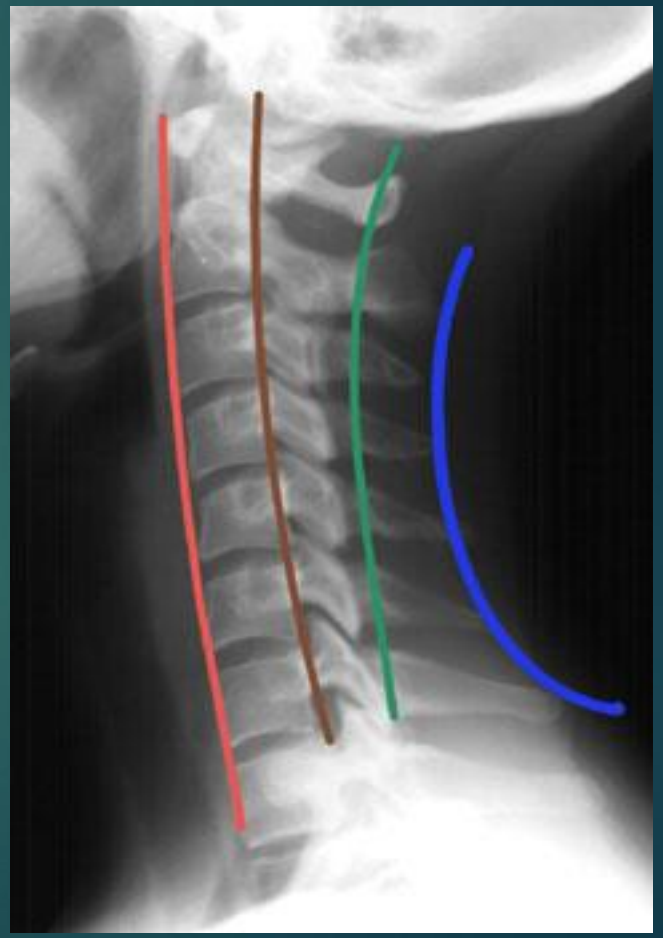
1. Anterior vertebral line

2. Posterior vertebral line

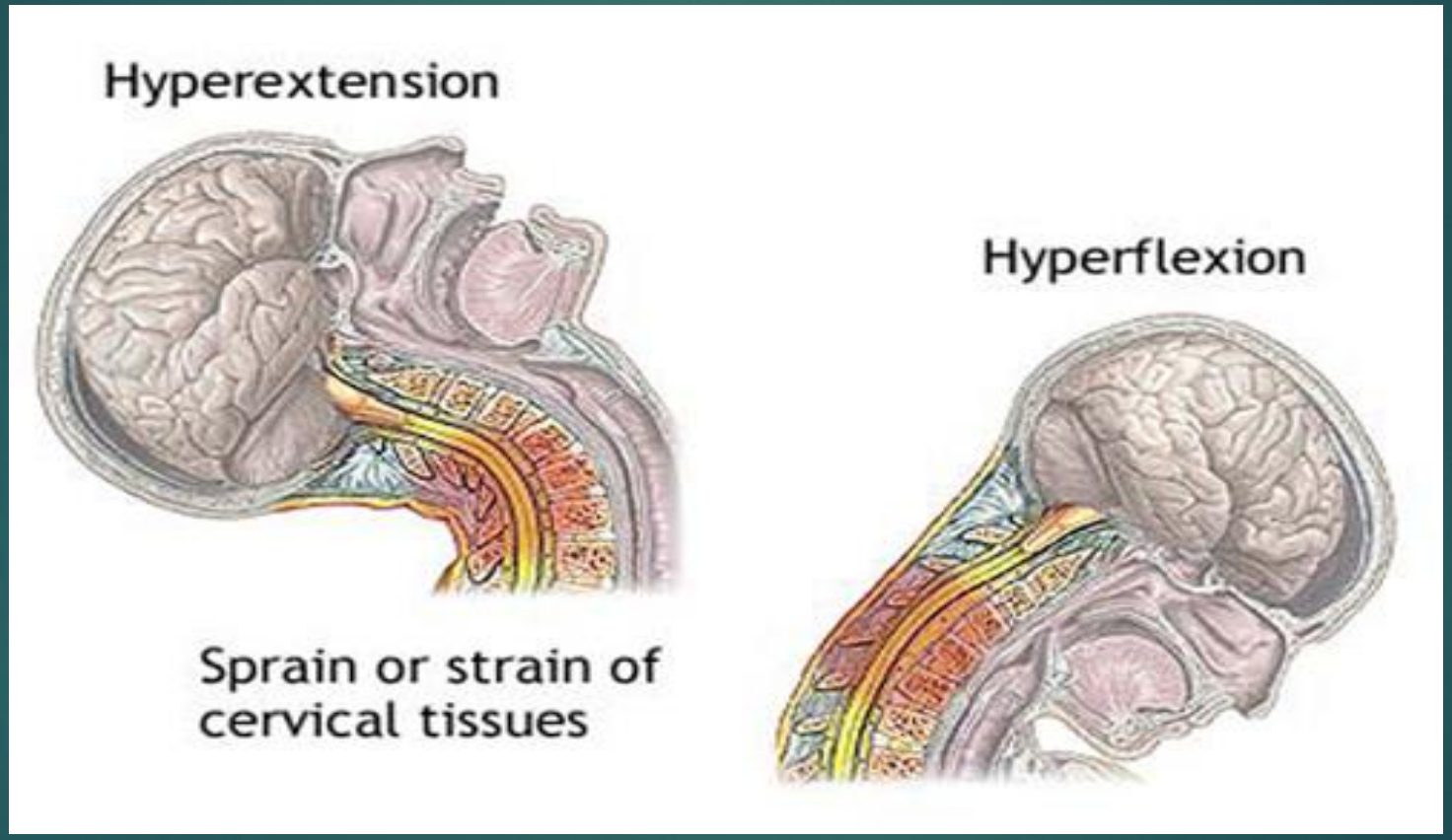
3. Spinolaminar line

4. Posterior spinous line

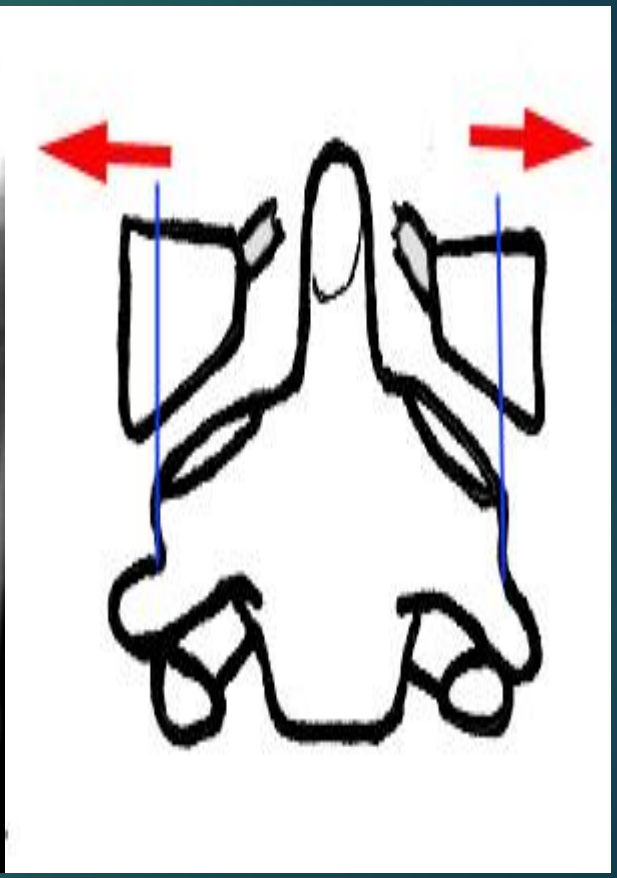




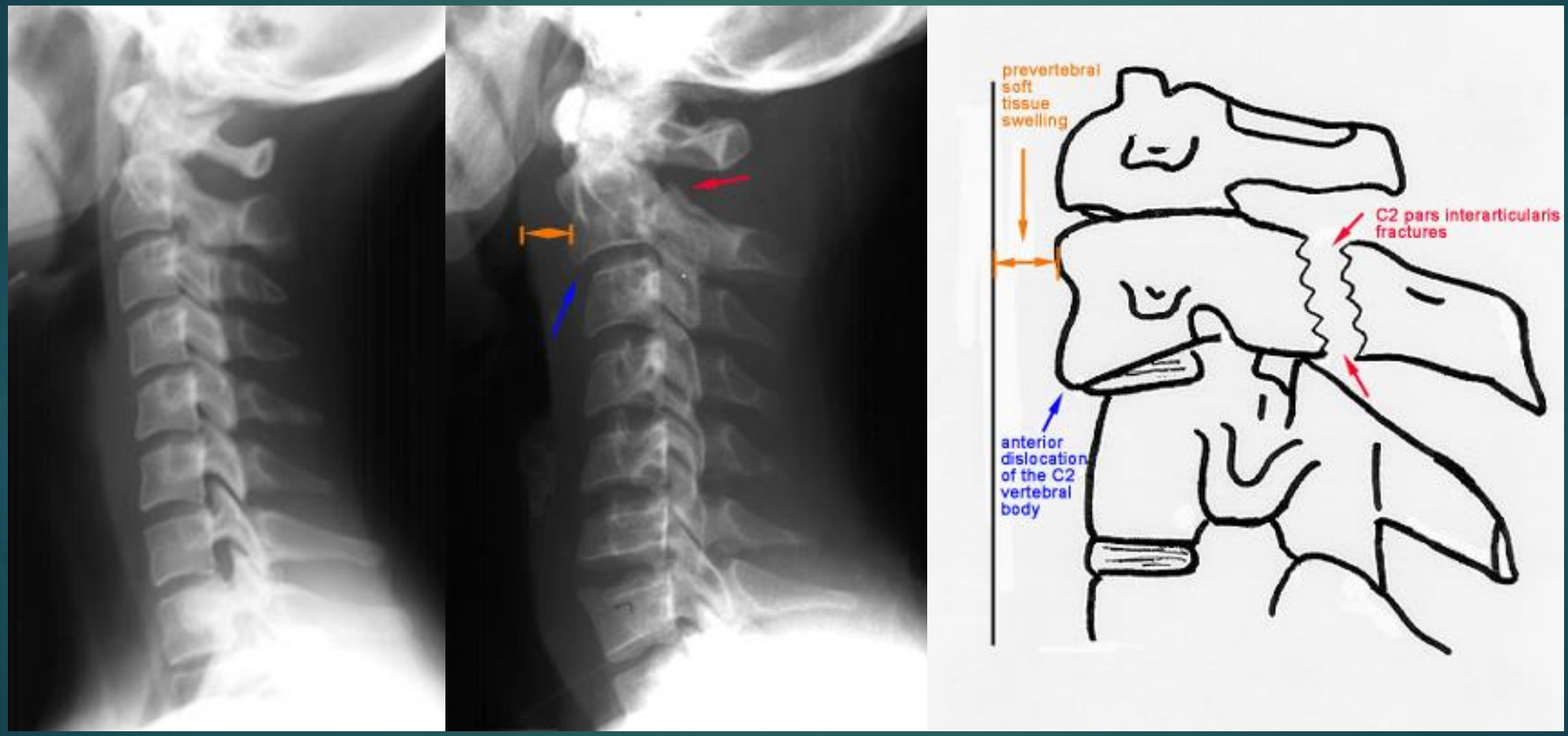
Mechanism Of Injury



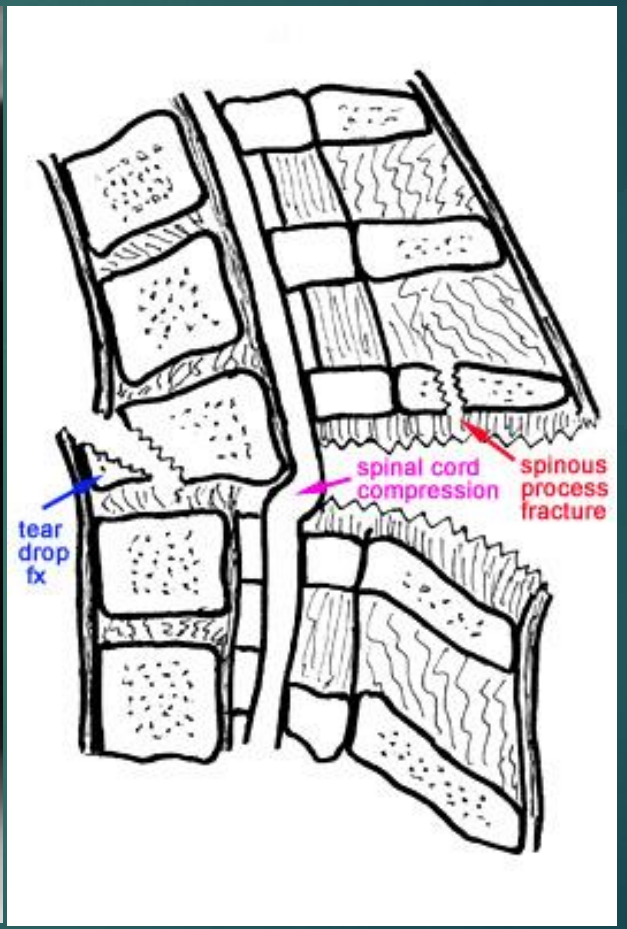
Compression Fracture



Hangman's Fracture

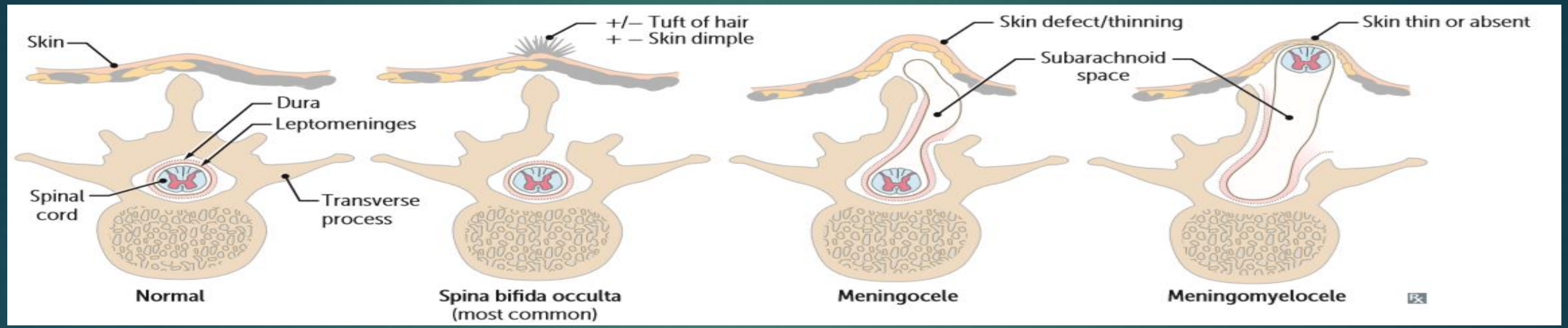


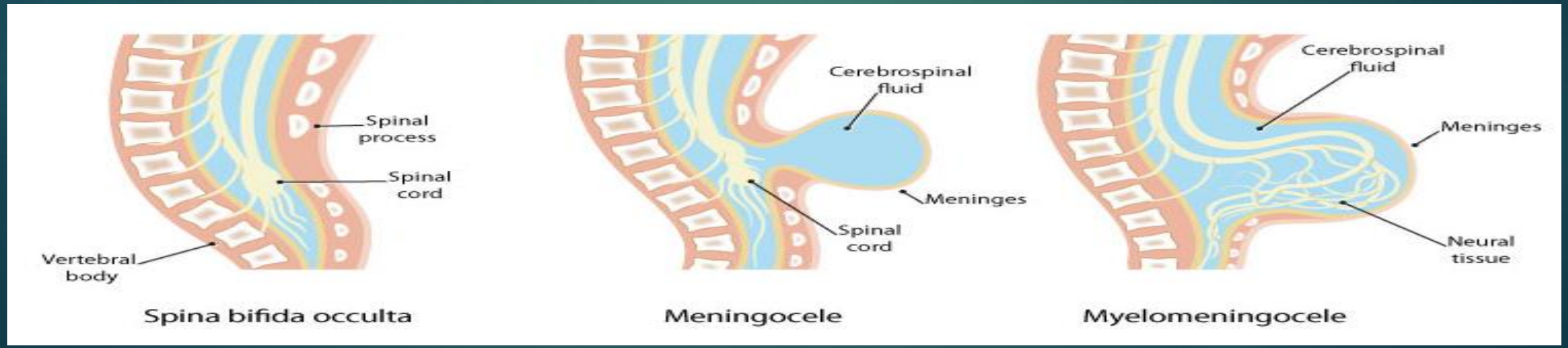
Hyperflexion



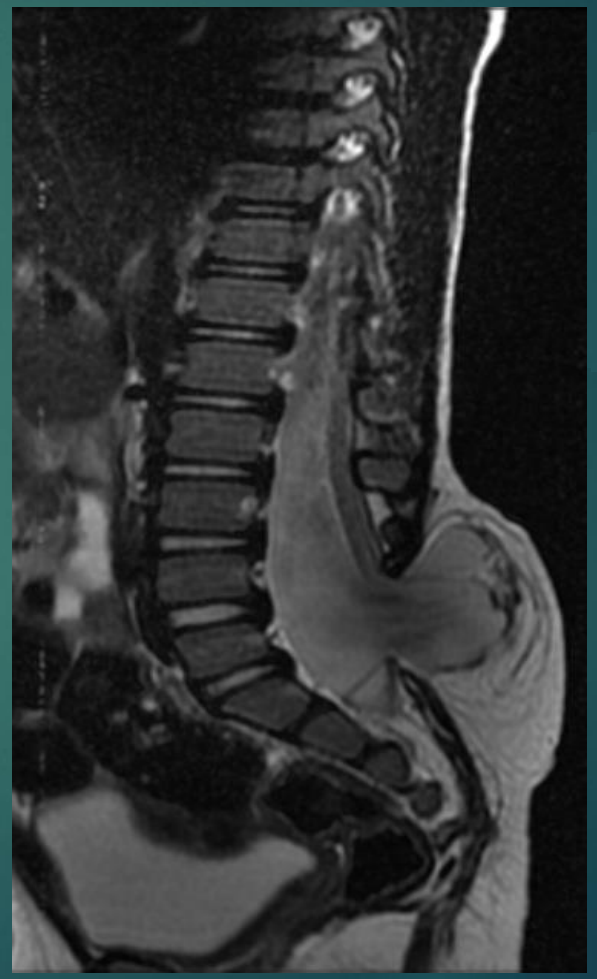
Congenital Defects

Spina bifida

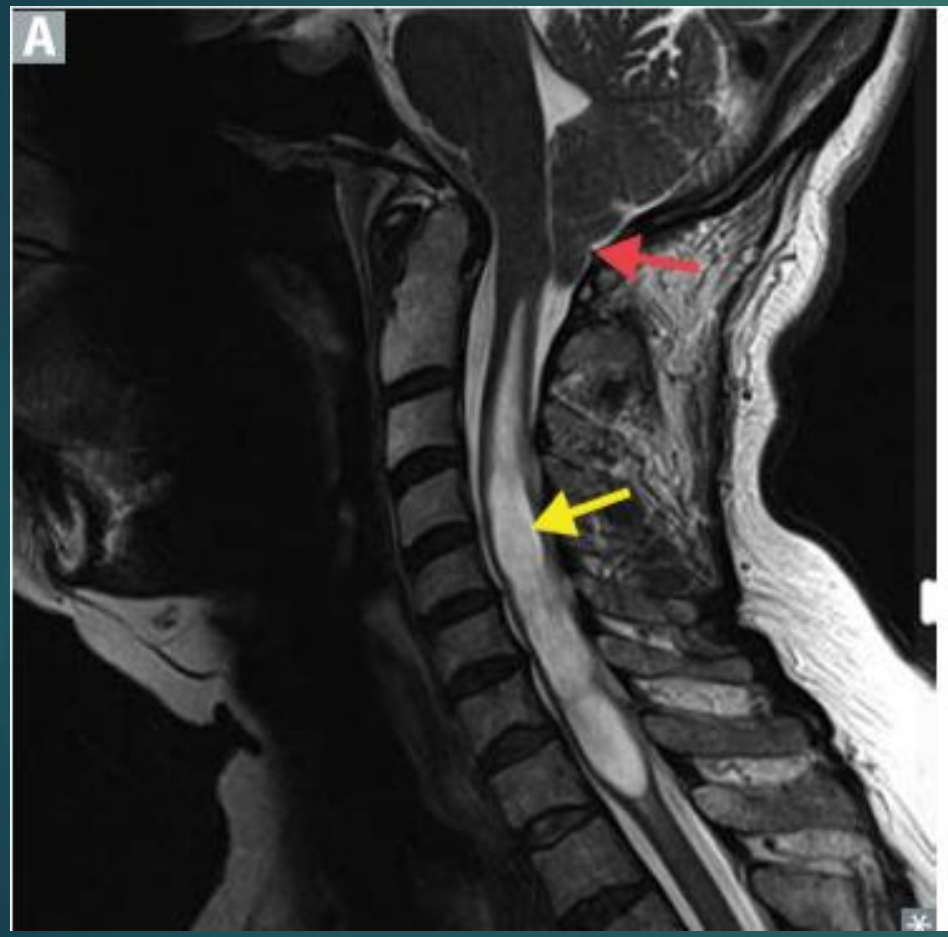


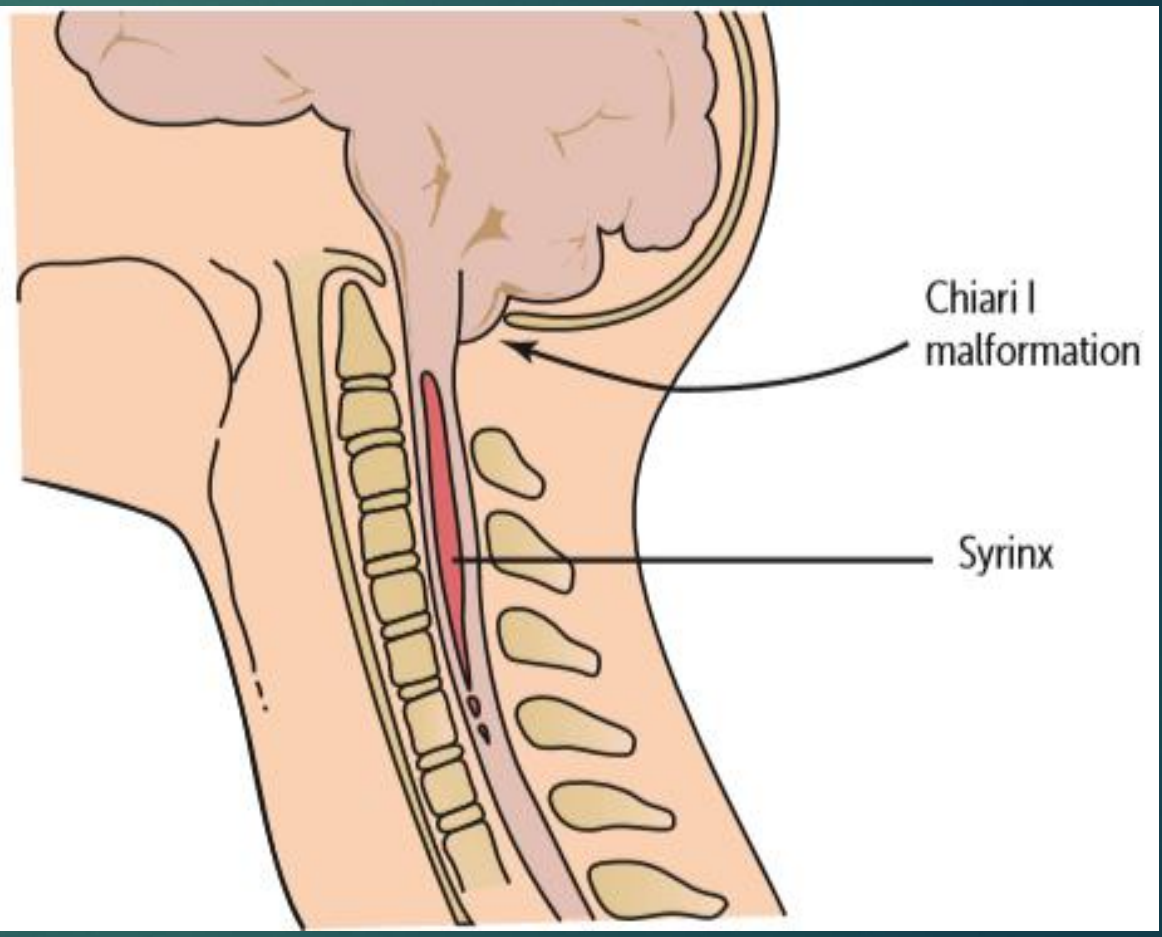



H
A
P
F



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

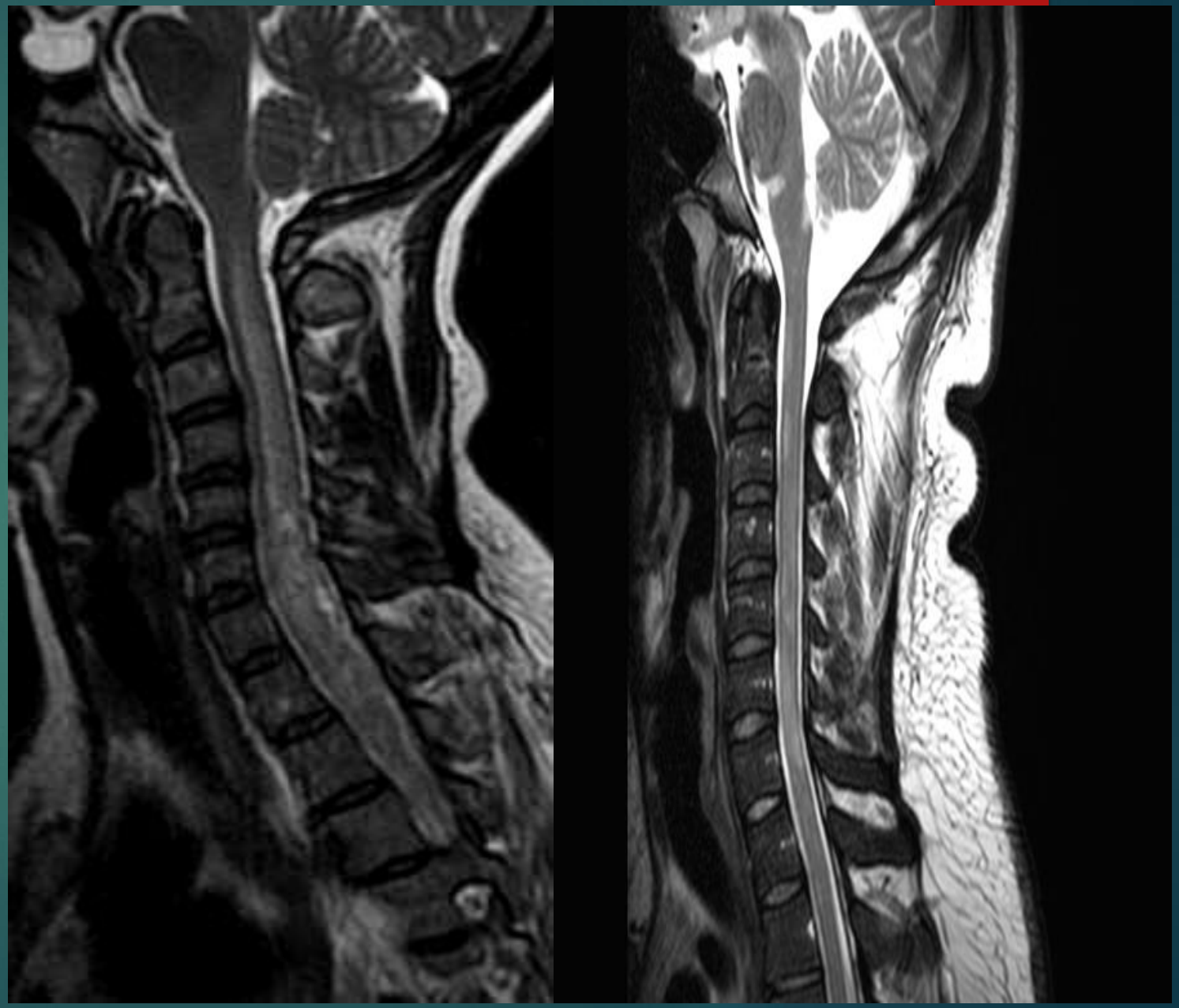
- Viral infections
- Immune reactions
- Idiopathic

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

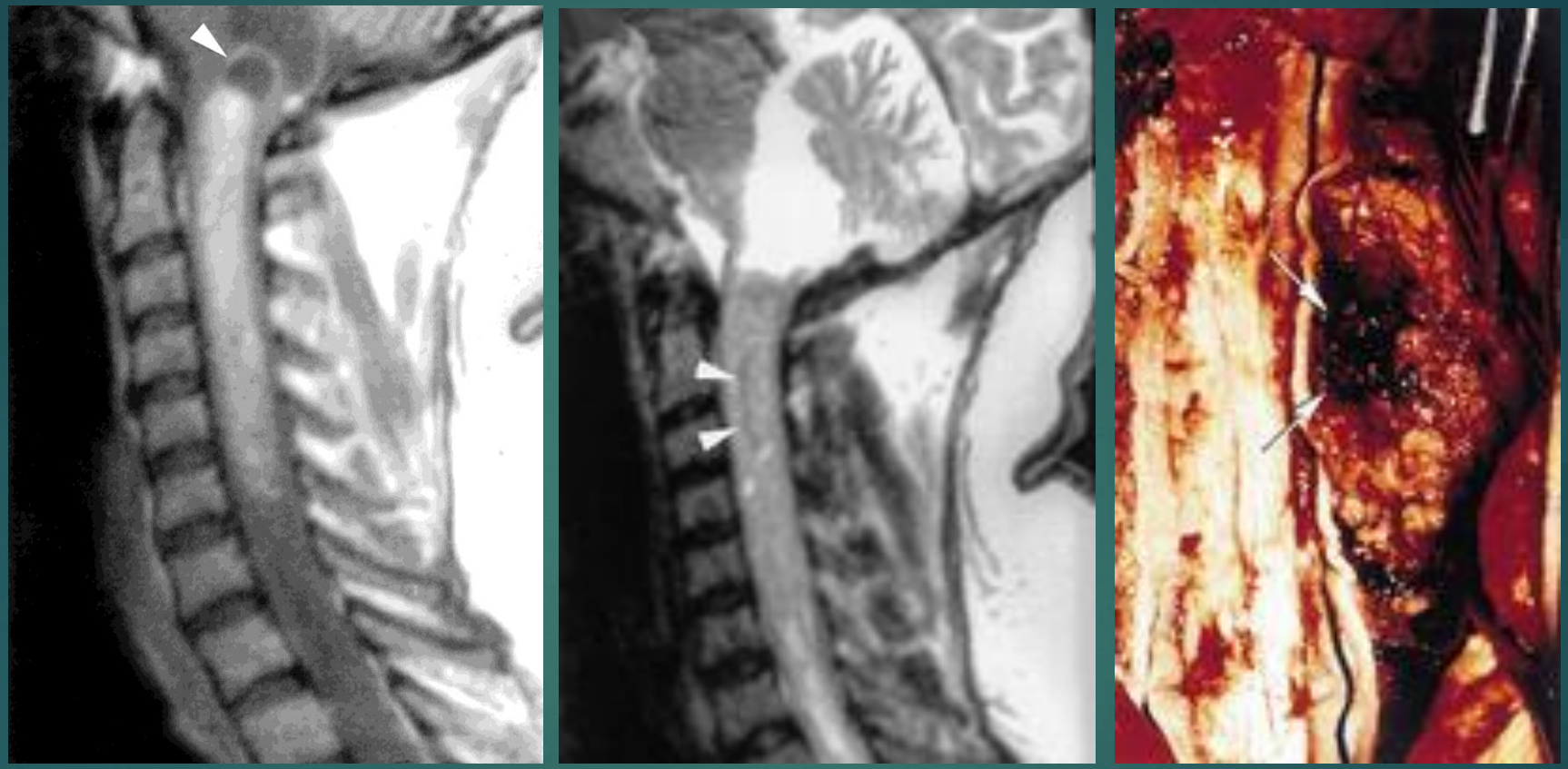
Classification

- **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 attachement (e.g. meningiomas).

Astrocytoma

Ependymoma



RadioGraphics

Thank you