

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)

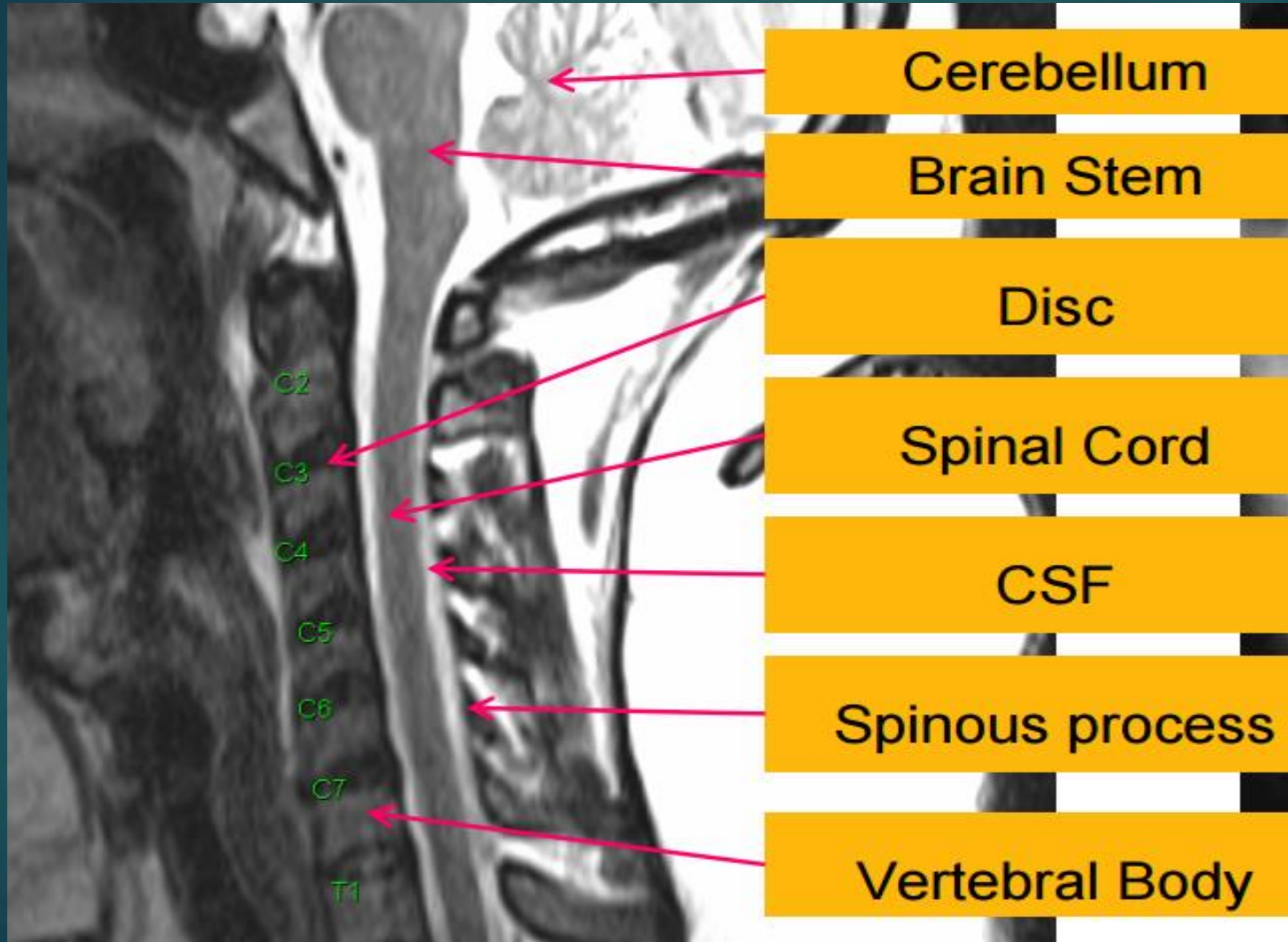
- ▶ Uses radiation
- ▶ Obtain 2-D images → can be processed to 3-D images
- ▶ Entire spine can be imaged within a few minutes
- ▶ Detailed information regarding bony structures
- ▶ Limited information about spinal cord & soft tissues



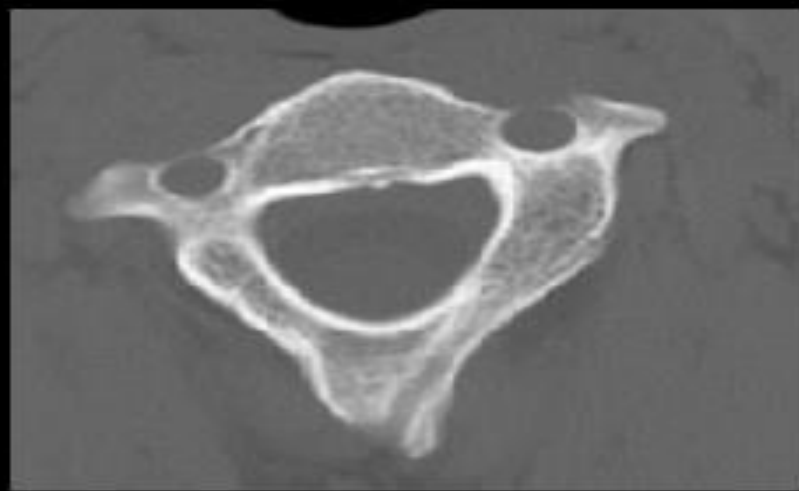
Magnetic Resonance Imaging (MRI)

- ▶ 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





Normal C-Spine with CT



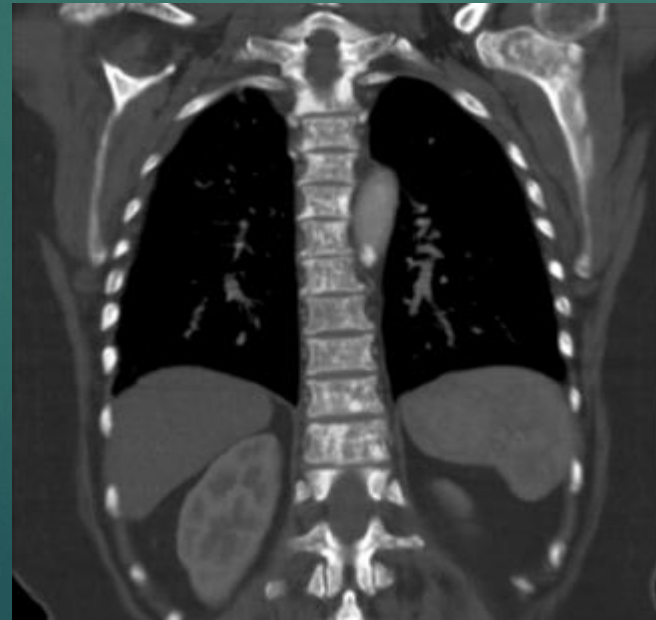
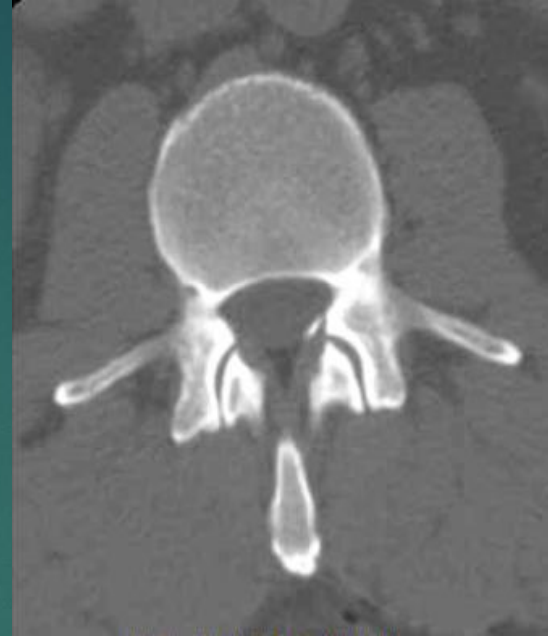
Axial



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.**

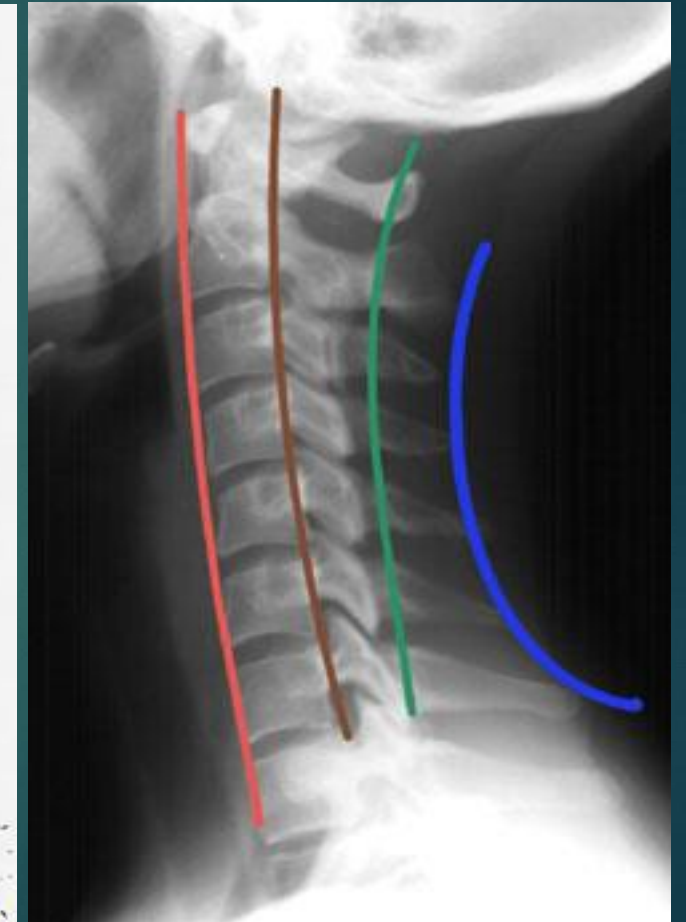
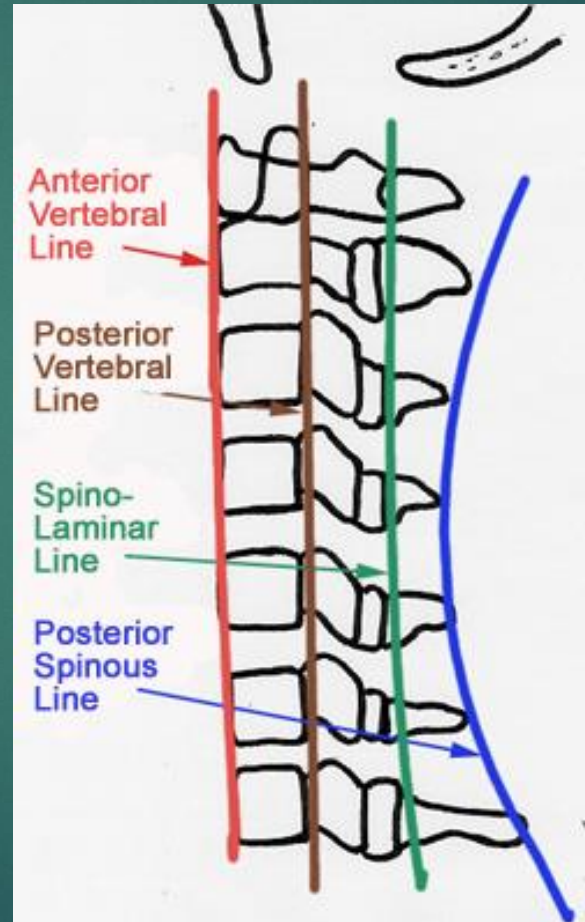
Assess four parallel lines.

1. Anterior vertebral line

2. Posterior vertebral line

3. Spinolaminar line

4. Posterior spinous line



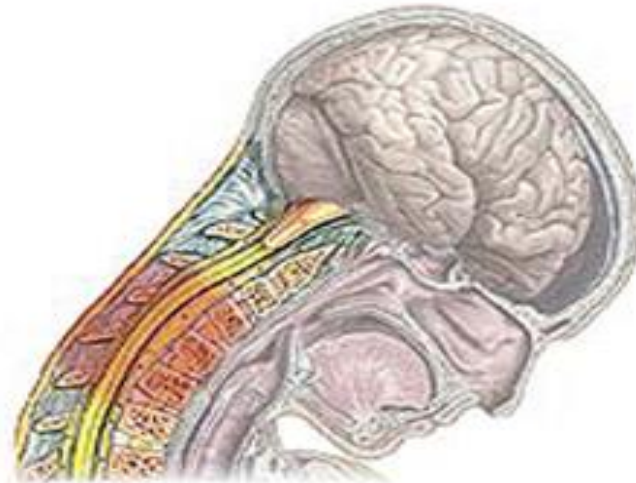
Mechanism Of Injury

Hyperextension

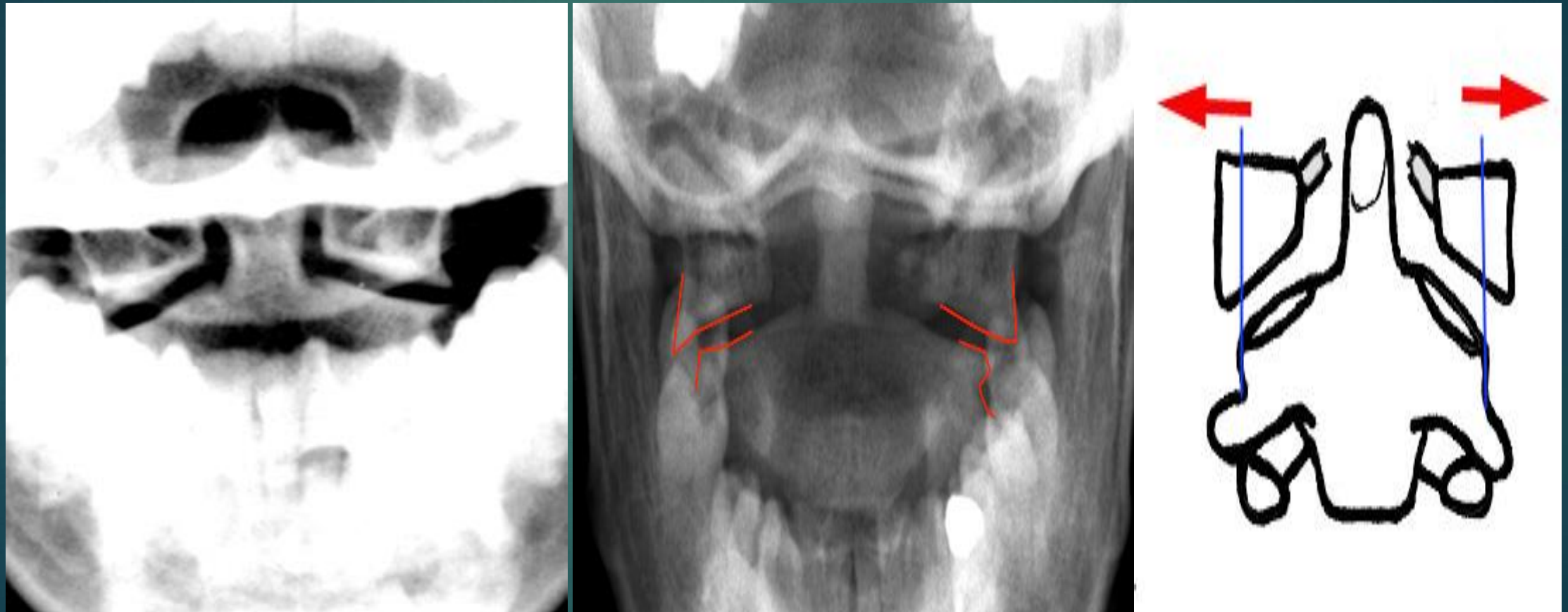


Sprain or strain of
cervical tissues

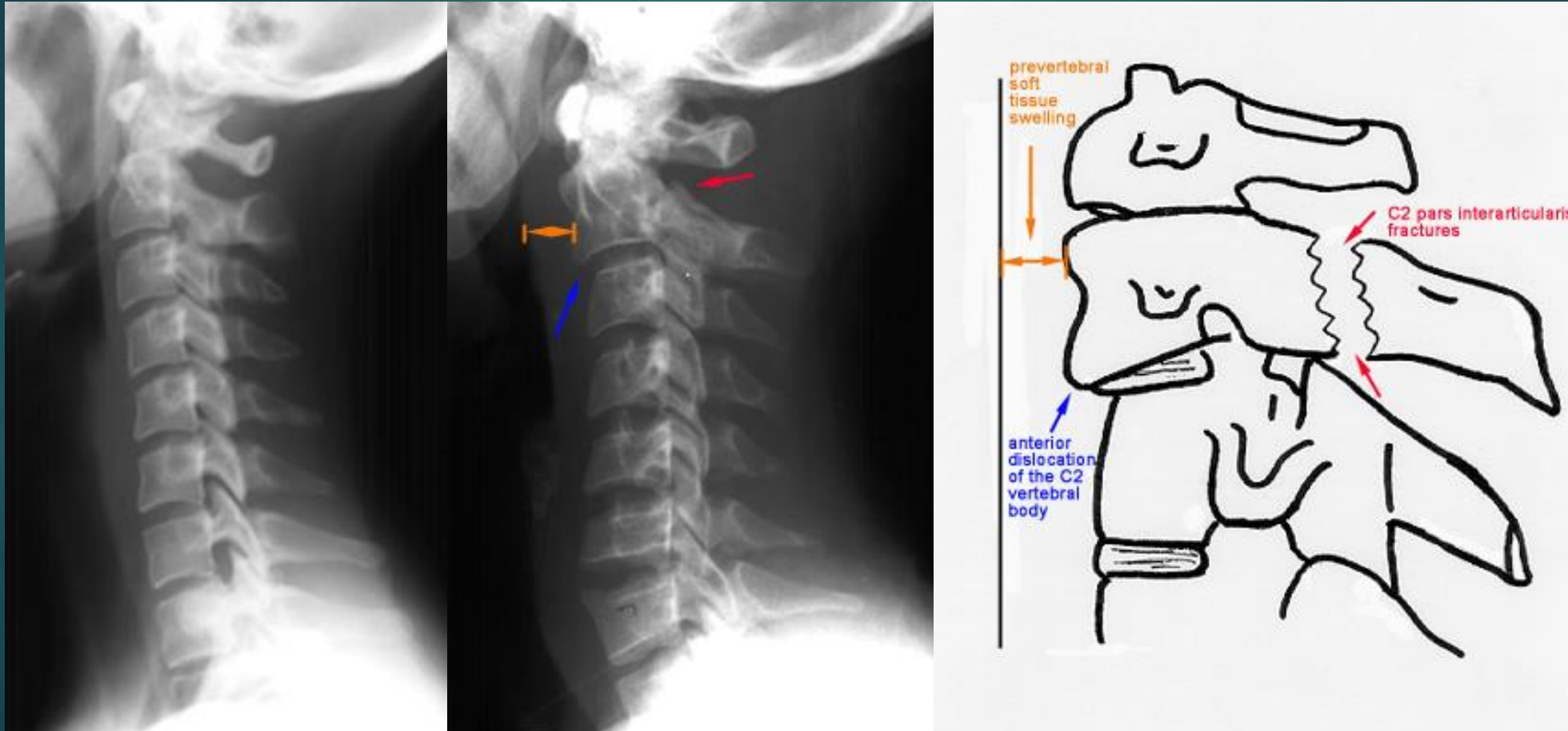
Hyperflexion



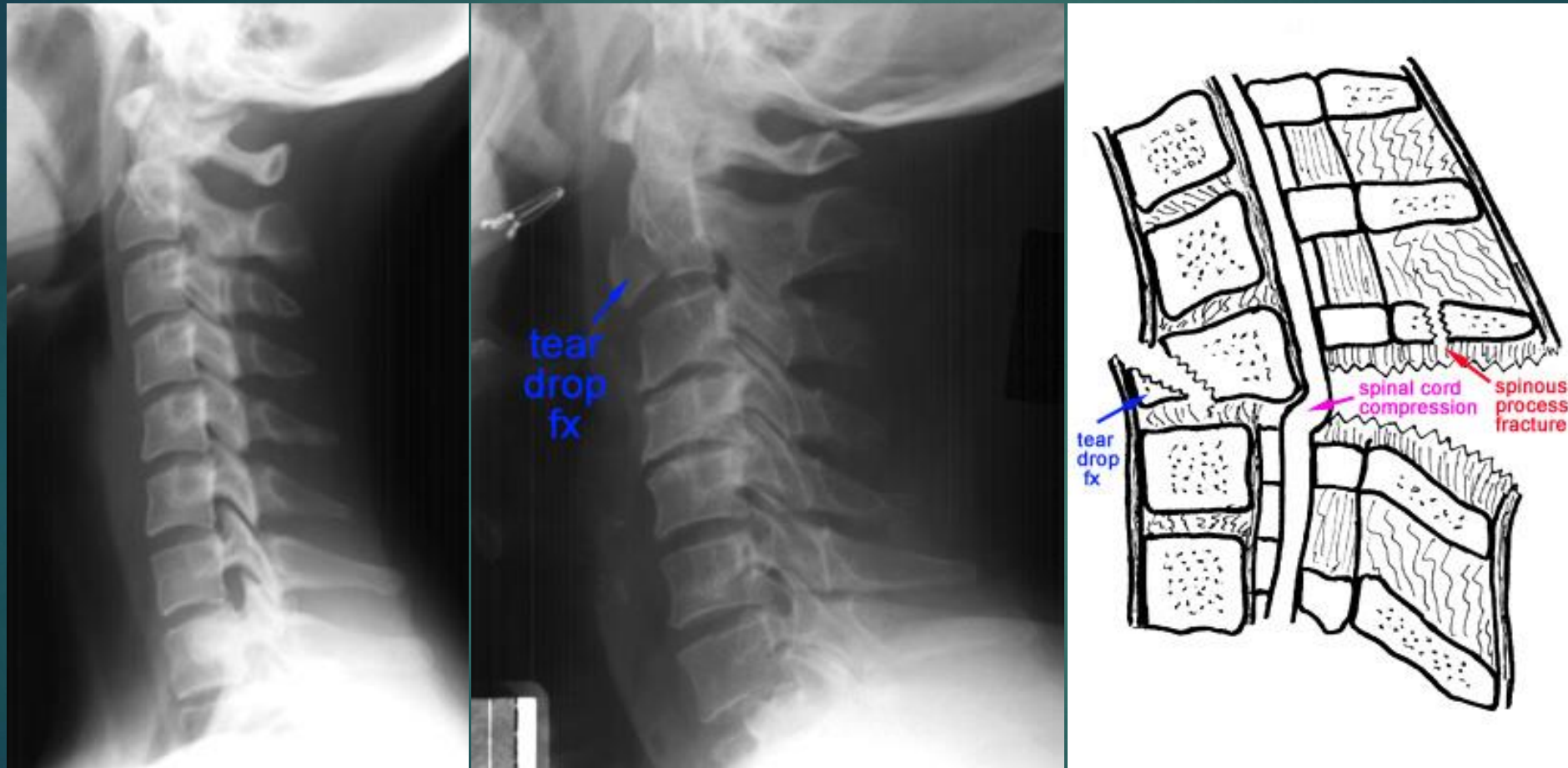
Compression Fracture



Hangman's Fracture

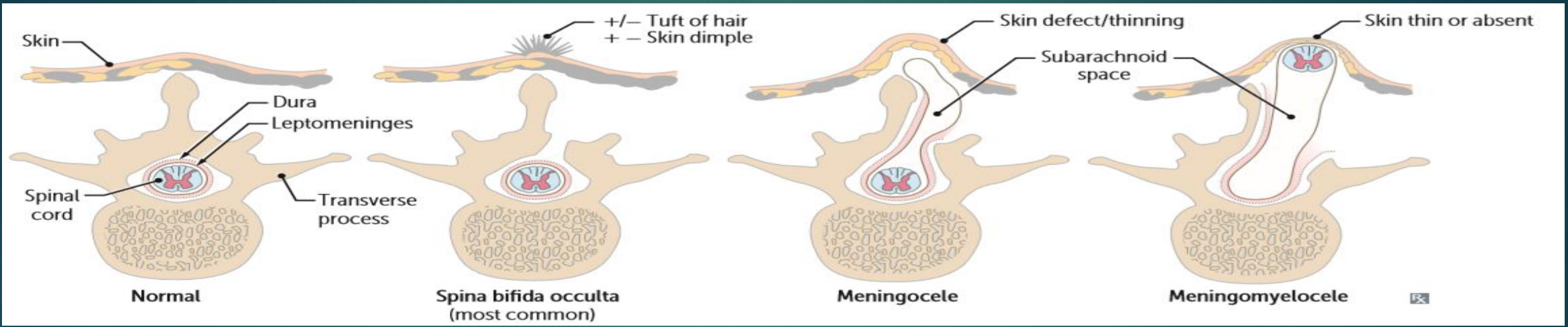


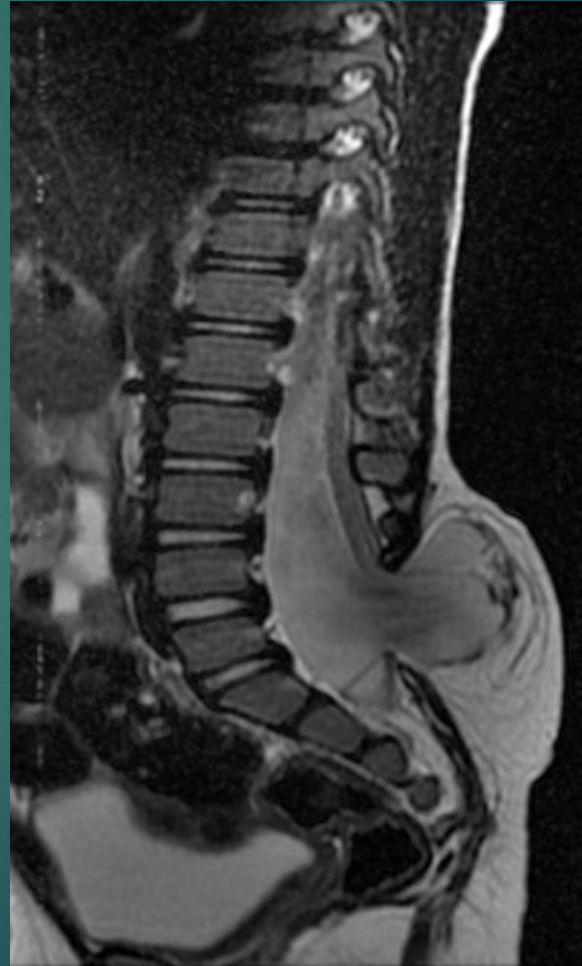
Hyperflexion



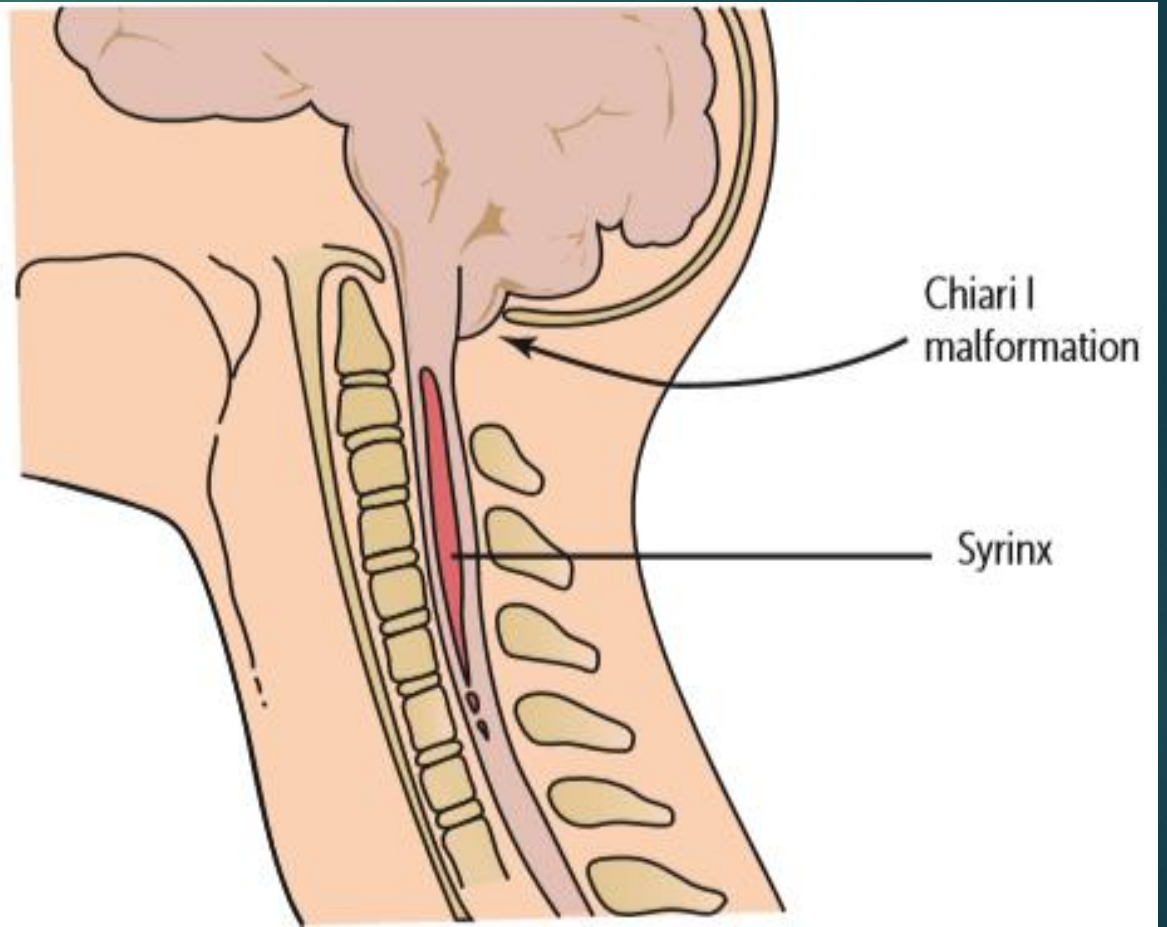
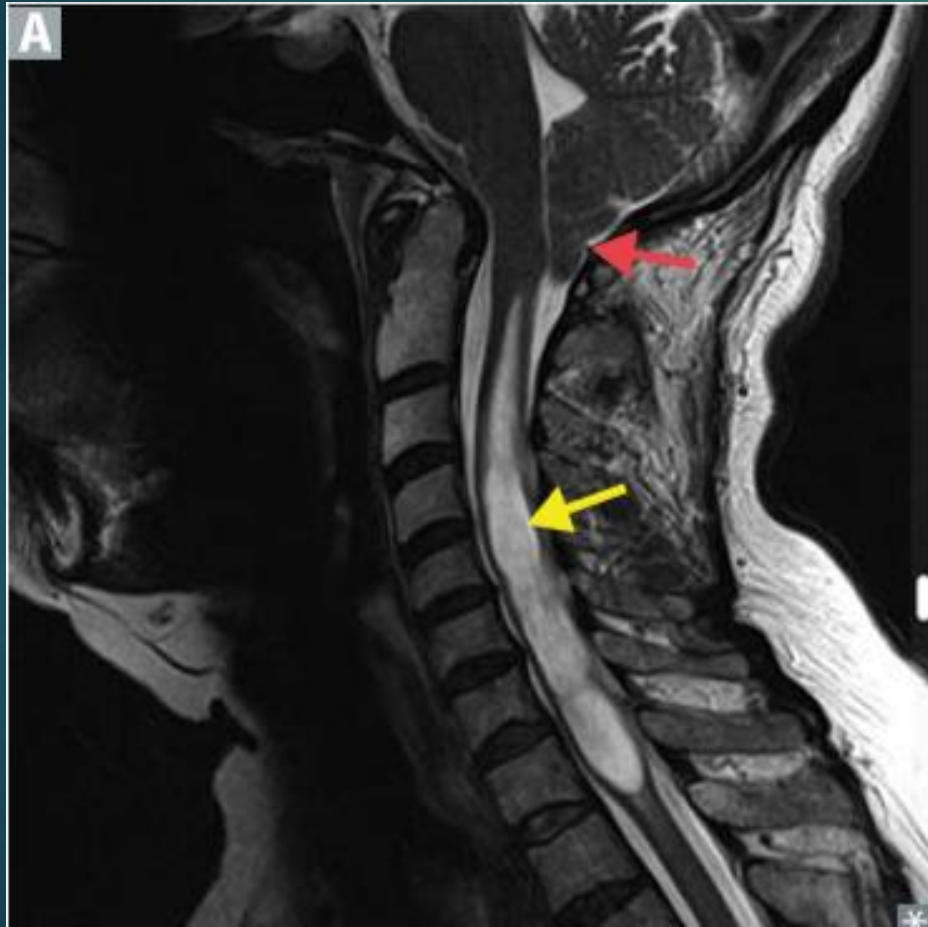
Congenital Defects

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