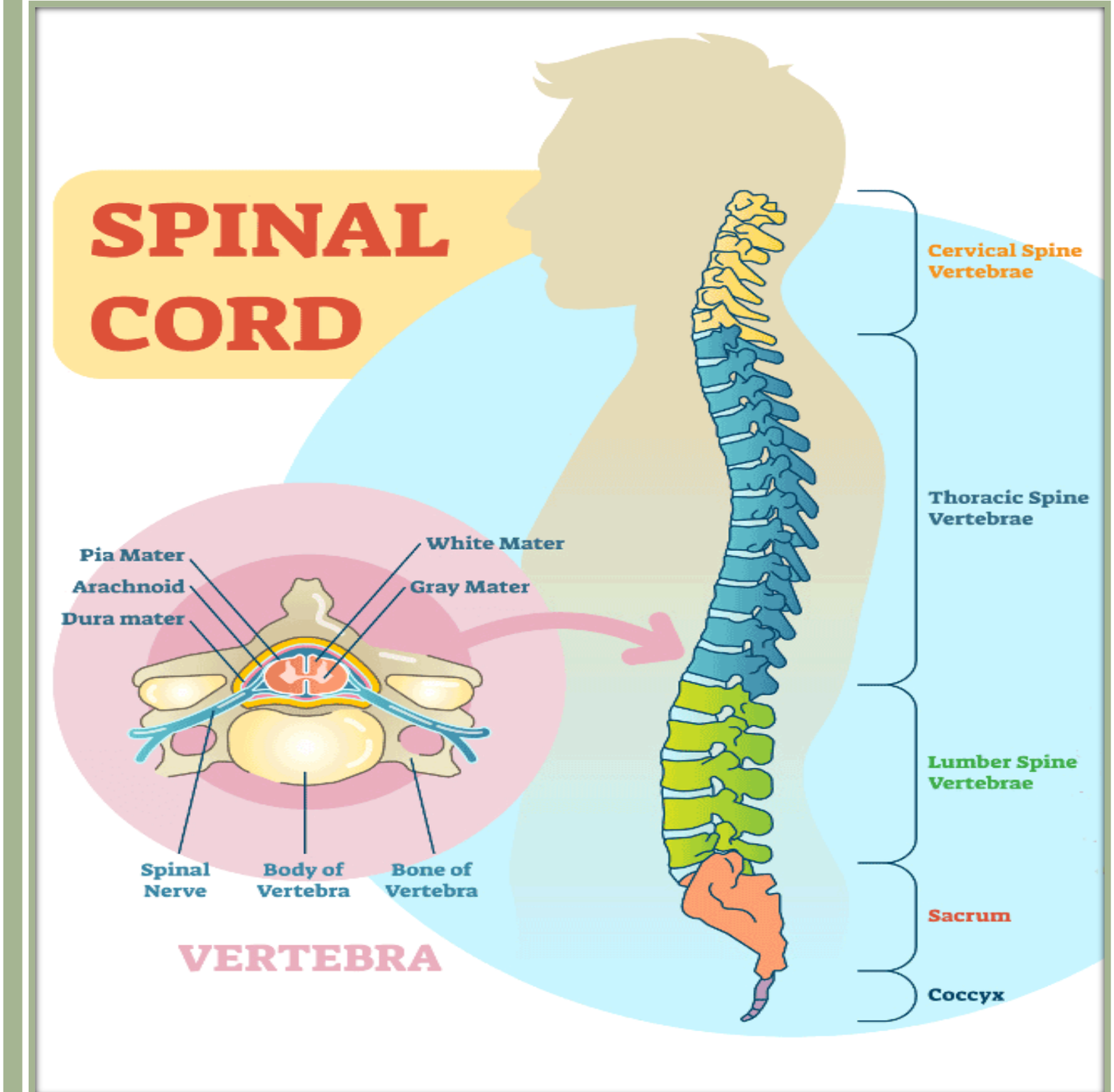
Spinal tumors

Zedan E Qais


SPINAL CORD
Cervical Spine Vertebrae
Thoracic Spine Vertebrae
Lumber Spine Vertebrae
Sacrum
Coccyx
Pia Mater
Arachnoid
Dura mater
White Mater
Gray Mater
Spinal Nerve
Body of Vertebra
Bone of Vertebra
VERTEBRA

Spinal cord tumors..

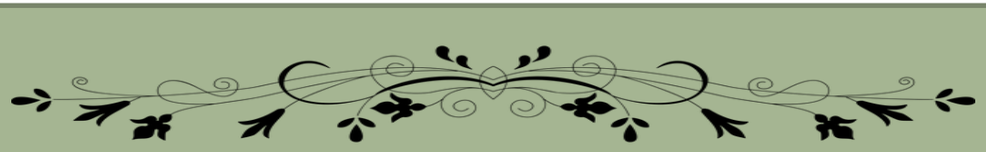
Spinal tumor is an abnormal growth arising from any of the tissues that make up the spine.

- It might be Primary or secondary (Metastatic).
- Primary spinal tumors are relatively rare, typically benign.
- Lung, prostate, and breast cancers are the three most common cancers that tend to spread to the spine.

Spinal Tumor Symptoms..

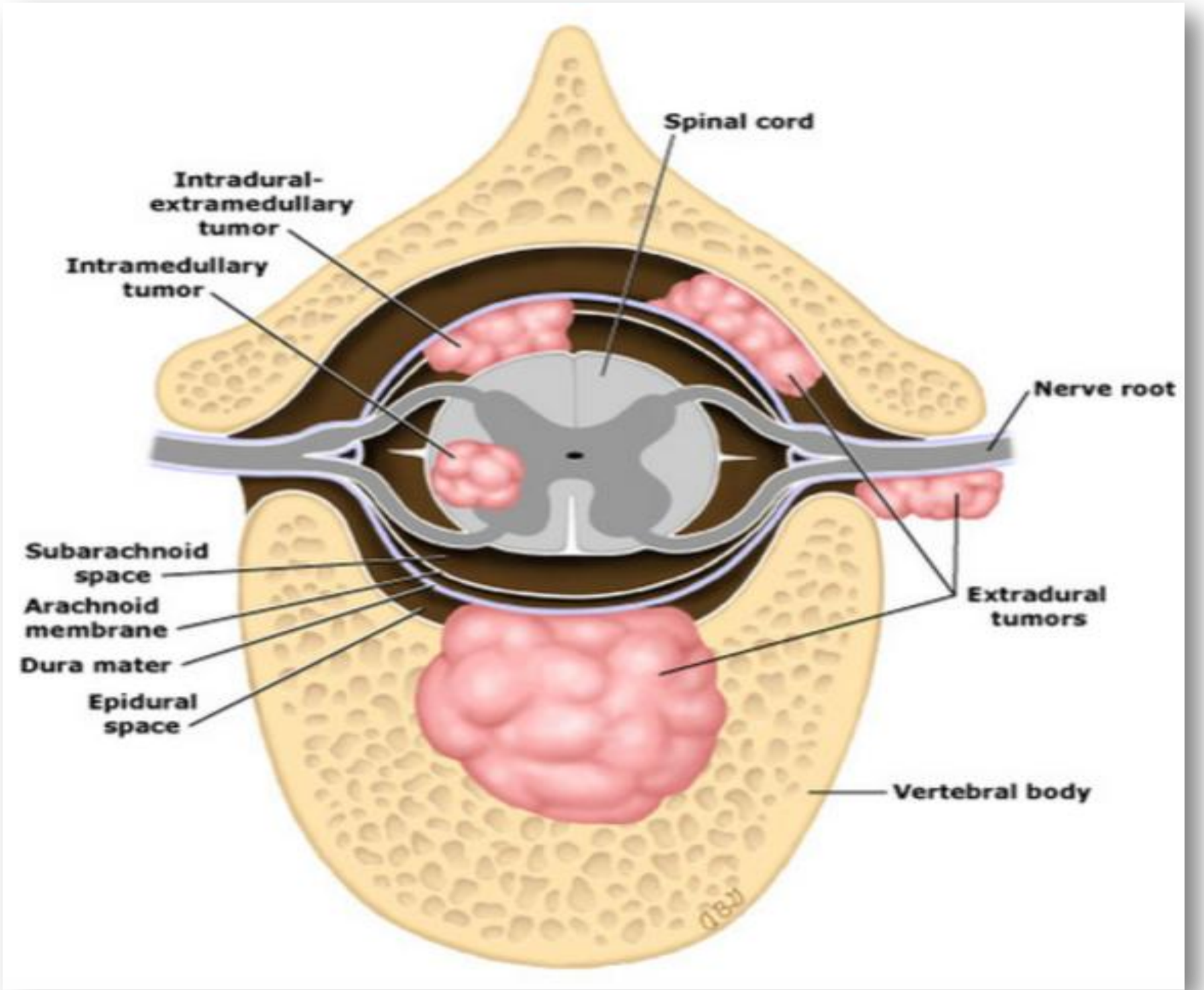
1. **Non-mechanical back pain**
    - In the middle or lower back.
    - Not related to injury, stress or physical activity.
    - The pain may increase with activity.
    - Can be worse at night when lying down.

2. **Loss of sensation or muscle weakness** in the legs, arms or chest
3. Stiff neck or back
4. **Decreased sensitivity** to pain, heat and cold.
5. **Loss of bowel or bladder function**.
6. **Paralysis** that may occur in varying degrees and in different parts of the body, depending on which nerves are compressed
7. **Scoliosis** or other spinal deformity resulting from a large and/or destructive tumor.



- Based on the location of the tumor in relation to the spinal cord, spinal tumors are classified into three groups:

1. Extradural tumors (epidural tumors). 55%
2. Intradural tumors. 40%
3. Intramedullary tumors. 5%


Spinal cord
Intradural-
extramedullary
tumor
Intramedullary
tumor
Nerve root
Subarachnoid
space
Arachnoid
membrane
Dura mater
Epidural
space
Extradural
tumors
Vertebral body

Extradural tumors

- form inside the spinal column and may involve the vertebrae.
- typically don't affect the spinal cord.
- They are often located in the epidural space.

Benign

1. Hemangioma.
2. Osteoid osteoma.
3. Osteoblastoma.
4. Osteochondroma.
5. Giant cell tumor.

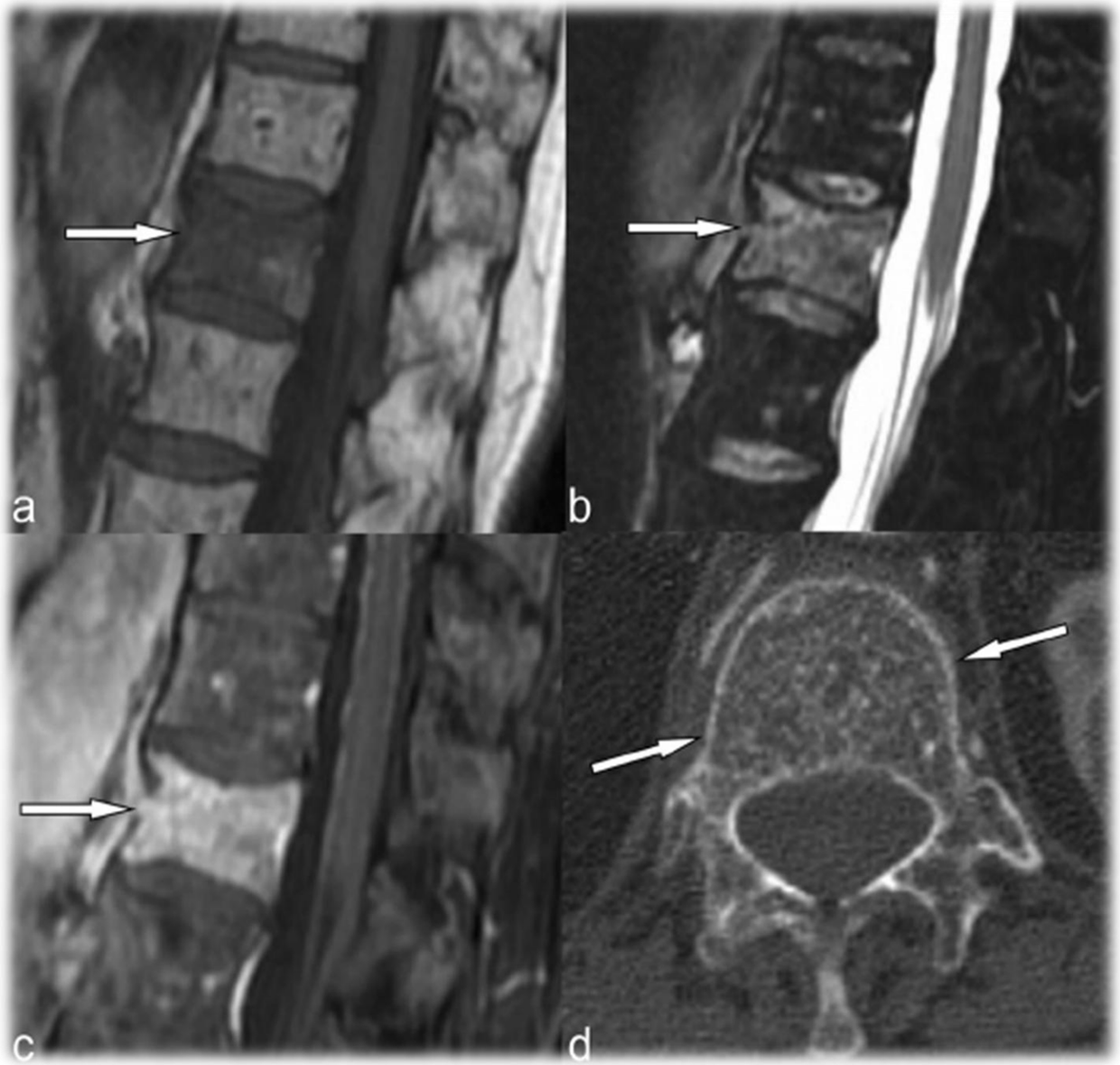
Malignant

1. Osteosarcoma.
2. Chondrosarcoma.
3. Multiple myeloma.
4. Chordoma.
5. Lymphoma.
6. Mets.

Extradural tumors - benign

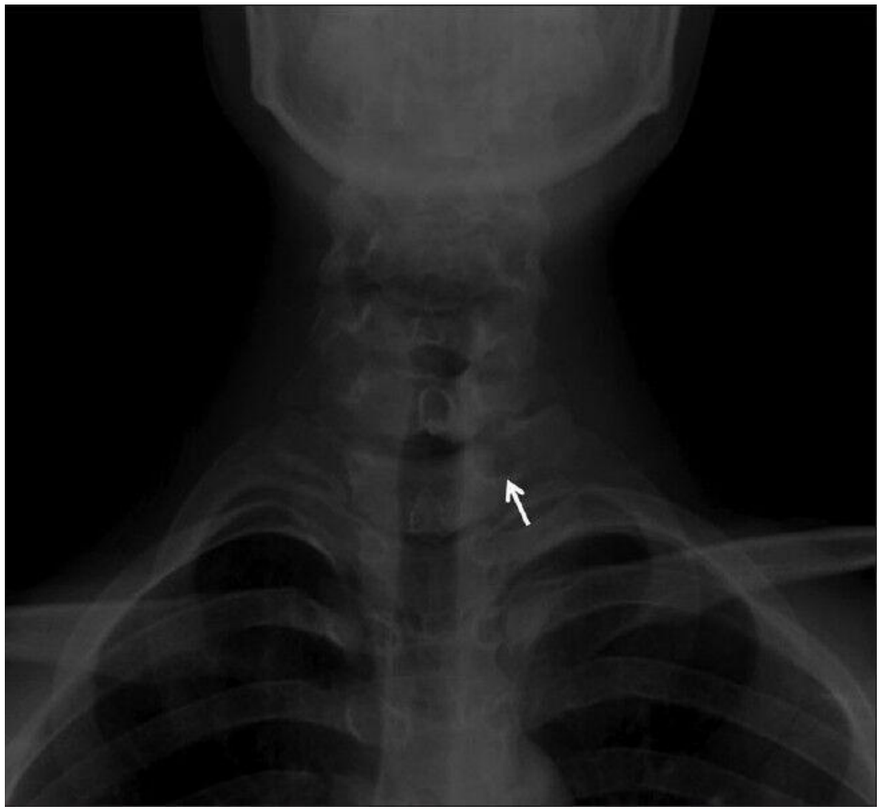
1. Hemangioma:

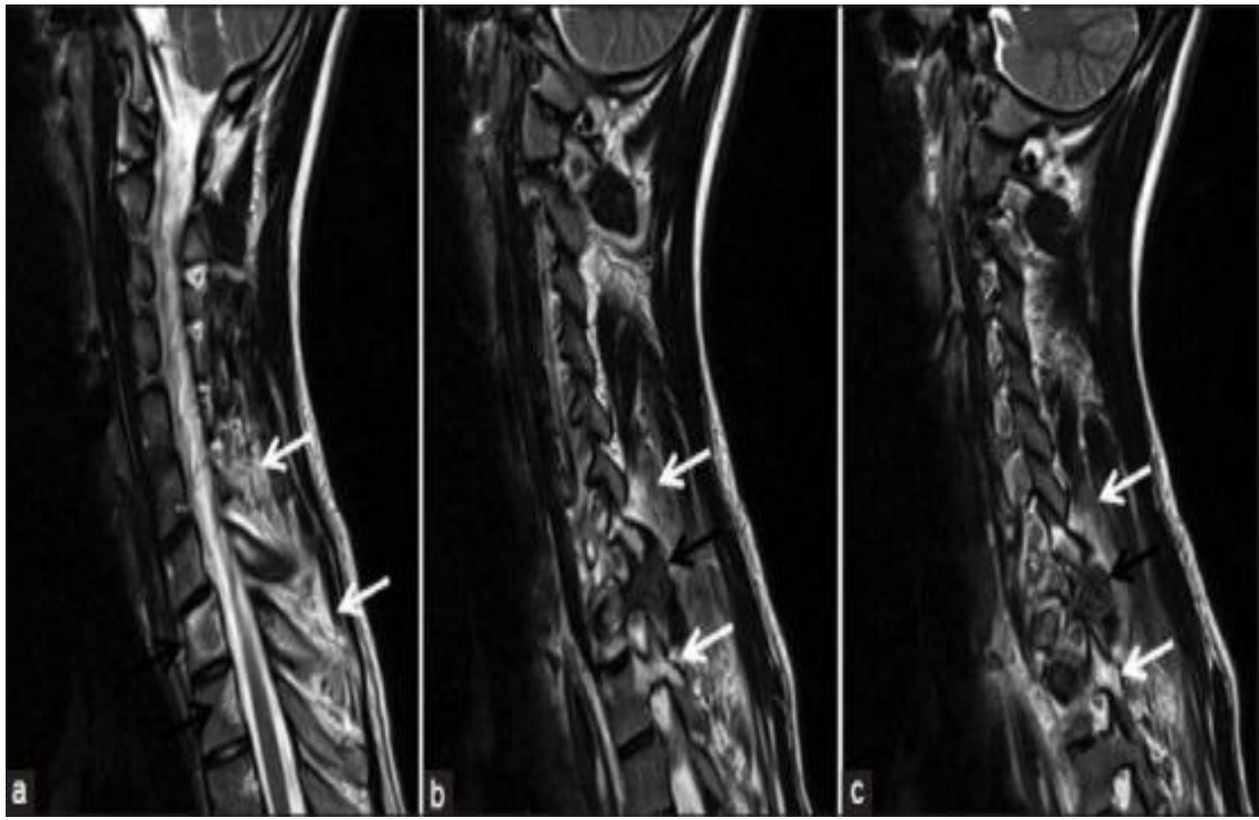
- a growth that forms from the tissues of blood vessels inside the spinal column.
- These tumors are more common on the surface of the skin, especially in infants, but may also affect internal organs.
- affect the vertebral body of a spinal segment.
- frequently during mid-life.
- Women more than men.



2. Osteoid osteoma:

- a small tumor in the bone that is more common in children and younger adults.
- the most common of the benign tumours.



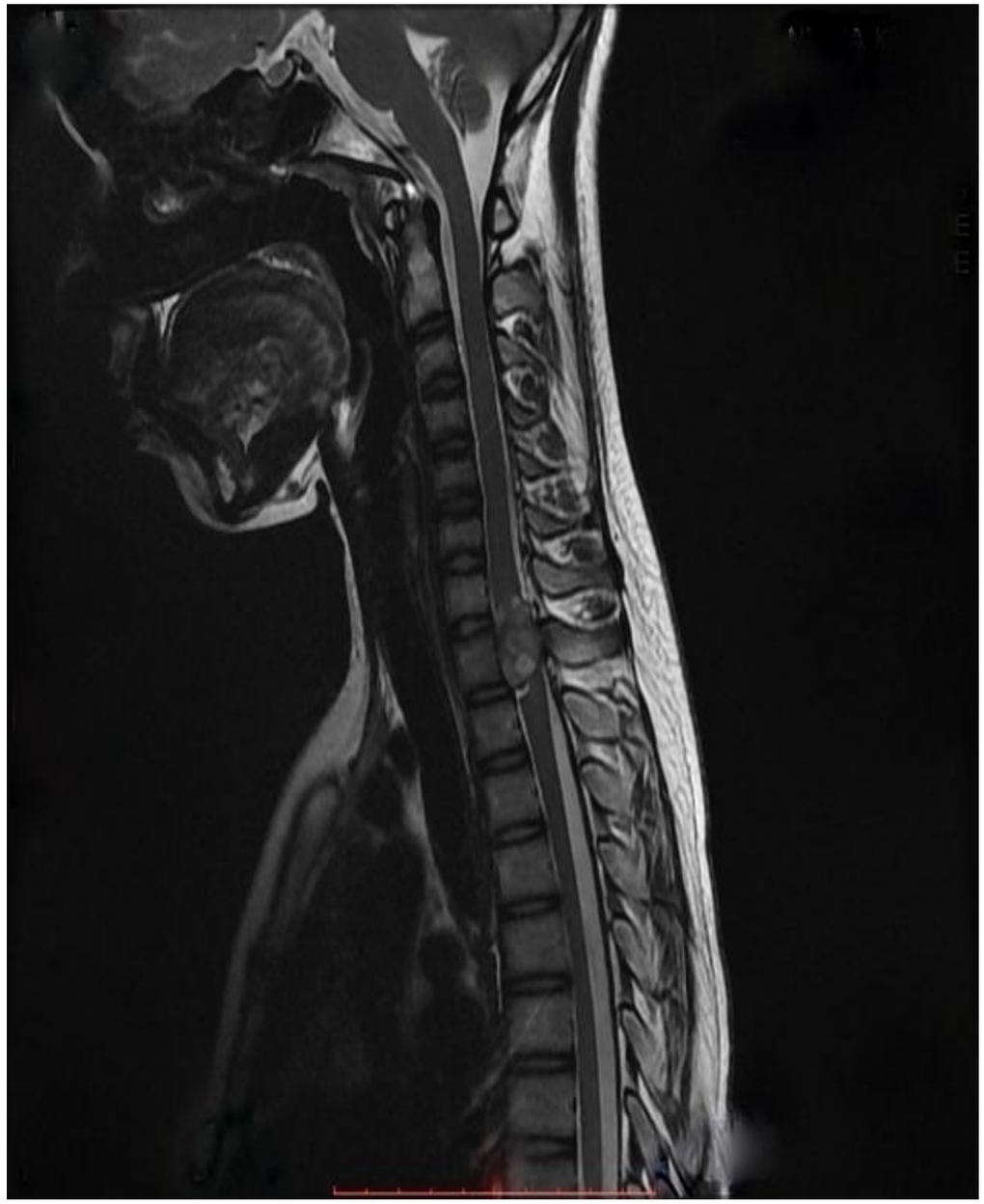


3. Osteoblastoma:

- similar to osteoid osteoma but typically larger and more aggressive.

4.Osteochondroma:

- an overgrowth of cartilage and bone that usually occurs at the end of the bone near the growth plate.



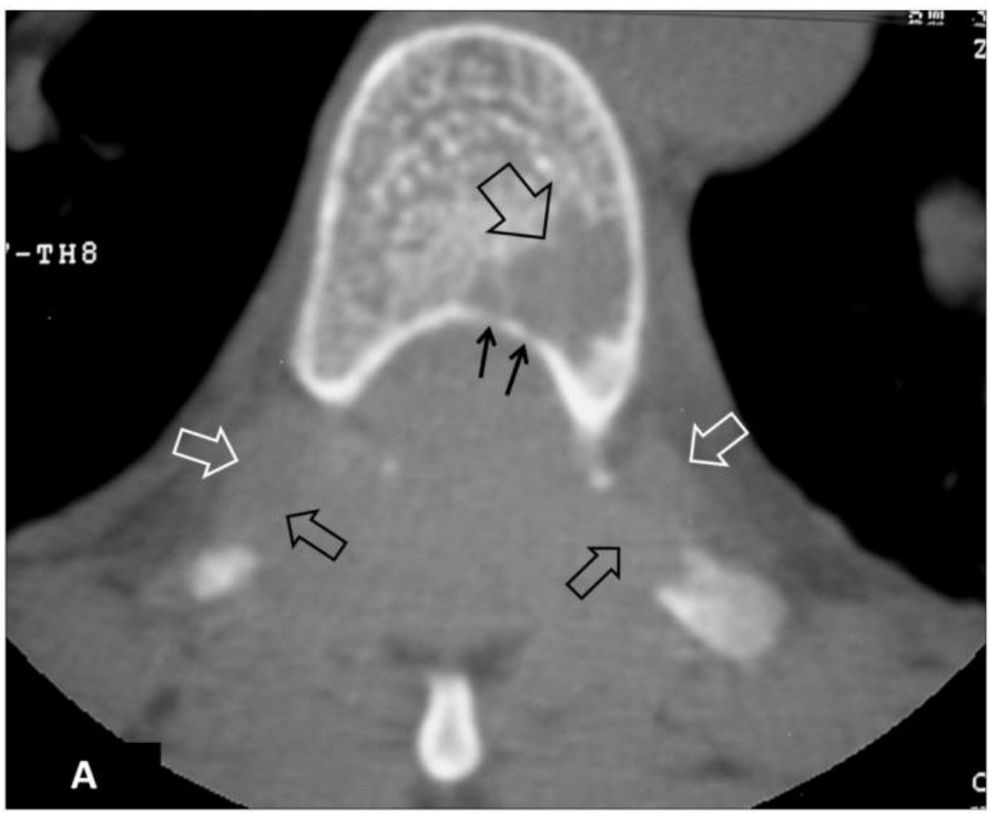
5.Giant cell tumor (GCT):

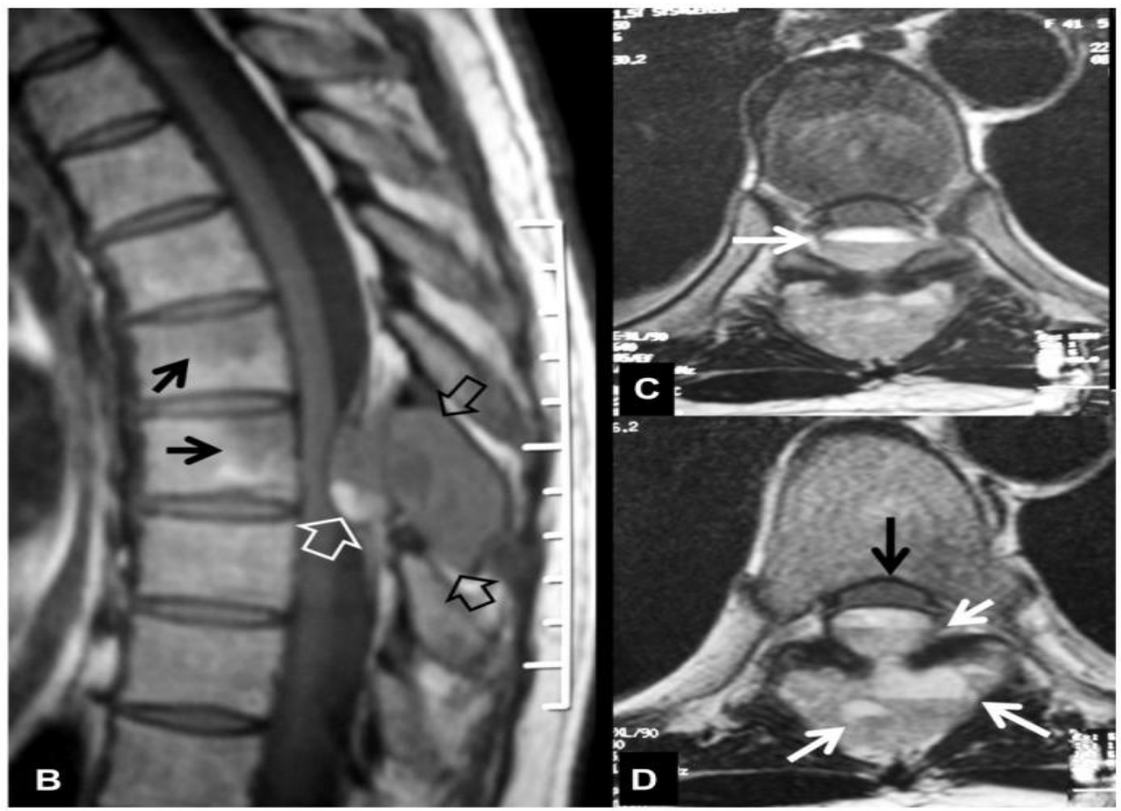
- It typically contains “giant” cells with multiple nuclei that formed as several cells fused together.
- GCTs in the spine typically affect the bones of the vertebrae.

Extradural tumors – Malignant

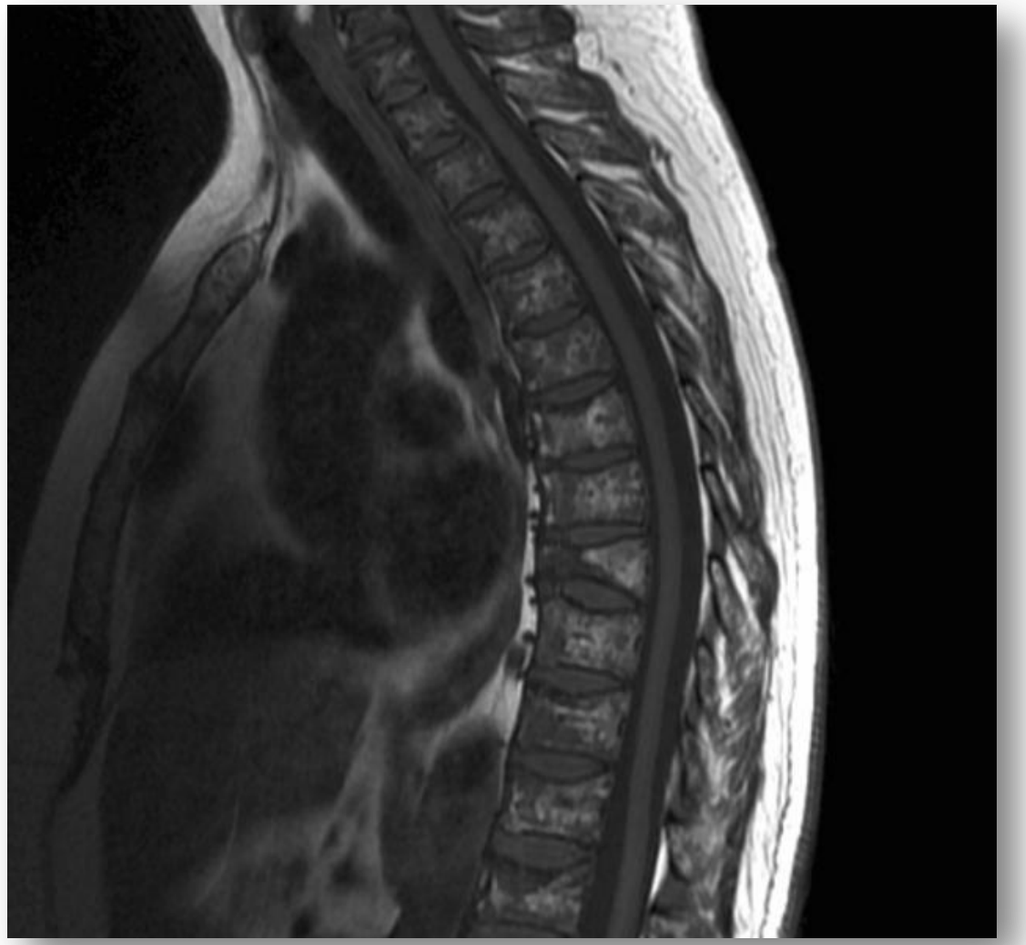
1. Osteosarcoma:

- a type of bone cancer that may originate in the spine but is more common in the thigh and shin bones.
- most often in children, adolescents, and young adults.
- Males more than females.





2. Chondrosarcoma: a tumor that arises from cartilage cells around the bone. Although uncommon in the spine, it can sometimes develop as a primary cancer in the bones that form the spinal column.



3. Multiple myeloma:

- the most common primary malignant tumor of bone.
- adults greater than 40 years of age.
- It tends to be generalized, involving multiple bones.
- back pain and involvement of the spine is the most common presenting complaint.

4. Lymphoma:

- A group of cancers that affect the cells of the immune system called lymphocytes.
- It may develop in the spine as a primary tumor, but more often it arises elsewhere and spreads to the spine.
- Extended from paravertebral LN Into vertebral body or through foramena to epidural space

5.Chordoma:

- A malignant bone tumor that can develop inside the spinal column anywhere along its length
- It is most commonly seen in the sacrum.

Testing & Diagnosis..

1) **X-Ray:**
   - They are not very reliable in diagnosing tumors.
2) **CT scan.**
3) **MRI**
4) **Bone Scan.**

5) **Biopsy**
   - may be needed if diagnosis is unclear or if concern for malignancy vs benign tumor type.
   - If the tumor is malignant, a biopsy also helps determine the cancer's type, which subsequently determines treatment options.

Treatment..

Treatment for spinal cancer and spinal tumors will differ based on the tumor type, aggressiveness and many other factors.

- Chemotherapy.
- Radiation therapy.
- Full or partial surgical removal of the tumor.
- Steroids to help with swelling and back pain.

❑ Certain benign spinal tumors and cysts may not need treatment if they don't cause any symptoms.

Spinal Cysts and Tumorlike Masses..

- Eosinophilic granuloma: benign lesions, rare in adults, that affect bones and may cause a collapse of the vertebrae; they are more common in the mid-back.

- Epidural lipomatosis: excessive growth of fat inside the epidural space.

- Synovial cyst: a fluid-filled sac that typically forms in the lumbar spine (lower back) around the vertebral joints, usually from a degenerative process, and is benign.

- Arachnoid cyst: a fluid-filled sac that may cause separation in the membranes enveloping the spinal cord and may protrude into the epidural space.

Thank You.!

Spinal tumors

Ruba Azzam

Classification: Intradural

Extramedullary: ~90%
in subarachnoid space

- Schwannoma
- Neurofibroma
- •Meningioma
- •Subarachnoid mets (only 4% of spinal mets) or “drop mets”

Intramedullary: ~10%
within spinal cord

- Ependymoma
- Astrocytoma
- Hemangioblastoma
- Mets (only 2% of spinal mets)

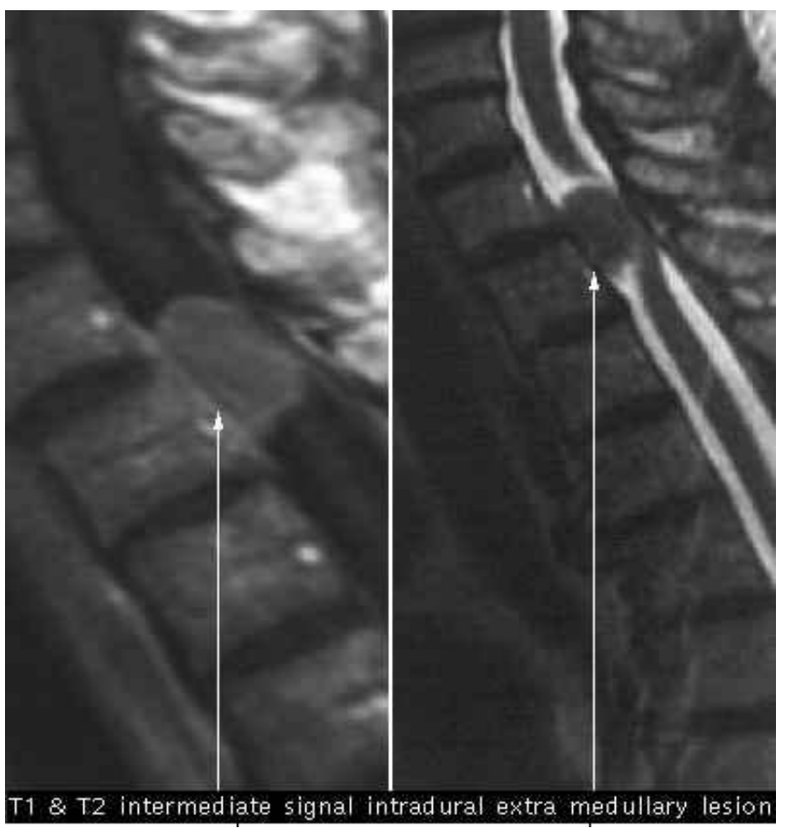
Benign Spinal tumors-Spinal meningioma

is **the most common spinal cord tumor**. predominate **after the fourth decade**

more in **female**

They arise from **meningothelial cells that are clustered around the spinal nerve roots**.

80% in T-spine (15% C-spine)



Spinal Meningioma

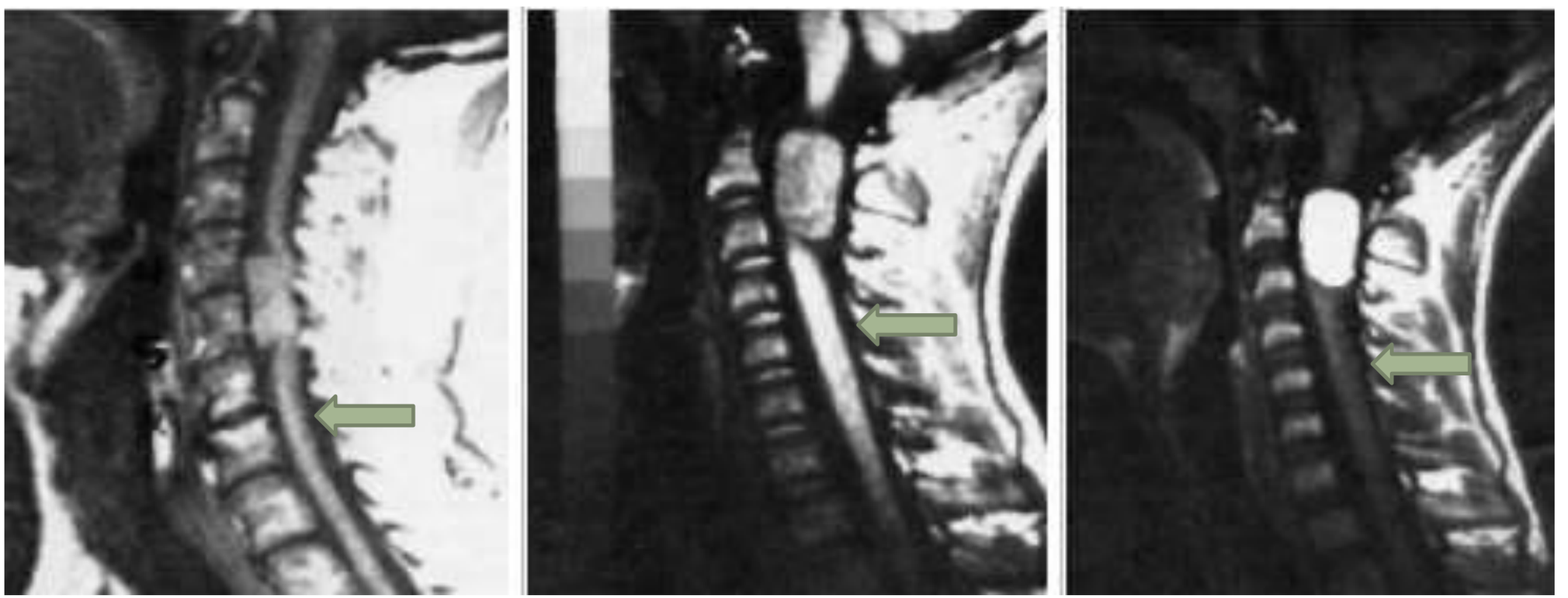
- Middle-aged women (80% women)
- Motor deficit: 90%
- Sensory deficit: 60%
- **Pain: 50-70% (diffuse localized over region or** radicular)
- Sphincter dysfunction-~50%

Spinal Meningioma Treatment

- complete surgical removal= treatment of choice
- compare to intracranial meningiomas:
  - Less difficult ventral exposure requirement!!??
  - Absence of bony involvement
  - Lack of venous sinus or major blood vessel involvement
- 10-15% recurrence rate of intraspinal meningiomas at 10 years after total or near total removal.

Benign Spinal tumors-Schwannomas

encapsulated, solitary tumors that derive from **Schwann cells** .
They arise adjacent to, and displace the involved **nerve root**.
Schwannomas and neurofibromas typically involve **the dorsal sensory nerve roots**.
Depending upon their site of origin, they can be intradural, extradural, or both, forming a “dumbbell” or hour-glass shaped mass.



MRI T1 ,precontrast [left, middle] and postcontrast [right] showing a spinal schwannoma, notice the T1 hypointensity and the dense contrast enhancement

Spinal Neurofibromas

Spinal neurofibromas are typically **larger tumors** that grow from nerves along the spinal column in adults with **NF1**. Despite the fact that spinal neurofibromas are close to the spinal cord, most people with spinal neurofibromas experience no medical problems as a result of their growth. Occasionally, adults with NF1 will experience back pain, numbness in an arm or leg and minor weakness.

Nerve Sheath Tumors

- **Schwannomas**
  - Slightly more common
  - Dorsal root
  - Encapsulated
  - Schwann cells
  - Malignancy v. rare

- **Neurofibromas**
  - Slightly less common
  - Dorsal root
  - Unencapsulated
  - Schwann cells & fibroblasts
  - 5-10% of pts w/ NF malignant (≤ 1 yr survival)

Nerve Sheath Tumors

- Majority arise from dorsal nerve root, **but Ventral root tumors are more common in Neurofibromas.**
- 10% of nerve sheath tumors are epidural or paraspinal.
- 1% of nerve sheath tumors are intramedullary
- Symptoms :
  - Pain and radiculopathies
  - Paresthesias
  - Weakness

NERVE SHEATH TUMORS TREATMENT

1) Gross total excision:

– Recurrence is rare

2) Gross subtotal excision

Extramedullary: ~90%

in subarachnoid space

- Schwannoma
- Neurofibroma
- •Meningioma
- •Subarachnoid mets (only 4% of spinal mets) or “drop mets”

Intramedullary: ~10%

within spinal cord

- Ependymoma
- Astrocytoma
- Hemangioblastoma
- Mets (only 2% of spinal mets)

Intramedullary tumor

Malignant spinal-Astrocytomas

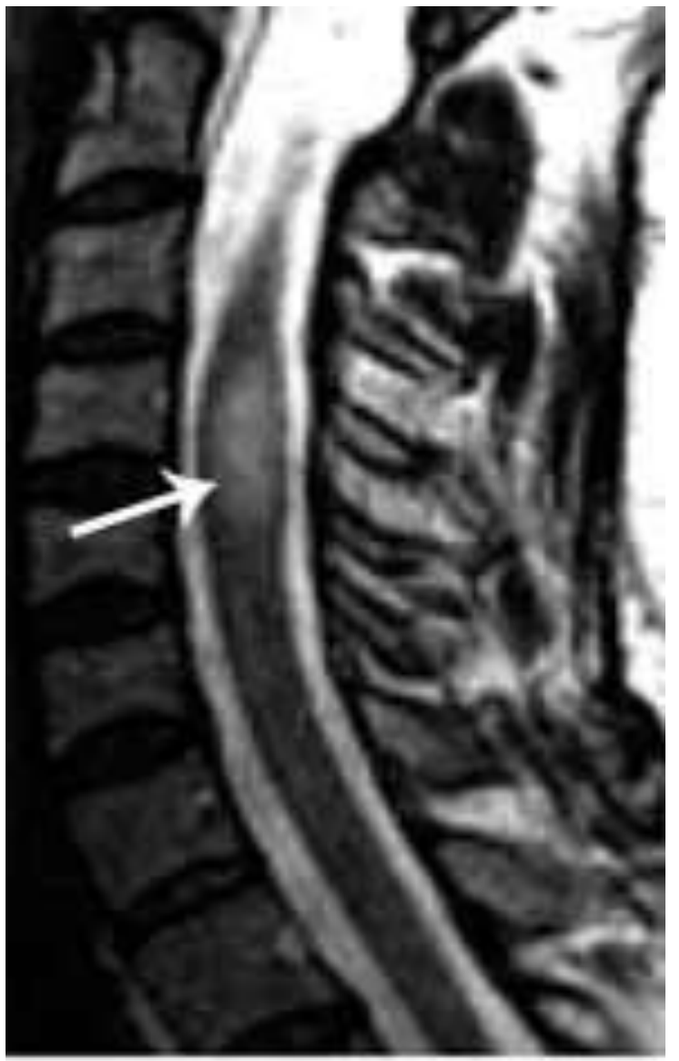
Astrocytomas are tumors that involve nerve cells **within the spinal cord**.

They most commonly in the **first 3 decades of life)**

Neurological symptoms such as **weakness and/or sensory** changes may be the cause for seeking treatment.

They tend to spread throughout the spinal cord and brain.

Astrocytomas in the spine can usually be **removed surgically**. However, they are **difficult to completely remove. Radiation therapy may be necessary following surgery to slow the spread of the tumor.**



Spinal cord astrocytoma

Astrocytoma

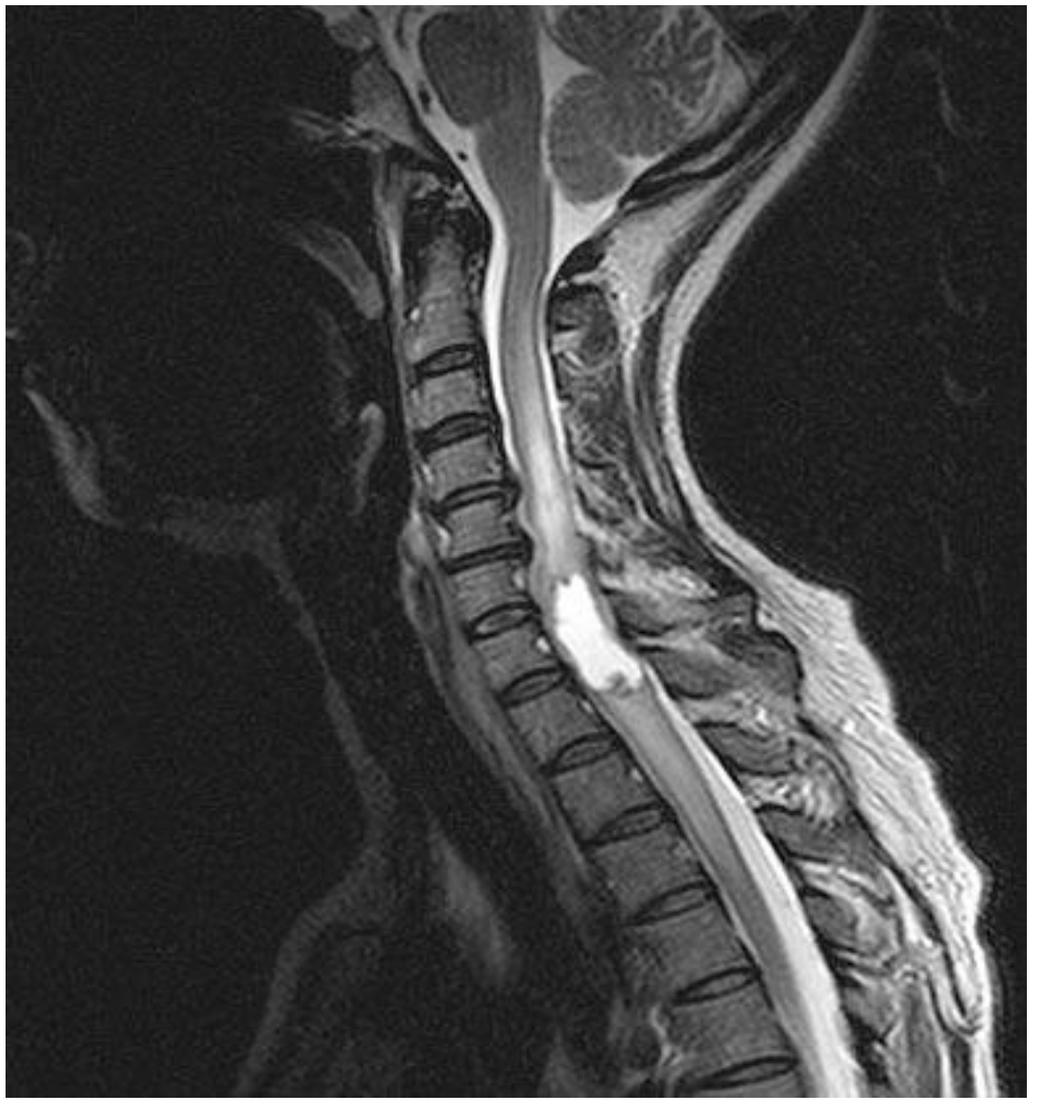
- 3% of CNS astrocytomas arise within spinal cord.
- **Most common pediatric “I.M” S.C.T.**
- 90% of I.M .S.C.T in patient younger than l0 years of age.
- 60% of IM SCT are in adolescence.
- 60% in cervical and cervicothoracic spinal cord segments.
- Less common in: thorasic,, lumbosacral cord & conus medularis.

Astrocytomas

- Includes
  - Low grade fibrillary astrocytomas.
  - pilocytic astrocytomas
  - Malignant astrocytomas
  - Gangliogliomas
  - Oligodendrogliomas
    - 90% of pediatric astrocytic tumors are benign
    - Most are grade I or II fibrillary
    - astrocutomas up to 1/3 are juvenile epilocytic astrocytomas or gangliogliomas)
    - 10% of pediatric gliomas are malignant astrocytomas or glioblastomas

Benign Spinal tumors-Ependymoma

Ependymoma is the most common primary spinal cord tumor involving the cells lining the canal in the center of the spinal cord.
mostly thoracic
Distinguished an ependymoma from an astrocytoma preoperatively as the neurosurgeon will attempt complete extirpation of ependymoma, whereas the infiltrative astrocytoma will not be completely resectable.



Spinal cord ependymoma

Eependymomas

- **Most common I.M.T in adults**.
- Middle age adult (most frequent)
- Men = women
- **Mostly in filium terminale and lower thoracic spine**
- Variety of histological subtypes.
  - Cellular ependymoma (most common)
  - Epithelial
  - Tanycytic (fibrillary)
  - Sub ependymomas
  - myxopapillary
  - mixed
- almost All are histologically **benign**
- **Unencapsulated and well circumscribed glial derived tumor.**

Hemangioblastomas

- 3-8% of I.M. S.C.T
- 15-25% occur in **association with von hippel-lindau Syndrome.**
- Rare in childhood.
- **Benign** tumor of vascular origin.
- **Sharply circumscribed not encapsulated.**
- **Most are dorsally or dorsolaterally located.**

miscellaneous pathology

- Dysembryogenic lesions
  - Lipomas= most common= 1% of intra medullary S.C.T
  - Inclusion tumors= rare
  - Cysts= rare
    - These are not true neoplasm
    - Arise from inclusion of mesenchymal tissue
    - Produce symptom in early and middle adult age.

Radiology & imaging

- plain x Ray: obsolete
- C.T Scan:Nonspecific
- Myelography :Not optimal
- ***MRI: modality of choice for diagnosis and pre operative evaluation***
  - Most I.M. S.C.T are isointense
  - or slightly hypointense on T_1-weighted images.
  - Often there is only ill-defined Spinal cord enlargment on T_1 weighted images.

Spinal arteriography:

This is beneficial only if a **hemangioblastoma** is suggested as a differential diagnosis. Hemangioblastoma arteriography findings include **a vascular blush with a prominent draining vein.**

TREATMENT

Pharmacological treatment→limited benefit.

Chemotherapeutic regimens → imited success in the treatment of spinal cord neoplasms.

- **This may be partly due to the inability of the chemotactic agents to cross the blood-brain barrier.**

Surgical Therapy

- **gross total resection**.
- The neoplasm is identified and then biopsy is performed.
- Surgery then proceeds based on the histology from the frozen specimen.
- If the lesion is an **astrocytoma, then the goal is debulking** the tumor while not injuring the normal neural tracts.
  Ependymomas are attempted to be resected completely as long as a viable plane can be established and normal neural tracts are not disturbed.

Thank You.!