

Tumours of the vertebral column (extradural tumours)

Benign and malignant

1. **Osteogenic** :

A. **Osteoma**:

- Small benign self limiting tumour, < 1.5 cm, 10-25% occurs in the spine most commonly in the lumbar region mostly in the **peripedicular region**, rarely above the age of 30, M: F 2-4:1.
- Classical presentation : pain worse at night relieved by Aspirin (intense inflammatory reaction in the surrounding periosteum caused by the release of prostaglandins), rarely the tumour has soft tissue component that can cause nerve root compression
- Radiologically: **radiolucent lesion with sclerotic margin and a nidus**. Scan-hot spot. MRI shows low intensity signal in the nidus and the rim (calcification) with intense enhancement of the **vascular nidus**.
- Symptomatic lesions are treated by curetting the nidus (red vascular spot)
- Histology: vascular fibrous tissue with surrounding bone matrix.

B. **Osteblastoma**:

- Histologically similar to Osteoma with the only difference in the size 1.5-6 cm, clinically similar presentation as Osteoma, similar age and sex predilection. CT scan –ovoid lesion with sclerotic margin and soft tissue component
- Surgical treatment en-bloc resection
- Incomplete resection is associated with high recurrence
- Both these lesions are **radioresistant**.

C. **Osteosarcoma**:

- **4% occur in the spine**
- 62% in males, age 2d and 3d decade.
- Premalignant conditions are **Paget's disease, osteochondroma and radiotherapy**
- Plain films shows sclerotic and osteolytic mass with calcified soft tissue component, CT scan-the bony anatomy, MRI shows the soft tissue component. The lesion enhances vividly with Gadolinium.
- Presentation: back pain, radicular symptoms and cord compression symptoms, pulmonary mets. Develop in 10-20%
- Histologically 55% osteoblastic, 25% fibroblastic and 22% chondroblastic
- Poor prognosis, average survival 6-10 months, aggressive surgery and radiotherapy is associated with better survival than radiotherapy alone.

D. **Giant cell tumour**: Tumour of **osteoclasts**. Low grade malignancy

- In the spine the sacrum is the most common involved bone. **Lytic** lesion with expansile appearance
- Histologically: ovoid cells with small nuclei interspersed among giant multinucleated cells. Three grades depending on malignant features
- Highly vascular tumour , consider preoperative embolisation

- High risk of lung metastases, poor prognosis, radioresistant

2. Cartilaginous tumours:

A. Enchondroma:

- Hyaline cartilage rests in cancellous bone. Less than 1% occurs in the spine. Multiple enchondromatosis in Ollier's syndrome and Maffucci's syndrome (Multiple enchondromatosis and hemangiomas). Malignant degeneration is rare except in syndromic lesions (50% malignant degeneration).
- CT scan-enchondral ossification shows ring calcifications (popcorn)
- Symptomatic lesions are treated by curettage or resection. More common in males and in 2d and 3d decade..
 - The most common benign bone tumour, 3% of solitary lesions and 7% of multiple lesions in the spine
 - More common in males 2d and 3d decade
 - Predilection for **spinous process mostly** in cervical and upper thoracic spine.
 - The tumour has cartilaginous cap and bony stem. Plain films show exostosis. MRI-the cartilaginous cap is Hyperintense and the calcified stem is low intensity

C. Chondrosarcoma:

- 7% of chondrosarcomas occur in the spine. Mostly in the lateral part of the vertebra near the costochondral junction
- more in males 5th and 6th decades
- Can be primary or secondary from Enchondroma or chondrosarcoma
- Radiologically : plain films-lytic lesion with calcified soft tissue mass, MRI-heterogenous signal(blood, calcification, soft tissue)
- Extremely vascular one should consider preoperative embolisation
- Survival depends on the grade .5 year survival 20%
- Treatment is radical surgical resection + radiotherapy (prolongs average survival from 16 months to 3.5 years).

3. Vascular tumours :

A. Hemangioma:

- Asymptomatic lesions are common (11% of autopsies and MRI scans). Symptomatic lesions are more common in thoracic spine and more common in women. They can present with myelopathy, radiculopathy and back pain. 66% solitary, 34% multiple. The majority of vertebral haemangiomas remain asymptomatic.
- Radiologically on plain film thickened trabeculae are visualized as parallel lines. On CT scan-honeycomb appearance (thickened trabeculae surrounding dilated vascular spaces). On MRI high signal on T1 and T2 (adipose component). Angiography to assess the vascularity of symptomatic lesions. Embolisation can reduce the risk

of surgery and in some cases is curative. Embolisation carries small risk of cord ischemia

- Symptomatic lesions can be managed by embolisation, surgery (resection +-instrumentation) or radiotherapy. Because these lesions are very vascular, preoperative embolisation is of paramount importance..

A. Aneurysmal bone cyst;

- Benign hyperemic destructive bone tumours more common in children and young adults with female preponderance.
- 12% occur in the spine. Radiologically-**expansile lytic lesion eggshell thin cyst with trabeculae and hemorrhagic inside**. The solid component contains fibrous and osteoid material and contains giant cells (needle biopsy may be confused with giant cell tumours). Usually involve the body and pedicles and **can bridge the disc space to involve adjacent vertebra**
- They can grow rapidly and cause cord compression. **Preoperative embolisation and curettage is curative.**

B. Angiolipoma: rare tumour.

4. Plasma cell tumours:

A. plasmacytoma:

- Consists of one or two lesions. M:F 3:1. 25-50% occurs in the spine.
- Diagnosis: presentation with local pain or cord compression. Thoracic spine is most commonly involved. Radiologically (plain films and CT scan) - a lytic lesion with sclerotic margin. Bone scan –hot lesion and excludes other lesions. **Protein electrophoresis** –monoclonal band that resolve after treatment. **Paraproteinemia** can occur in significant number of patients and if severe can cause coagulopathy.
- **Radiotherapy** is the first line of treatment .Local control rates up to 96%. 50% of lesions progress to **MM in 5 years**.
- Surgery is indicated for lesions causing cord compression or instability.
- Protein M component has been shown to predict recurrence.
- 60% 5 year survival

B. Multiple myeloma:

- Older at presentations than those with plasmacytoma (**60Y**).
- 45% of symptomatic patients present with back pain or cord compression symptoms.
- Investigations: protein electrophoresis showing paraproteinemia (protein M=Ig A), Benz-Jones protein in the urine, hypercalcaemia, increased creatinine. Plain films and CT scan-multiple lytic lesions. MRI-isointense on T1, Hyperintense on T2. Soft tissue extension into the spinal canal is common.
- Blood test may show leucopenia, anemia, thrombocytopenia (replacement of bone marrow by plasma cells).
- Complications: Renal failure, hypercalcaemia, coagulopathy (thrombocytopenia and paraproteinemia), amyloidosis.

- Treatment: Radiotherapy+ Chemotherapy. Surgery may be indicated in the presence of cord compression and instability.
- Prognosis is poor 18% 5year survival.

5. **Metastatic tumours:**

- The most common vertebral column tumours.5-10% of cancer patients develops symptomatic mets. The lumbar spine followed by the thoracic spine are most commonly affected. The majority of tumours are extradural and involve the vertebral bodies and pedicels.
- The most common tumours giving spinal mets are **lung, breast, prostate and lymphoma, leukemia**. Any cancer can give mets. In 10% the primary tumour can't be identified.
- **Vascular mets are melanoma, renal cell carcinoma and thyroid cancer.**
- Clinically patients may present with back pain, radiculopathy and myelopathy.
- Diagnosis: **Plain films can demonstrate the tumour in 90%** of cases
 - A. **Osteoplastic** (prostate and some breast cancers)
 - B. **Osteolytic**: most mets. Winking owl's eye sign, pedicle erosion, vertebral collapse and fracture dislocation
- Treatment: **Goals** are relief of pain, decompression of the cord and stabilization of the spine
 1. Steroids
 2. Radiotherapy
 3. Surgery
- Surgery is indicated
 1. If radiotherapy fails (salvage surgery)
 2. For diagnosis
 3. For cord compression
 4. For instability.
- **Radiotherapy** is effective against lymphoreticular mets, moderately effective against breast and prostate and less effective against lung cancer and melanoma.
- Tumours can be approached from the front (anterior and antero-lateral) and from the back (posterior and posteriolateral). The choice depends on the site of the compression, spinal level (back for craniovertebral junction to avoid the complications of big surgery for palliative reasons), and patient's general condition. Look the question on approach to thoracic lesions
- Preoperative **embolisation** should be considered in patients with **renal cell carcinoma, thyroid cancer and melanoma.**

6. **Miscellaneous:** chordoma, Ewing's sarcoma, eosinophylic granuloma