Benign and Malignant Osseous Tumors of the Spine

- Low incidence of primary osseous tumors of the spine, together with nonspecific clinical presentation and a wide spectrum of histologic entities, may lead to delay in diagnosis.

- While incidence is low, the prevalence of spine imaging in the United States results in a high likelihood of discovering osseous lesions of the spine.

- Various neuroimaging techniques play a crucial, and often complimentary role in narrowing the differential diagnosis and guiding further management.

- Radiologists need to be knowledgeable in the neuroimaging features of benign and malignant osseous spinal tumors to prevent delay in management, potentially unnecessary invasive procedures and undue anxiety for the patient.

Educational Goals

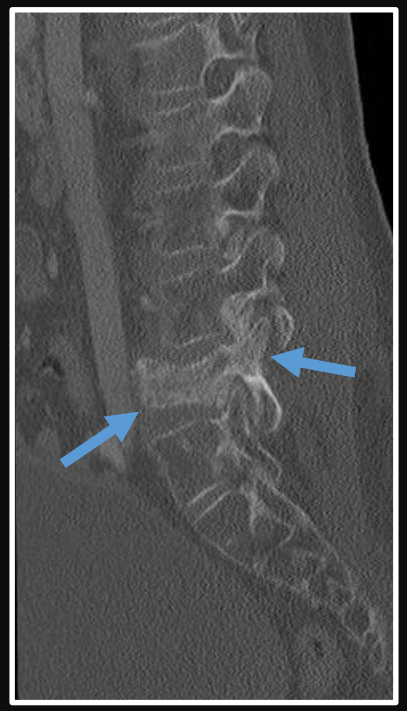
- Introduce background epidemiologic burden of primary osseous tumors of the spine.
- Outline analytic approach to radiologic evaluation of spinal osseous lesions.
- Review pertinent clinical factors to recognize signs of malignant neoplasms.
- Define the diagnostic value of applicable neuroimaging techniques.
- Highlight the key imaging pearls of a variety of benign and malignant osseous tumors of the spine via case examples.
- Discuss the differential diagnosis and significant distinguishing imaging features.
- Emphasize the value of the radiologist in evaluation of spinal osseous tumors and the implications on quality patient care.

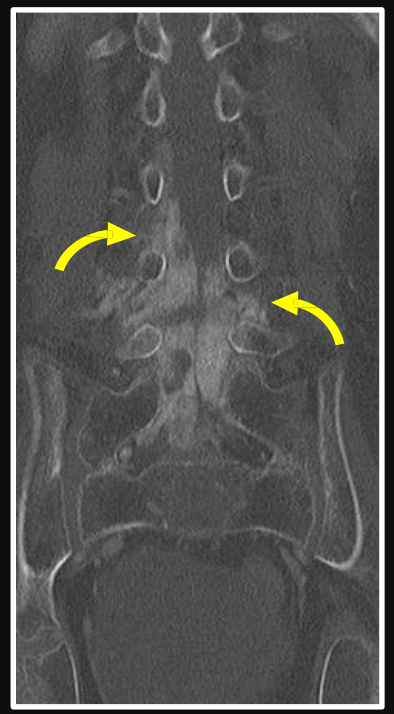
Case-Based Review of Key Imaging Pearls

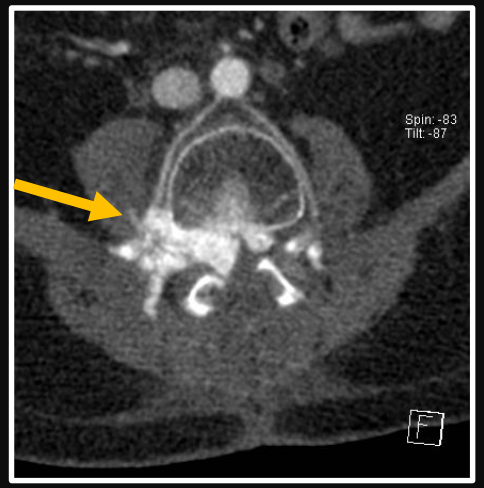
- Aneurysmal Bone Cyst (ABC)
- Osteoblastoma with secondary ABC
- Hemangioma
- Dysspondyloenchondromatosis
- Eosinophilic Granuloma
- Gorham-Stout Disease
- Osteoid Osteoma/Osteoblastoma
- Osteochondroma
- Chondrosarcoma
- Chordoma
- Giant Cell Tumor
- Osteosarcoma
- Plasmacytoma
- Sacral teratoma
- Vertebral lymphoma

Case 1

Spinal osteosarcoma with vascular invasion, neurologic compromise and pathologic fracture







Sagittal CT of lumbar spine shows diffuse sclerosis of L4 vertebral body and posterior elements with pathologic compression fracture (straight arrows).

Coronal view demonstrates extensive soft tissue component with osteoid matrix, epidural and neuroforaminal extension causing severe spinal canal and neuroforaminal stenosis (curved arrows).

Axial soft tissue window angiogram reveals vascular invasion (straight arrow), likely into epidural and paravertebral veins.

Pearls:

1. Involvement of vertebral body with posterior element extension, infiltrative appearance, soft tissue component and osteoid matrix should heighten concern for malignancy.

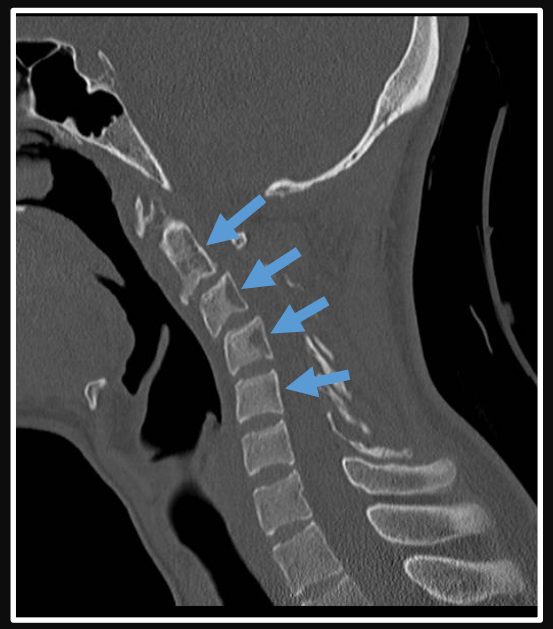
2. Incidence of primary site within the spine: 30% sacral, 25% thoracic/lumbar, 25% cervical.

3. Important secondary findings that will acutely alter patient management: neurologic compromise, soft tissue component and extension, pathologic fracture, and vascular invasion.

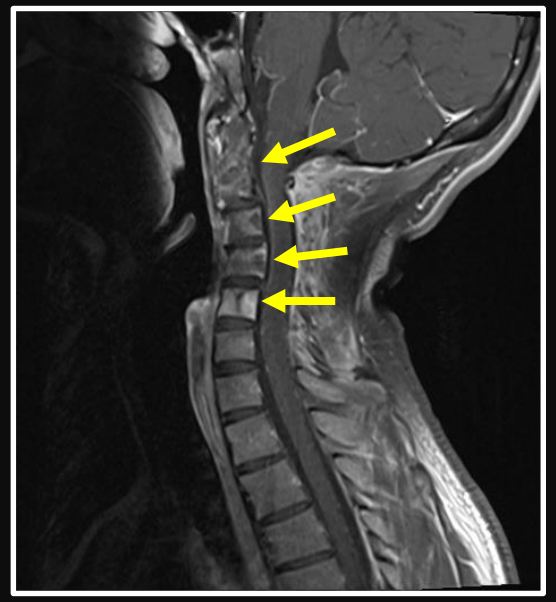
Case 2

Vanishing Bone syndrome

(also known as: Gorham Disease or Progressive Massive Osteolysis)



Sagittal CT of the cervical spine shows subcortical osteolysis of C2-C4 and to a lesser extent C5 (straight arrows).



Sagittal pre-contrast (not shown here) and post-contrast T1 weighted MR demonstrates subcortical enhancement, corresponding to osteolysis on CT (straight arrows).

Pearls:

1. Earliest imaging finding = subcortical or intramedullary lucency.
2. Progresses to massive osteolysis via osteoclastic activation with lack of appropriate osteoblastic repair or periosteal reaction.
3. Affected osseous structures are eventually replaced with varying amounts of enhancing hypervascular fibrous tissue.