BONE & JOINTS TUMORS

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Pathology KGMC

Osteosarcoma

- Osteosarcoma is a malignant, high grade tumor of bone in which the tumor cells produce osteoid (bone)

Sites

- Mandibular tumors are more frequent in the posterior body and ramus
- Maxillary lesions are more common along the alveolar ridge, sinus floor and palate than the zygoma or orbital rim
- Other sites include long bones

Clinical features

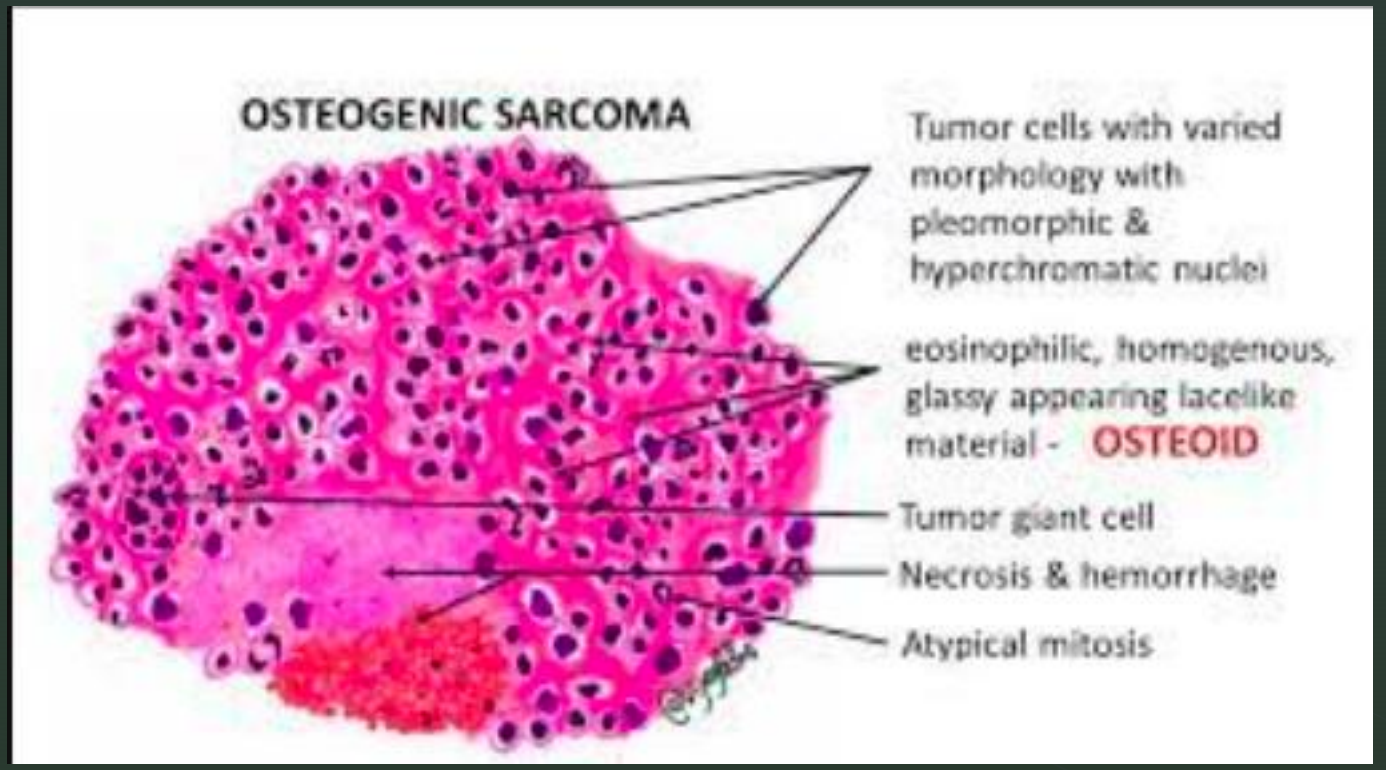
- Pain
- swelling
- Paresthesia
- ulceration

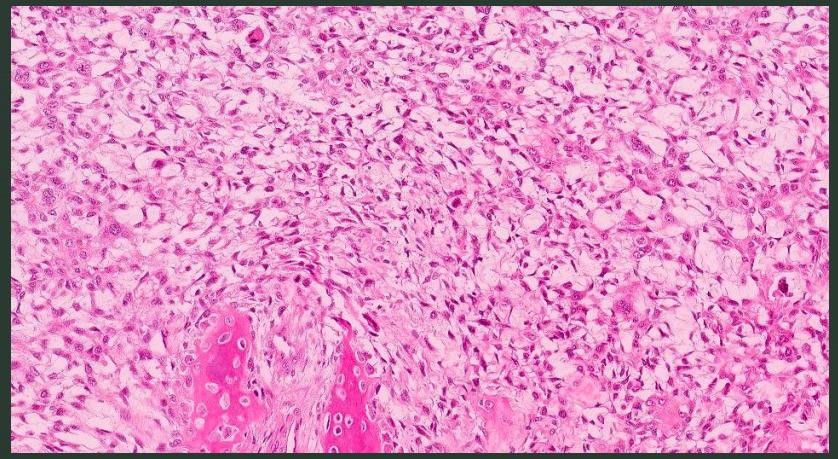
Diagnosis

- Diagnosis dependent on clinical, radiologic and pathologic correlation

Treatment

- Radical surgery with adjuvant chemotherapy
- Radiation can be added if tumor cannot be fully removed surgically

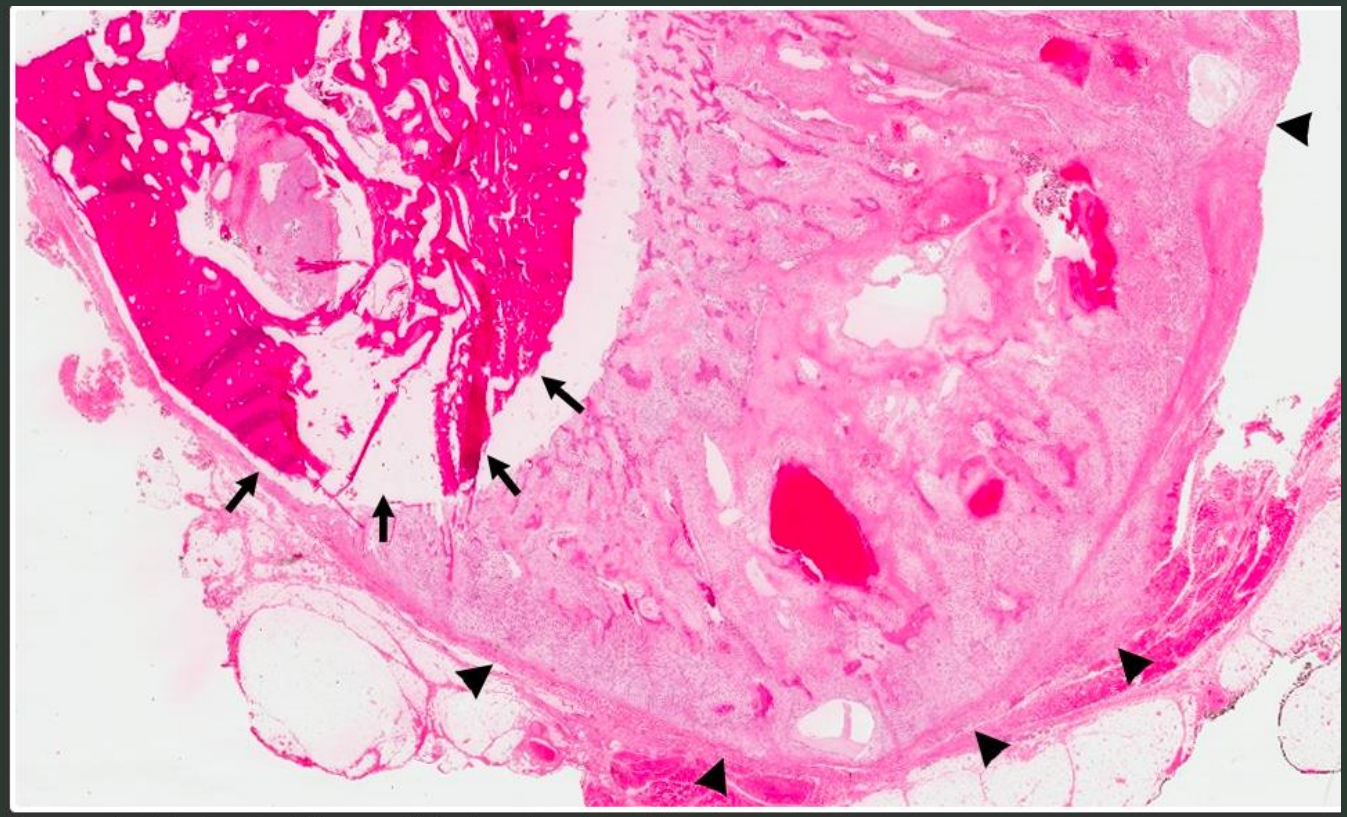

OSTEOGENIC SARCOMA
Tumor cells with varied morphology with pleomorphic & hyperchromatic nuclei
eosinophilic, homogenous, glassy appearing lacelike material - OSTEOID
Tumor giant cell
Necrosis & hemorrhage
Atypical mitosis



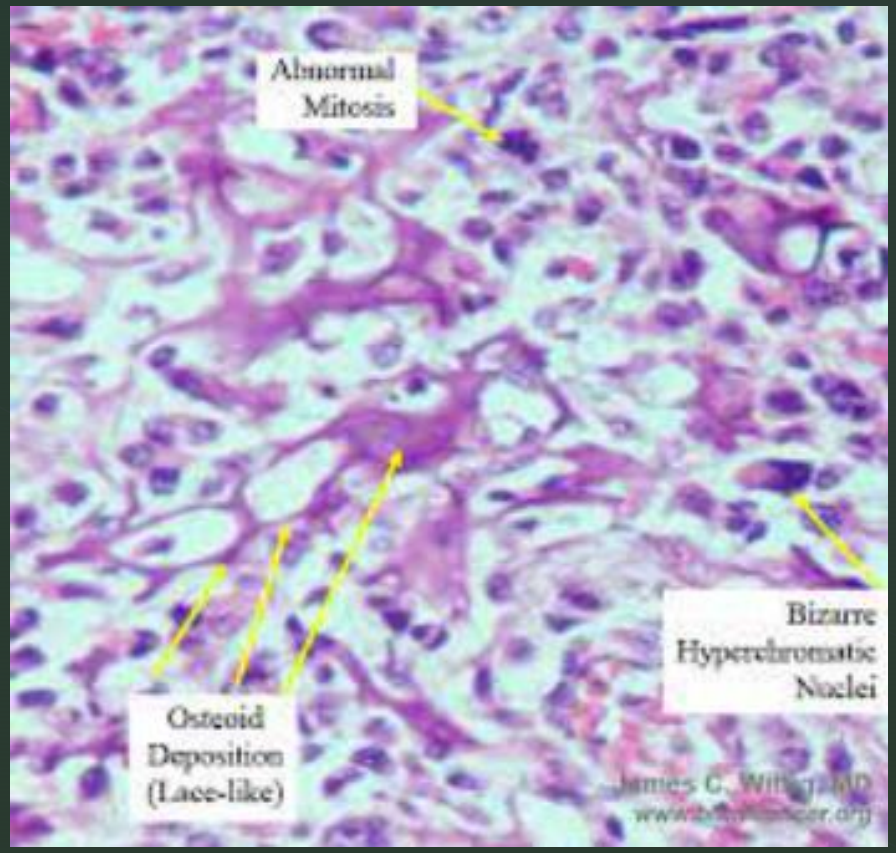
- Stroma - Malignant connective tissue with anaplastic spindle cells in mesenchymal parenchyma.
- Tumor cells surrounded by osteoid matrix c/f
- Osteoblastic – lot of new bone
- fibrous – fibroblasts
- Chondroid - cartilaginous tissue

Microscopic (histologic) features

- Osteosarcomas are composed of sarcomatous tumor cells that produces malignant bone or osteoid
  - The tumor cells may have densely eosinophilic cytoplasm resembling osteoblasts but often are larger than normal osteoblasts and vary in size with nuclear atypia
  - The osteoid may be thin, lace-like or it may consist of broad, irregular trabeculae
    - The osteoid may be variable in amount



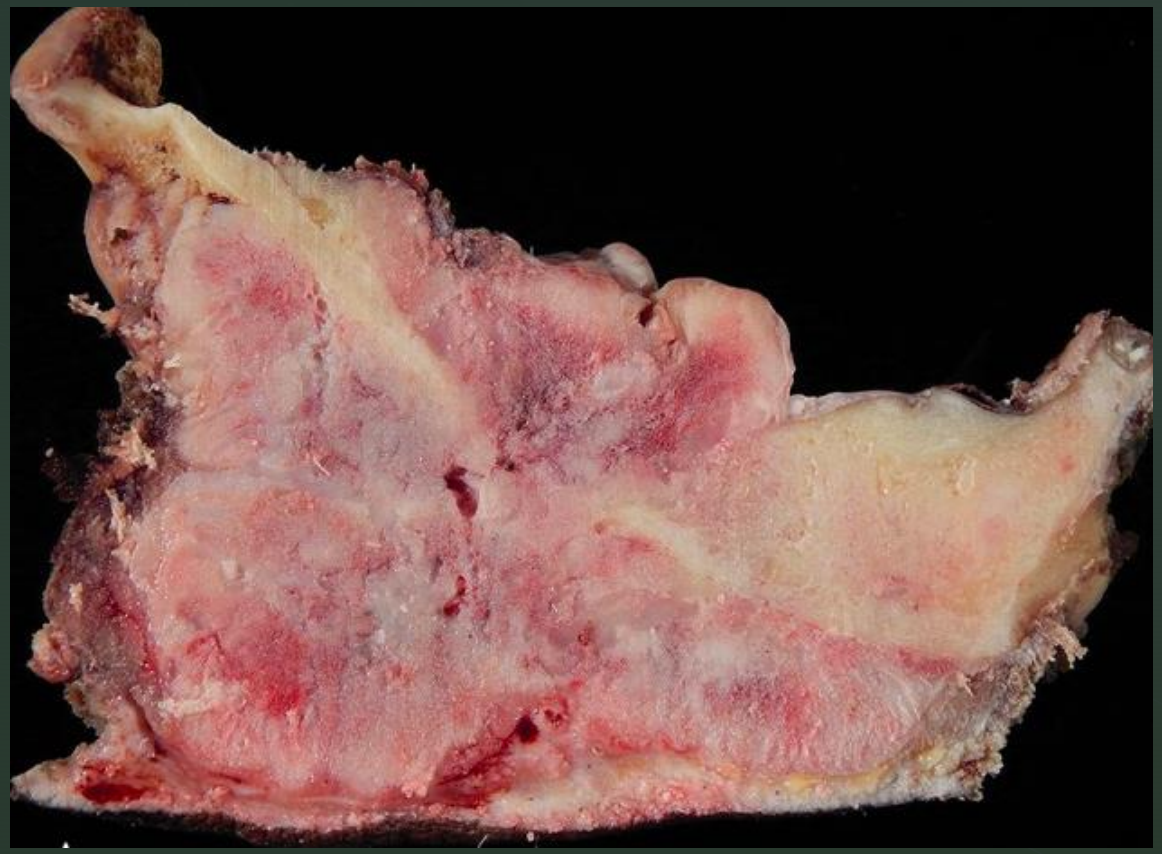
Arrows = inferior border of the mandible; Arrowheads = osteosarcoma


Abnormal Mitosis
Bizarre Hyperchromatic Nuclei
Osteoid Deposition (Lace-like)

Gross Features

- Gross photograph of a large osteosarcoma involving the ramus (left) and body (right) of the mandible.
- This osteosarcoma, which contains a prominent chondroblastic component, extends out of the mandible into adjacent soft tissues circumferentially.
- Classic chondroblastic osteosarcoma of the jaw, containing areas of cartilaginous differentiation and abundant osteoid matrix.

Gross Features



Osteoclastoma or Giant Cell tumor of bone

- Benign but locally aggressive primary bone neoplasm composed of mononuclear round to spindle cells with numerous evenly dispersed osteoclast-like giant cells
- Not the same tumor as giant cell lesion of the small bones
- Malignancy in giant cell tumor is rare (< 2% of cases) and is more common at older ages (30 - 50 years)
- Rarely associated with Paget disease of bone.
- May occur in setting of focal dermal hypoplasia

Sites

- Usually occurs in the epiphysis and adjacent metaphysis of long bones (distal femur, proximal tibia, distal radius, proximal humerus)
- Other bones (proximal sacrum, vertebrae, skull base) may be involved, and any bone may be affected
- > 95% are unifocal

Treatment

- Curettage: ~15 - 50% recur after curettage alone (usually within 2 years of curettage)
- **Antiosteoclast agents**:
  - Bisphosphonates
  - Denosumab (anti-RANKL monoclonal antibody)
    - Denosumab treated giant cell tumor of bone demonstrates ossification, fibrosis, depletion of giant cells, proliferation of mononuclear cells and cytologic atypia

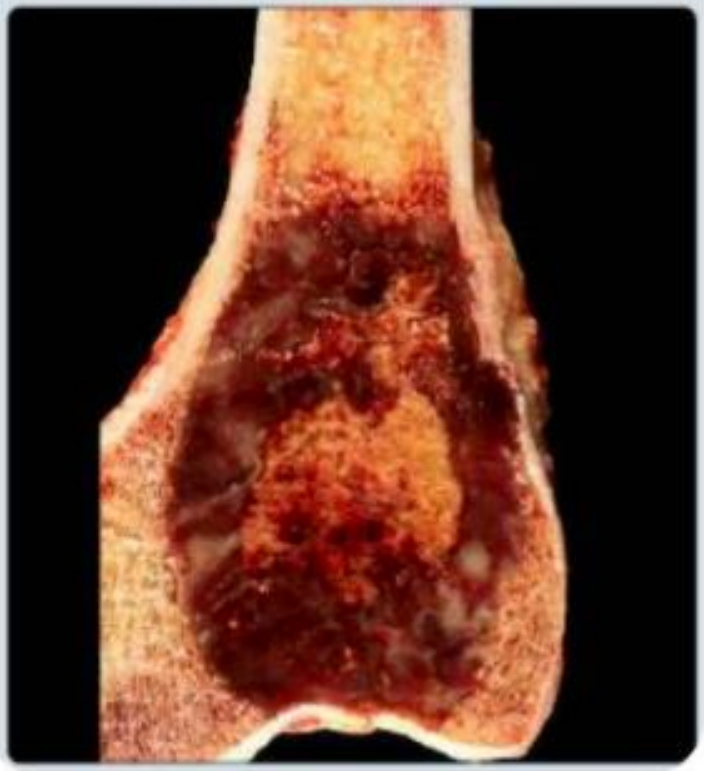
GROSS

Highly variable gross appearance, can range from predominantly hemorrhagic to soft and fleshy

Typically, sharp margin between the tumor and surrounding bone

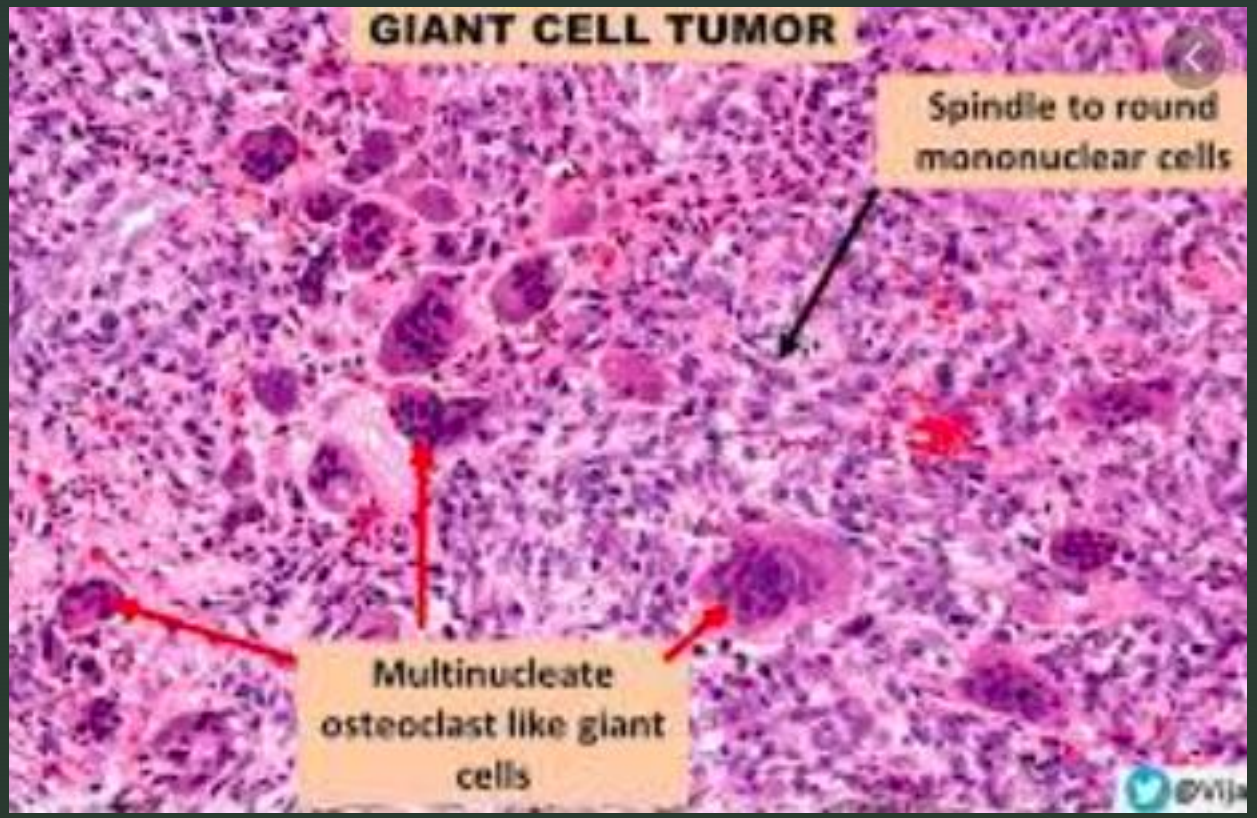
Surrounding bone is typically expanded with a thinned cortex

Hemorrhagic, Tan Mass



Gross description

- Well defined borders
- May be an expansile lesion with cortical thinning or soft tissue extension and a pushing border with a rim of reactive bone (often incomplete)
- Cut surface may have yellow (xanthomatous), white (fibrous) or hemorrhagic / cystic areas
- Necrosis may be seen in large tumors
- Malignant transformation (if present) is often a large, fleshy area with soft tissue invasion


GIANT CELL TUMOR
Spindle to round mononuclear cells
Multinucleate osteoclast like giant cells

Microscopic (histologic) description

- Numerous osteoclast-like giant cells uniformly distributed throughout tumor; many giant cells are larger than normal osteoclasts with numerous (> 50) nuclei; some areas may have scarse giant cells
- Spindle and round mononuclear cells also present
- Highly vascular stroma; may have fibrosis
- Acute hemorrhage, hemosiderin, xanthomatous histiocytes, necrosis (in large tumors) present
- Vascular invasion at periphery of tumor may be seen;
- Malignant giant cell tumor resembles high grade sarcoma (osteosarcoma, fibrosarcoma, malignant fibrous histiocytoma)

Chondrosarcoma

- Locally aggressive or malignant group of tumors characterized by formation of cartilaginous matrix
- Primary: arising without a benign precursor
- Secondary:
  - Central: arising in preexisting enchondroma
  - Peripheral: arising in preexisting cartilaginous cap of an osteochondroma
- Periosteal chondrosarcoma: occurs on the surface of the bone in association with the periosteum

Sites

- Most common sites are the pelvic bones, femur and humerus
- Other sites are the trunk, skull and facial bones
- Involvement of the hands and feet is rare
- Periosteal chondrosarcoma involves the metaphysis of long bones, usually distal femur and humerus
- Conventional type chondrosarcoma is also the most common sarcoma arising in the larynx

Clinical features

- Pain, local swelling and enlarging mass are the most common presenting symptoms
- Neurological symptoms in skull base tumors
- Change in the size and clinical symptoms might be an indicator of malignant transformation in enchondromas and osteochondromas

Treatment

- Wide surgical resection is the mainstay of treatment
- Low grade chondrosarcomas are often surgically cured
- Chondrosarcomas are in general resistant to chemotherapy and radiotherapy
- Chondrogenic tumors require a high dose of radiation
- Resection with adjuvant radiotherapy yields the best outcome for high grade chondrosarcomas

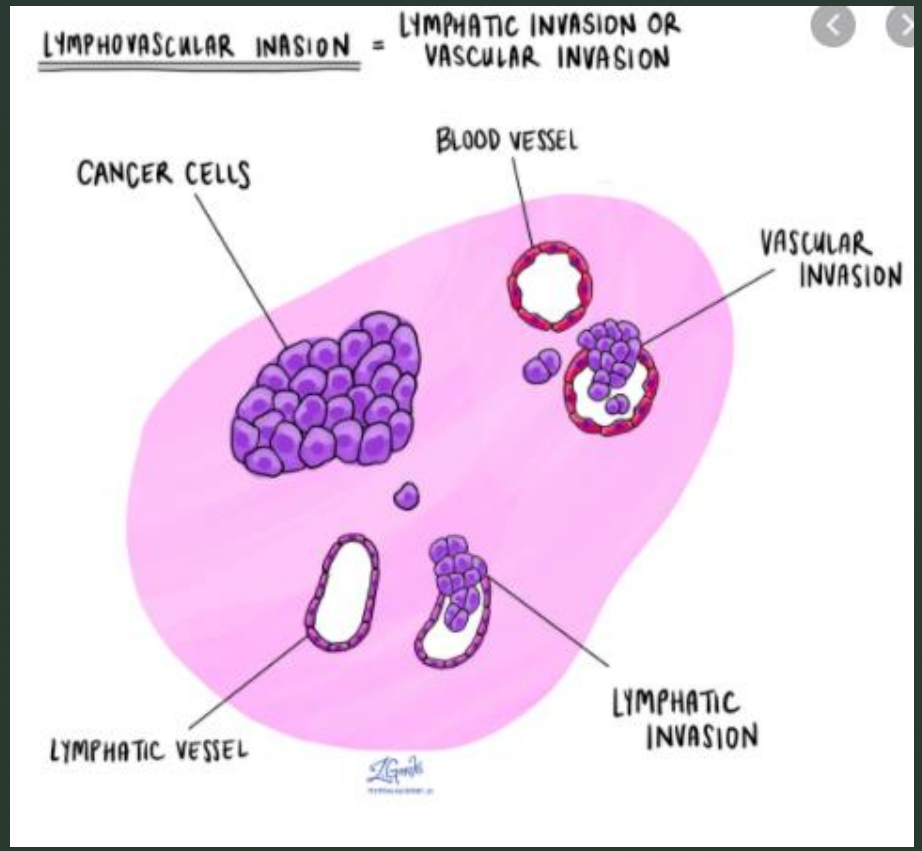
Gross description

- Neoplastic hyaline cartilage has a lobular, gray-tan cut surface
- Cystic changes with myxoid or mucoid material
- Mineralization appears as chalky calcium deposits
- Cortical erosion and soft tissue extension can be seen
- Thick cartilage cap (1.5 - 2 cm) with cystic cavities in secondary peripheral chondrosarcoma
- Periosteal chondrosarcoma appears as a large, lobular mass attached to the surface of bone

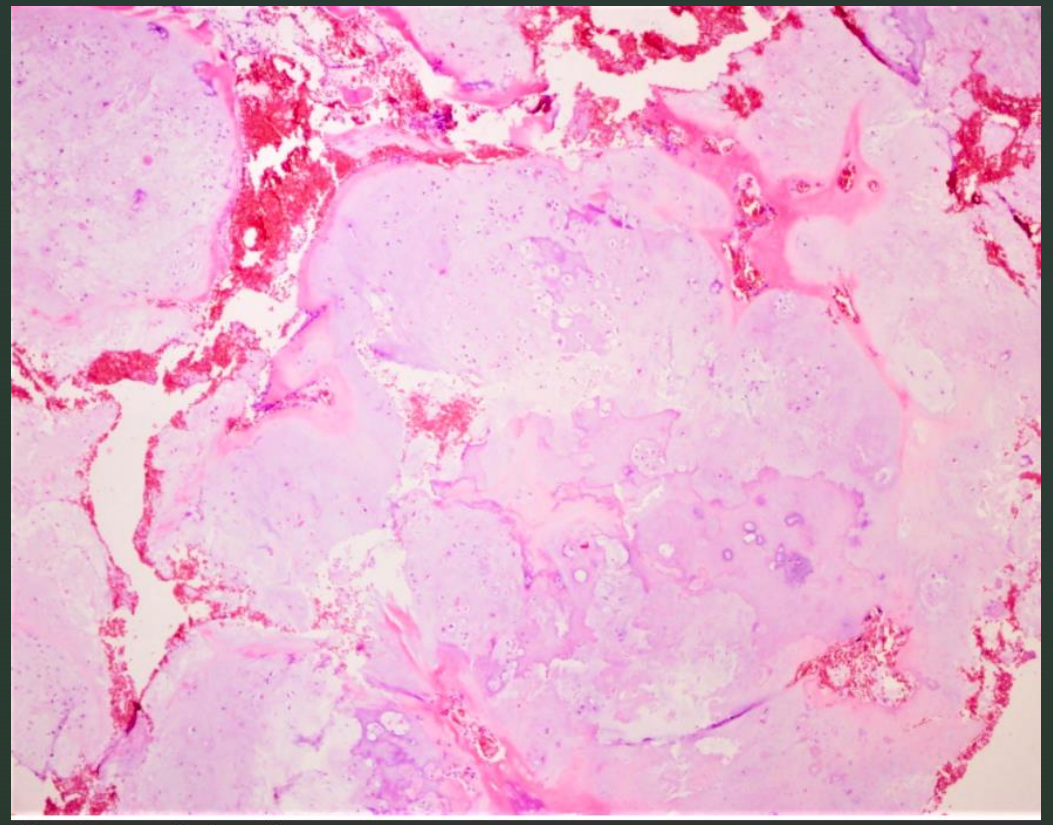
Microscopic (histologic) description

- Abundant cartilaginous matrix with chondrocytes embedded in lacunae
- Lobular or diffuse growth (depending on grade)
- Permeation of intertrabecular spaces
- Varying degrees of increased cellularity, nuclear atypia and mitotic activity
  - Grade I: minimally increased cellularity, nodular growth and occasional binucleate nuclei
  - Grade II: moderate cellularity and diffuse growth
  - Grade III: high cellularity, marked atypical cells, pleomorphic appearance and easily identifiable mitotic figures

- Myxoid changes, chondroid matrix liquefaction and necrosis can be seen
- Formation of nodules and cystic cavities can be seen in secondary peripheral chondrosarcoma (generally low grade tumors)
- Periosteal chondrosarcoma:
  - Grade I or II tumors seen on the external surface of the bone
  - Cortical invasion, soft tissue extension and size (> 5 cm) can be helpful in distinguishing from periosteal chondroma

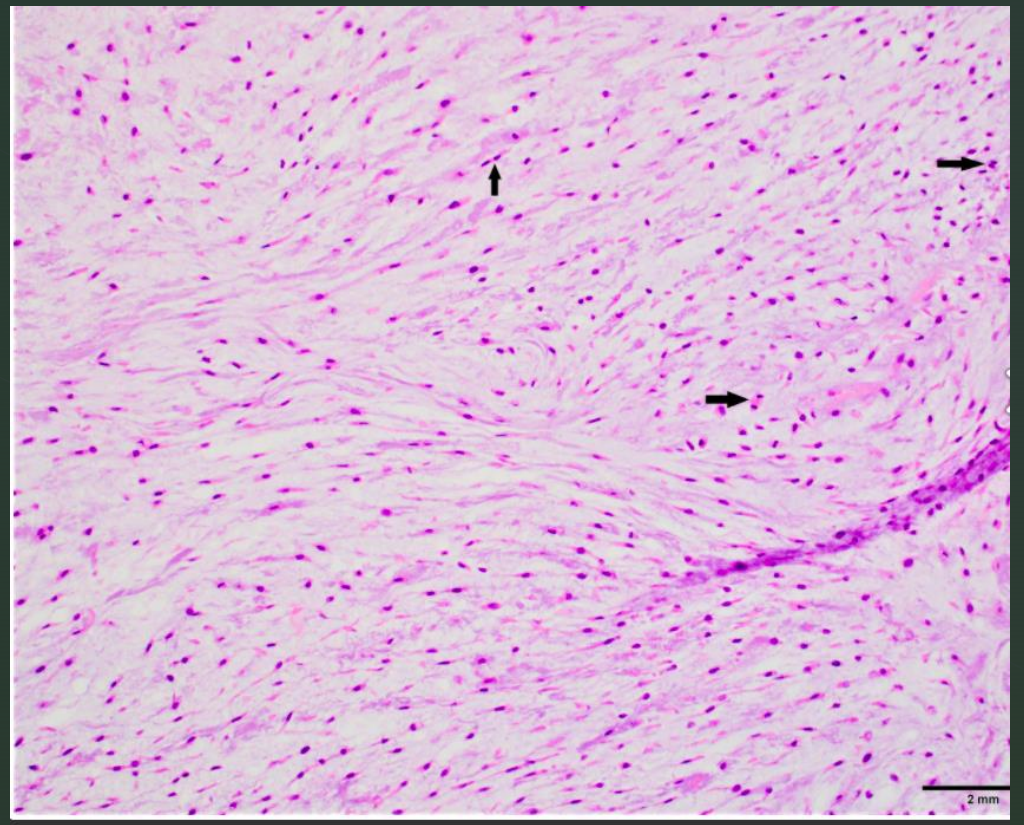

LYMPHOVASCULAR INASION = LYMPHATIC INVASION OR VASCULAR INVASION
BLOOD VESSEL
CANCER CELLS
VASCULAR INVASION
LYMPHATIC INVASION
LYMPHATIC VESSEL

GRADE I



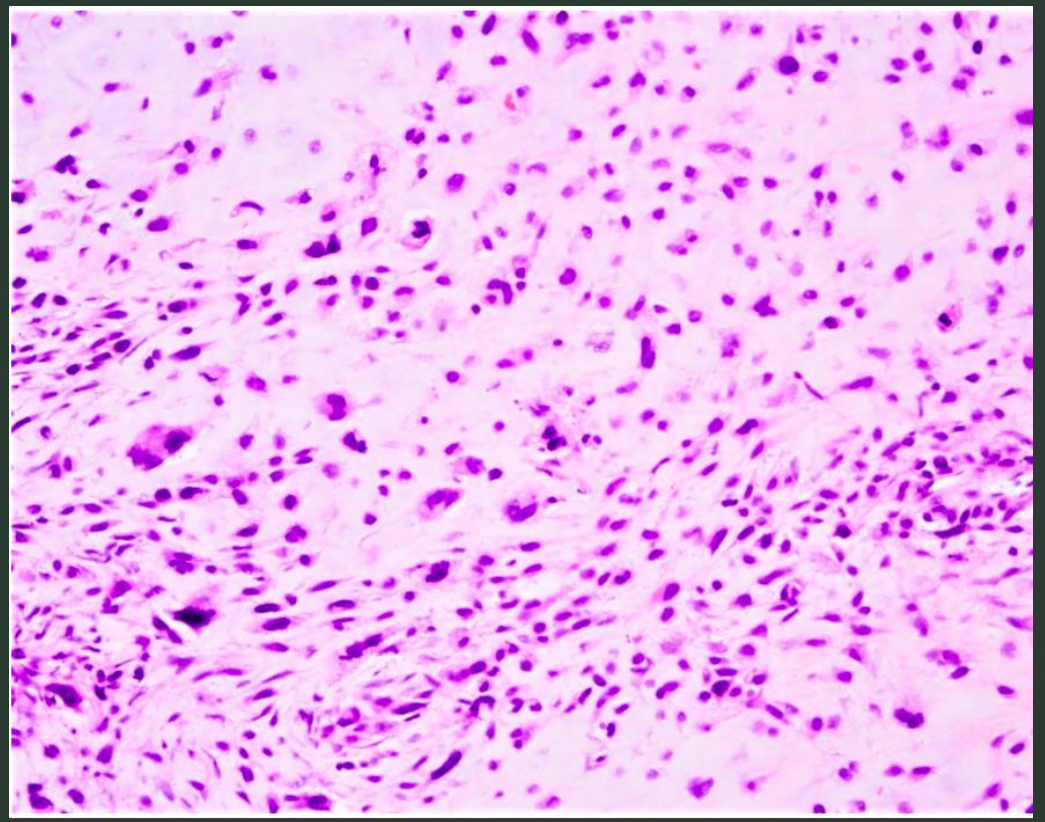
Notice the tumor lobules on low power.

GRADE II



There is increased cellularity and nuclear atypia. Notice the binucleation (arrows).

GRADE III



There is obvious nuclear atypia and pleomorphism but the background is distinctly chondroid.

- THANKYOU!!!!!!