# Osteosarcoma

- Most common malignant primary bone tumor in children/young adults
- Incidence: 5/1 million children ≤ 19 years of age
  - Bimodal age distribution: 10-30 years, > 60 years
- Presentations: Pain, mass, recent trauma
- Treatment
  - Neoadjuvant chemotherapy → surgical resection → adjuvant chemotherapy
    - » Improved survival if necrosis > 90% at resection
  - Lung nodule metastasectomy (if low-volume disease)

# Image Interpretation Pearls

- Bone MR
  - Do not miss distinct skip or other metastatic lesions
    - » Requires joint-to-joint imaging
  - Evaluate relationship to physis, joint, & NV bundle
    - » Requires focused high-detail imaging
- Chest CT:
  - Calcified & noncalcified pulmonary nodules must be presumed as metastatic until proven otherwise
  - Even in geographic locations with endemic granulomatous diseases (such as histoplasmosis)

# Secondary osteosarcoma

- Occurs in the elderly:
- Usually secondary to
  - Malignant degeneration of Paget disease,
  - Extensive bone infarcts
  - Post-radiotherapy for other conditions
  - Osteochondroma
  - Osteoblastoma

# Classification

- Primary osteosarcoma
  - Intramedullary/central
    - » Conventional osteosarcoma: most common (75-80%)
    - » Low-grade central osteosarcoma
    - » Telangiectatic osteosarcoma
    - » Small cell osteosarcoma
  - Surface
    - » Parosteal osteosarcoma
    - » Periosteal osteosarcoma
    - » High-grade surface osteosarcoma
- Secondary osteosarcoma
- Conventional osteosarcomas can be further divided by histological subtype:
  - Osteoblastic (most common)
  - Chondroblastic
  - Fibroblastic

# Radiographic features

- Conventional OS (75-85%)
  - Poorly defined, intramedullary mass
  - Extends through cortex: Frank lysis &/or moth-eaten destruction
  - Aggressive periosteal reaction: Codman triangle, sunburst appearance
  - Indistinct borders with wide zone of transition
  - Soft tissue mass with cloud-like osteoid matrix (90%)
- Telangiectatic OS (< 5%)
  - Purely lytic geographic lesion; blown-out appearance
  - Cystic cavities filled with blood/necrosis
  - Fluid-fluid levels in 90% (may mimic aneurysmal bone cyst)
  - Enhancing nodular components
  - Pathologic fracture in 25%

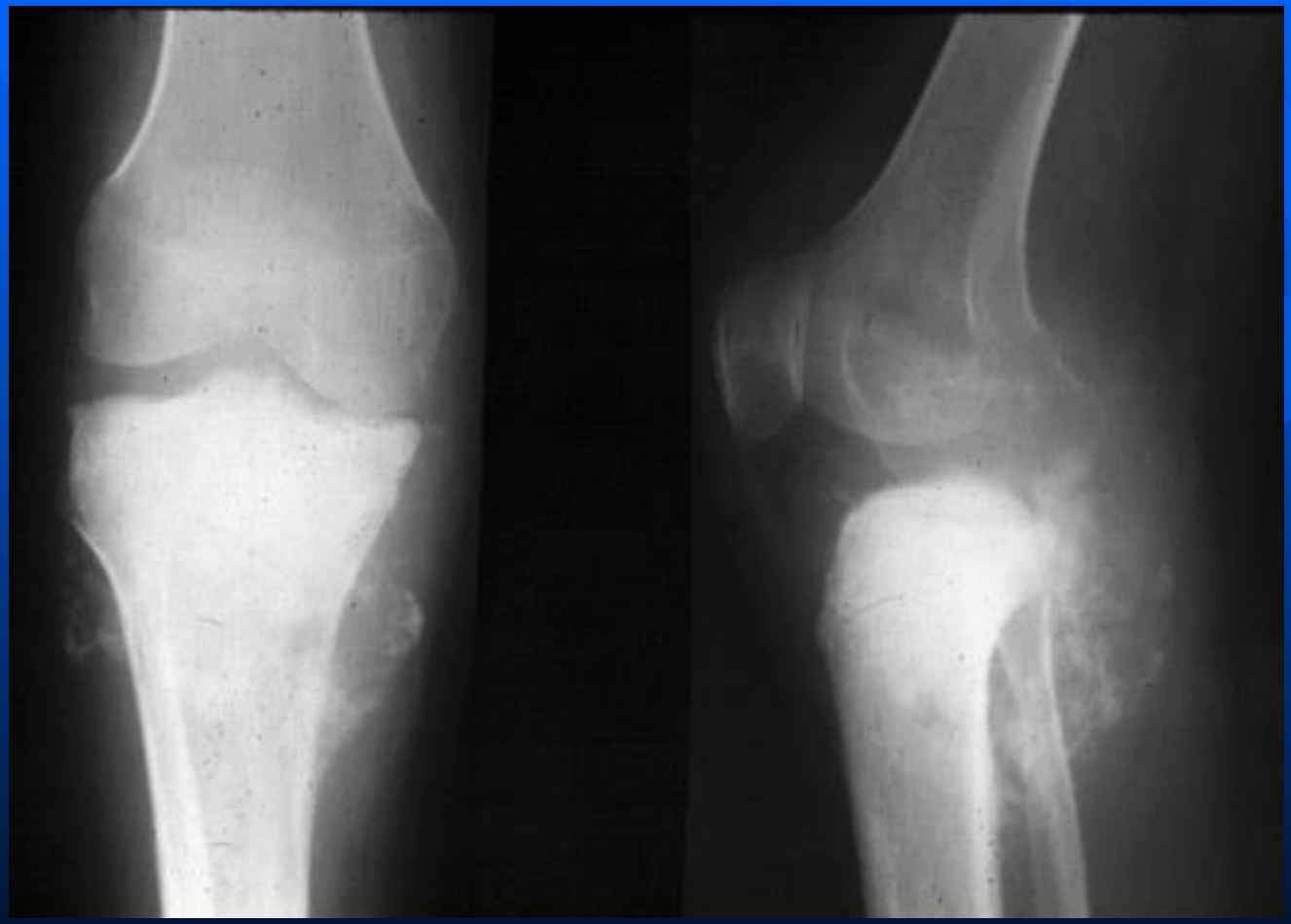
# Radiographic features

- Parosteal OS (3%)
  - Low-grade surface OS; better prognosis than conventional OS
  - > 90% 5-year survival
  - Age: 20-50 years (older than conventional OS)
  - Classically at distal posterior femoral metaphysis
  - Invasion of marrow in 25%
- Periosteal OS (1%)
  - Intermediate- to high-grade surface OS
  - Metastatic disease in 15%
  - Recurrence rate as high as 70%
  - Attached to underlying cortex with thickening, scalloping, &/or saucerization of cortex
  - Usually diaphyseal with no medullary involvement
  - Medullary involvement may have poorer prognosis
  - Femur + tibia (85-95%); ulna + humerus (5-10%)

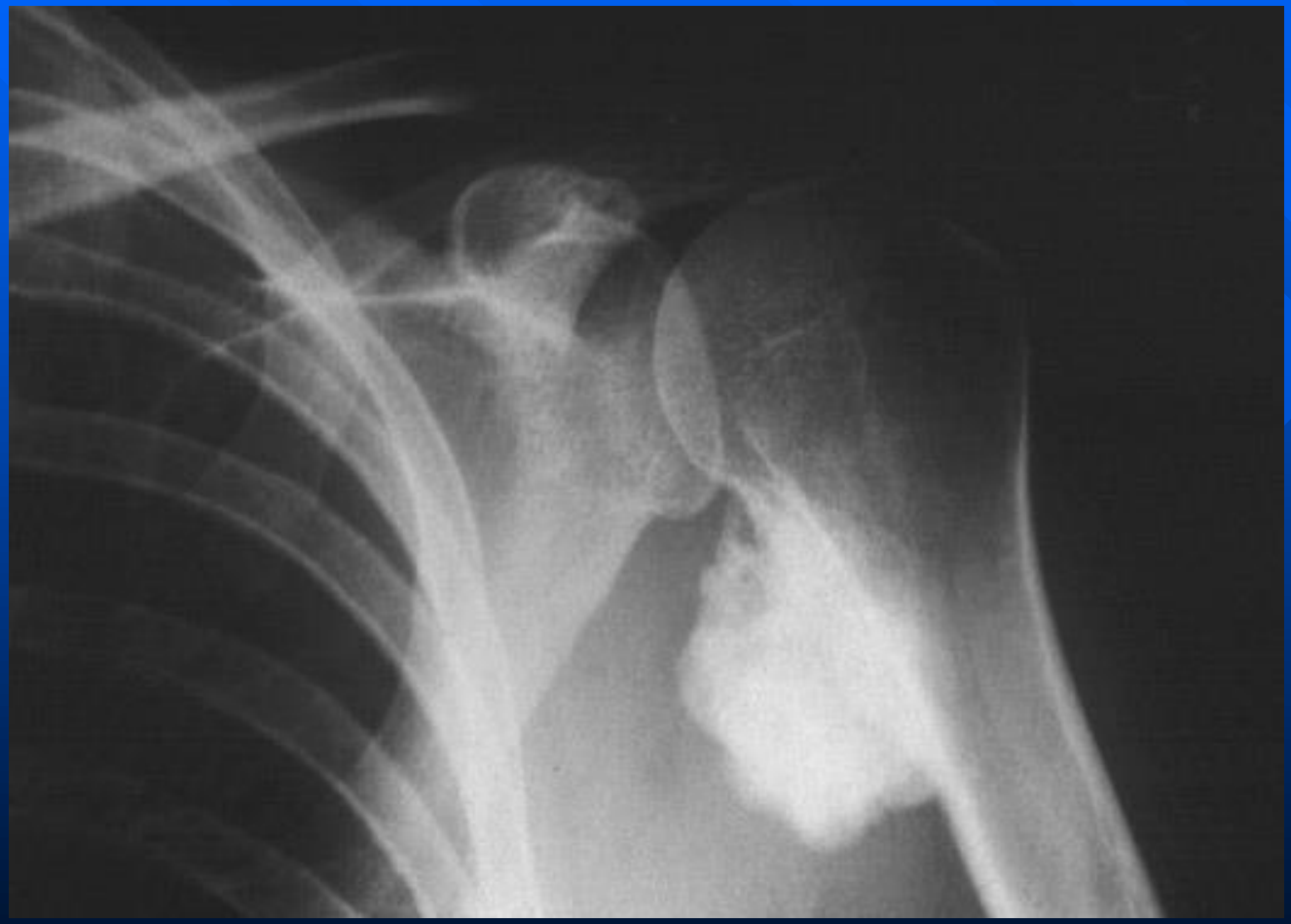
# Radiographic features

- High-grade surface OS (1%)
  - Peak incidence in 2nd decade of life
  - Partially mineralized mass
  - Underlying cortex is often partially destroyed
  - Periosteal new bone along margins of lesion
  - May have minimal medullary involvement
- Multicentric OS (1%)
  - Synchronous osteoblastic osteosarcomas at multiple sites (usually symmetric)
  - Exclusively in children (5-10 years)
  - Extremely poor prognosis
  - Secondary OS (5%)
  - Association with preexisting bone lesion: Paget disease, prior radiation, bone infarct)

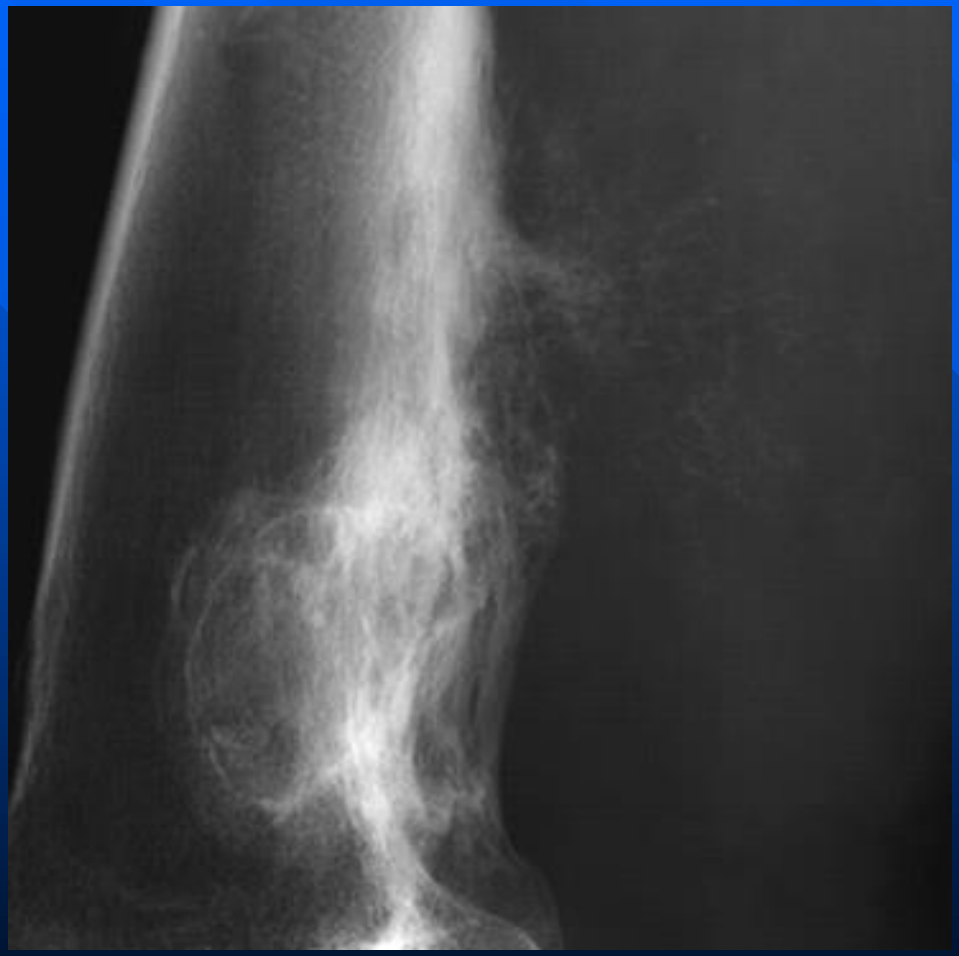
# Osteosarcoma



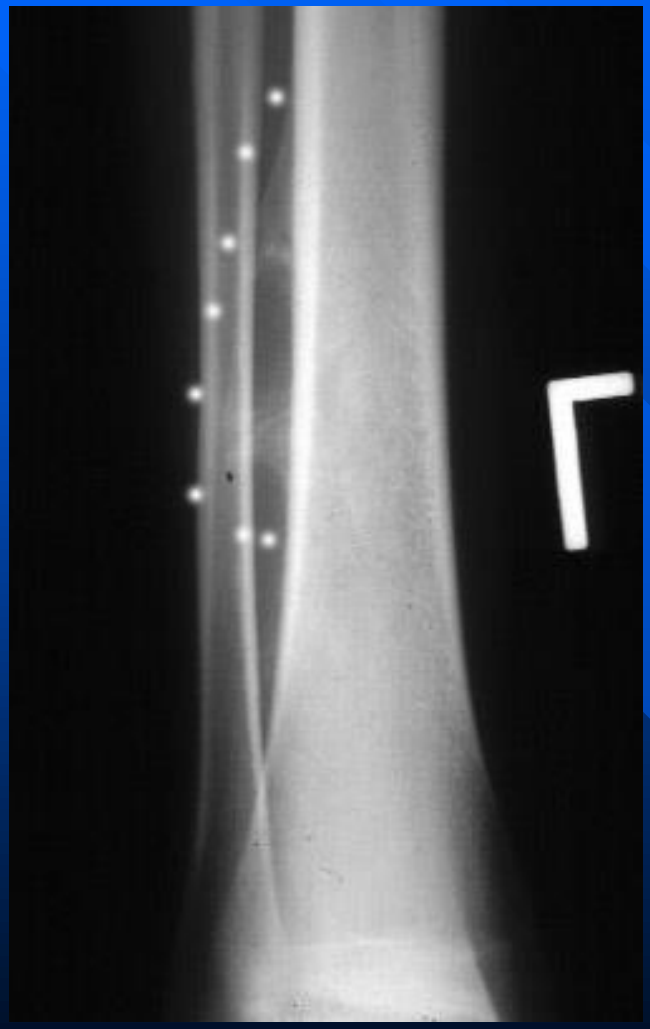
# Parosteal Osteosarcoma

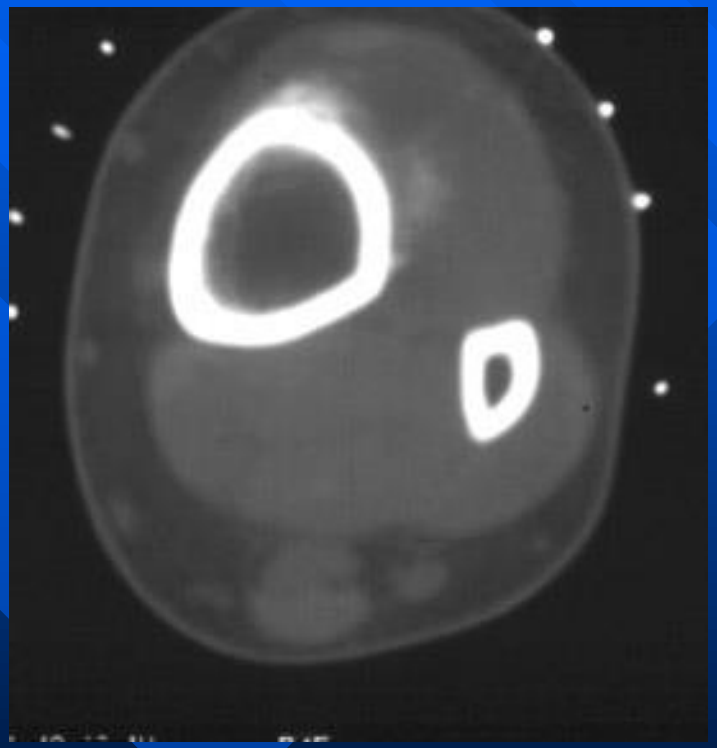


# Parosteal Osteosarcoma



# Periosteal Osteosarcoma





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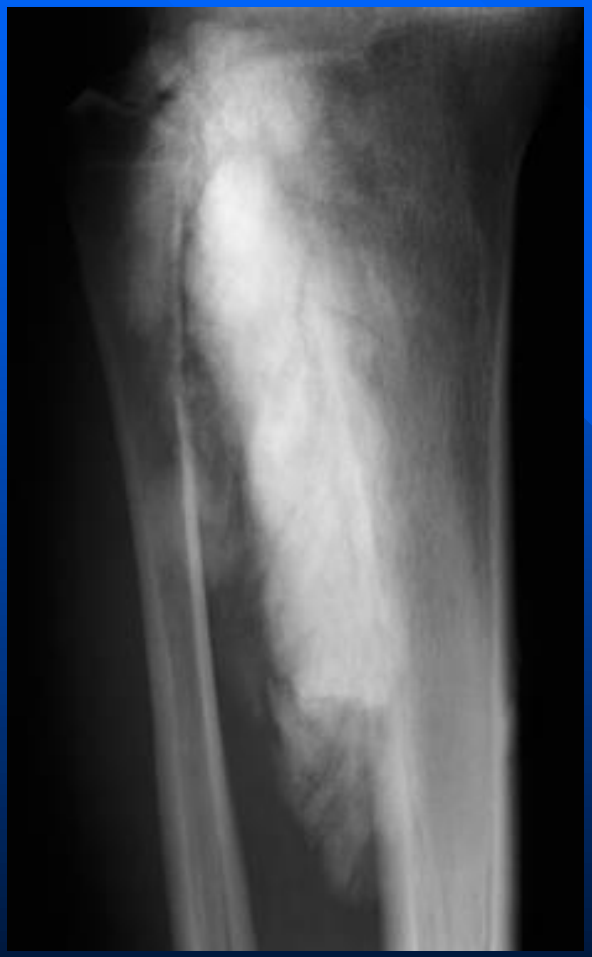
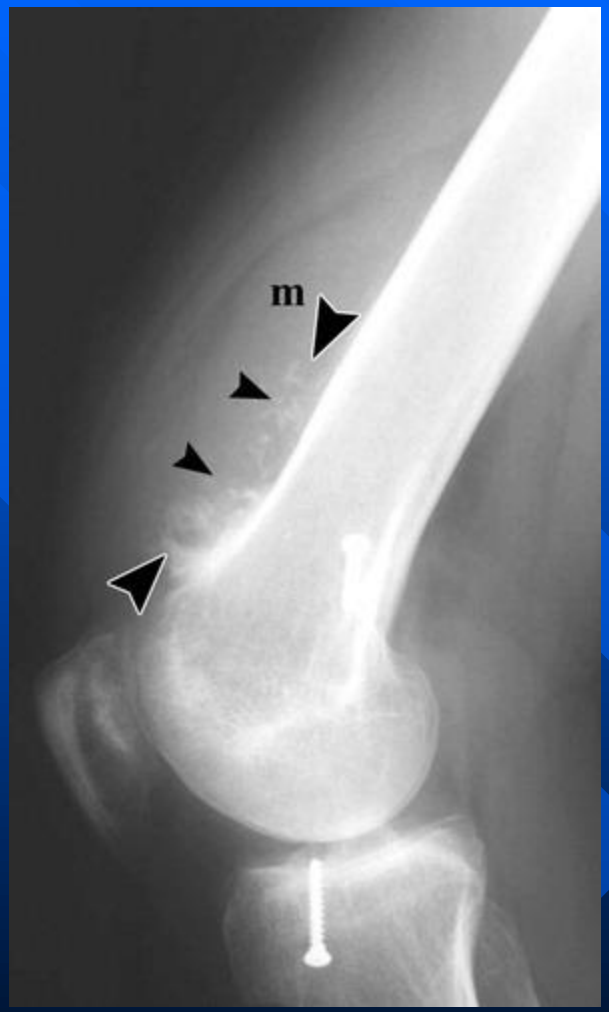
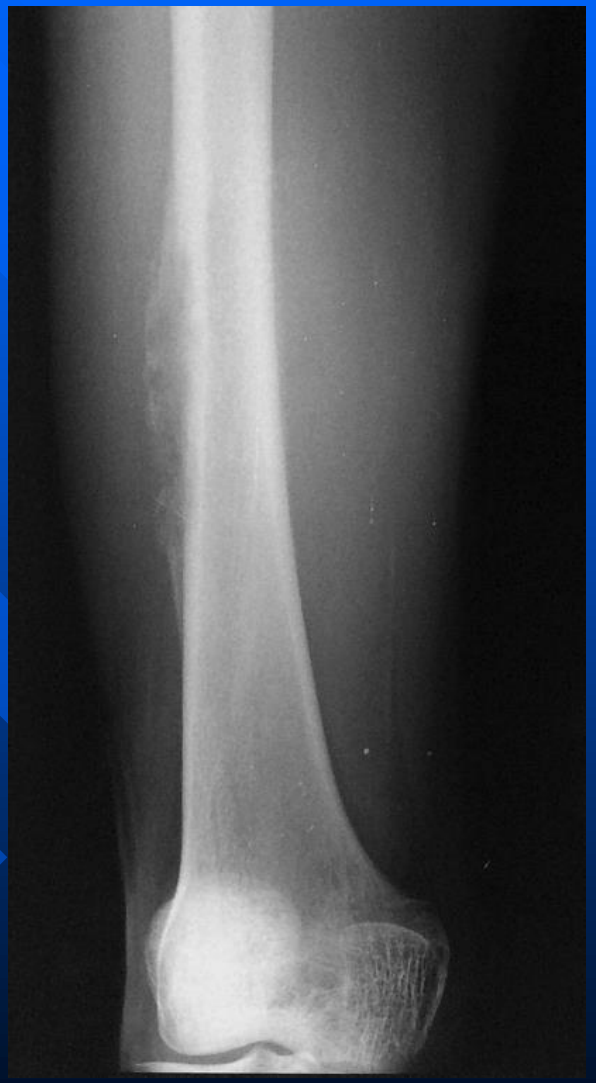
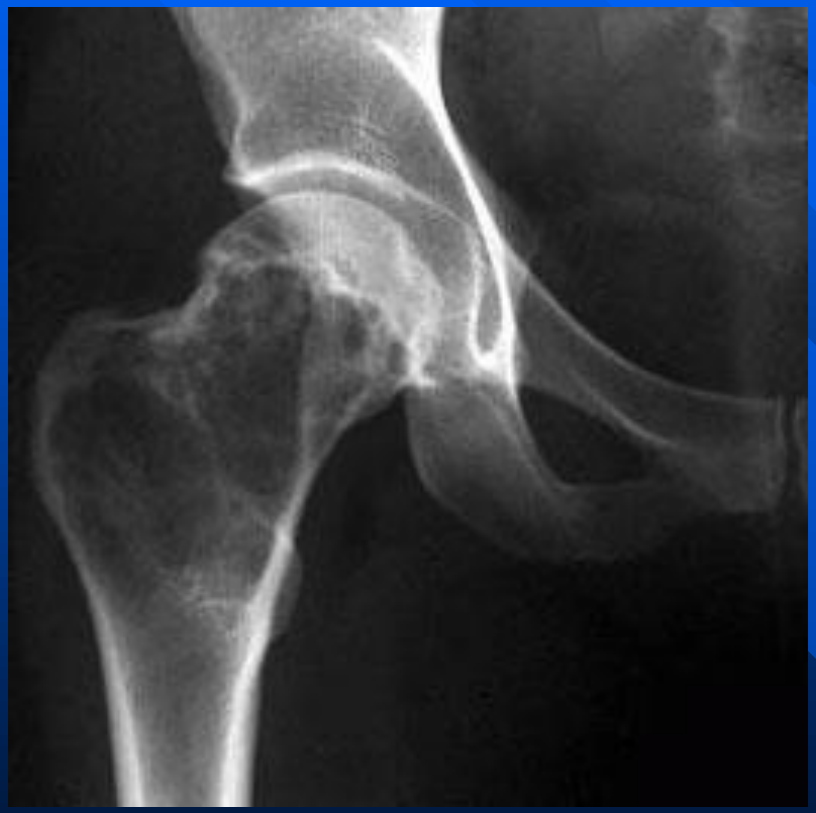
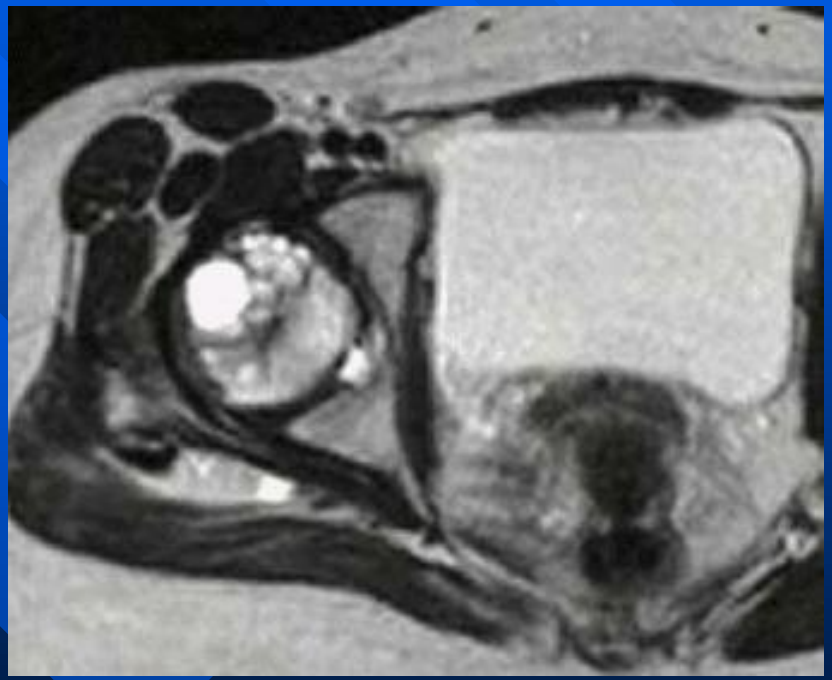




# Teleangectatic osteosarcoma





# Secondary Osteosarcoma

- Paget's
- Radiation