# Bone tumours

# Classification of bone tumours

- Osseous
  - Osteoma
  - **Osteoid osteoma**
  - Osteoblastoma
  - **Osteosarcoma**
- Cartilagenous lesions
  - **Osteochondroma**
  - Multiple hereditary osteochondromatosis
  - Enchondroma
  - Multiple enchondromatosis (Ollier's disease)
  - Chondroblastoma
  - Chondromyxoid fibroma
  - Chondrosaroma

- Fibrous lesions
  - Non ossifying fibroma
  - Fibrous dysplasia
  - Fibrosarcoma
  - Malignant fibrous histiocytoma
- Small (round) cell sarcoma
  - **Ewing's sarcoma**
  - Neuroectodermal tumour of bone
- Giant cell lesions
  - **Giant cell tumours**
- Vascular lesions
- Chordoma
- Lesions of hematopoeitic, lymphoid and histiocytic lesions
  - Myeloma
  - Lymphoma

- Exostosis (osteochondroma)
- Osteoid osteoma
- Osteoclastoma
- Osteosarcoma
- Ewing's tumour

# General approach to musculoskeletal tumours

- Presentation of musculoskeletal tumour may be
  - Pain
  - Mass
  - Abnormal radiographic finding during evaluation of unrelated problem

- Pain of a muscloskeletal tumour
  - Initially may be activity related, but the patient with a malignancy of bone often complains of progressive pain at rest and at night.
  - Patients with benign bone tumors also may have activity-related pain if the lesion is large enough to weaken the bone.
  - Other benign lesions, most notably osteoid osteoma, may initially cause night pain.
  - Conversely, patients with soft tissue tumors rarely complain of pain but more often complain of a mass. Exceptions to this rule are patients with nerve sheath tumors who have pain or neurological signs

# Incidence

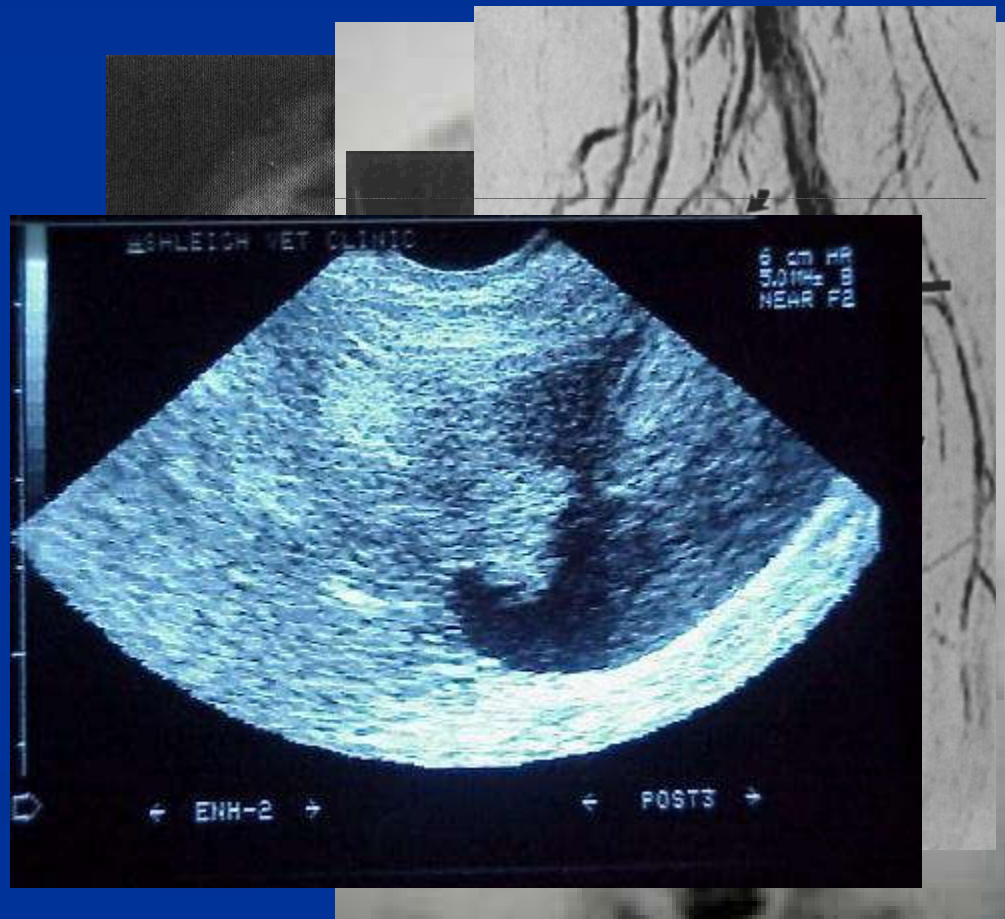
- Age … the most important information obtained from history. Muscloskelet neoplasms occur within specific age ranges
- Sex …
- Race … Ewing's sarcoma is rare in African race
- Family history..
  - Multiple hereditary exostosis
  - Neurofibromatosis

# Physical examination

- Mass
- Atrophy of surrounding musculature
- Neurological examination
- Distal pulse
- Skin lesion … Café au lait patches
- LN … sarcomas are rarely give LN metastases

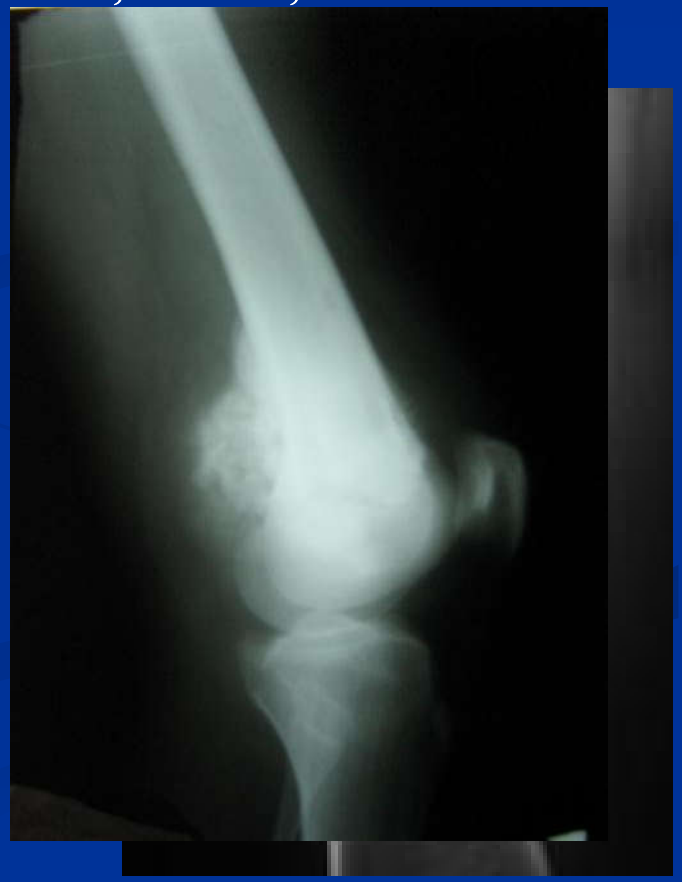
# Radiographic Investigations

- Radiographic
  - Plane x-rays … the gold standard in bone tumours
  - C.T.
  - Bone scan
  - MRI
  - Ultrasonography
  - Angiography
  - Gallium scans
  - PET

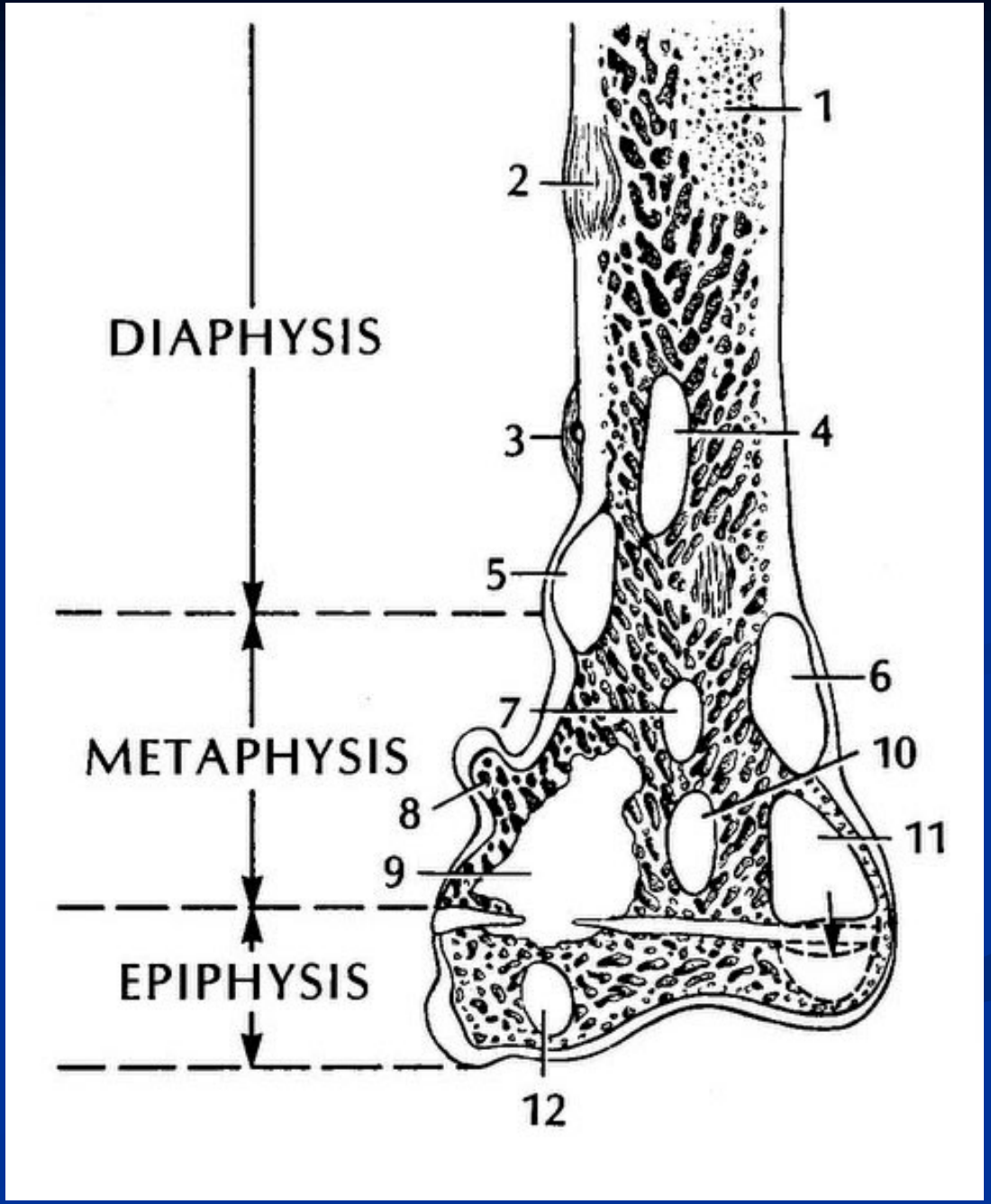


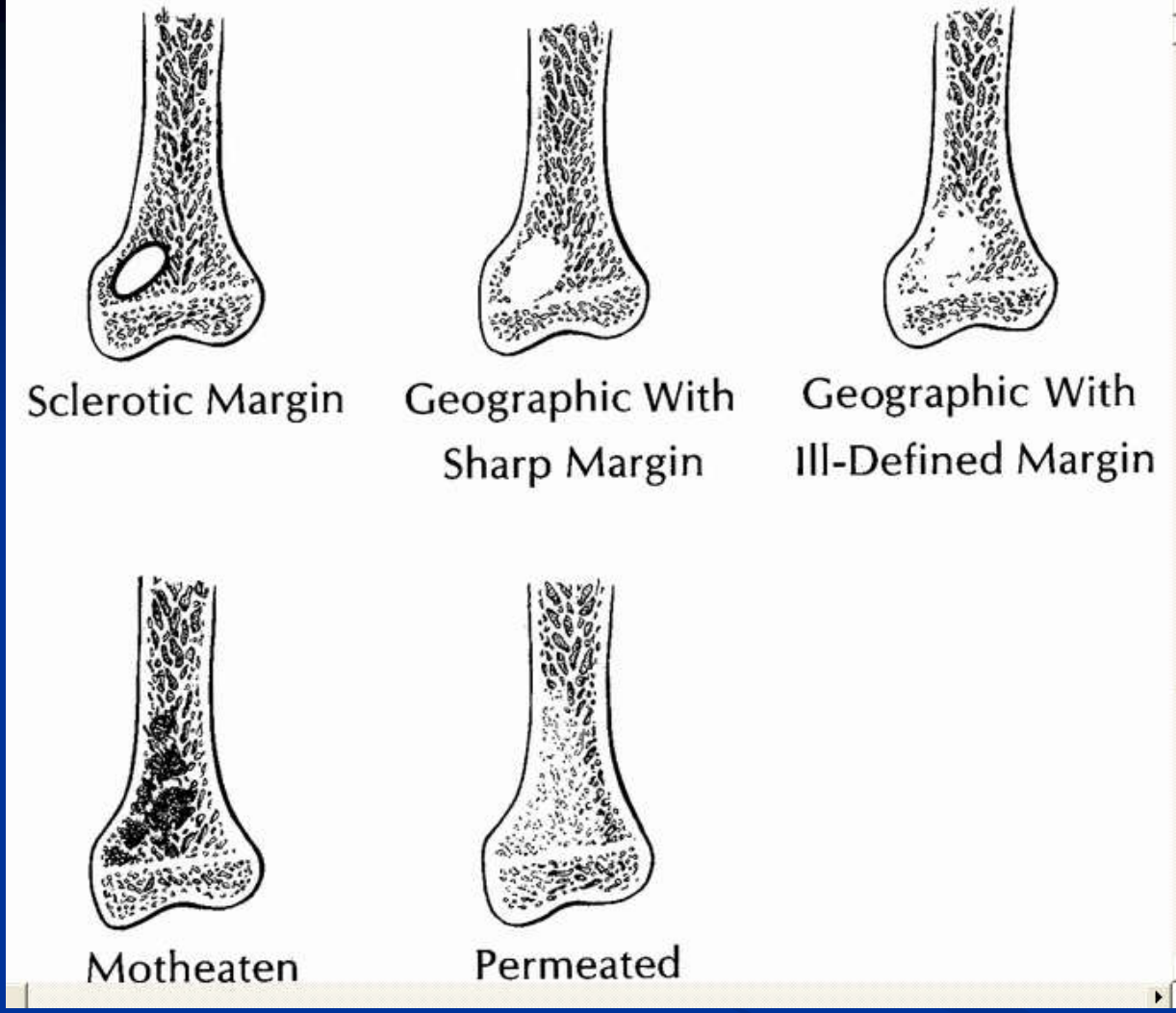
# Radiographic evaluation

- Site of the lesion
  - Bone affected
  - Segment of bone … metaphyseal, epiphyseal or diaphyseal
  - Position in the transverse plane … central, eccentric, cortical, juxtacortical, periosteal or soft tissue
- Rate of growth
  - Pattern of bone destruction
  - Margin
- Visible tumour matrix
  - Tumour matrix
  - Any calcificatoin
- Internal or external trabeculae
- Cortical pentration, erosion or expansion
- Periosteal response
- Soft tissue mass
- Rest of the bone



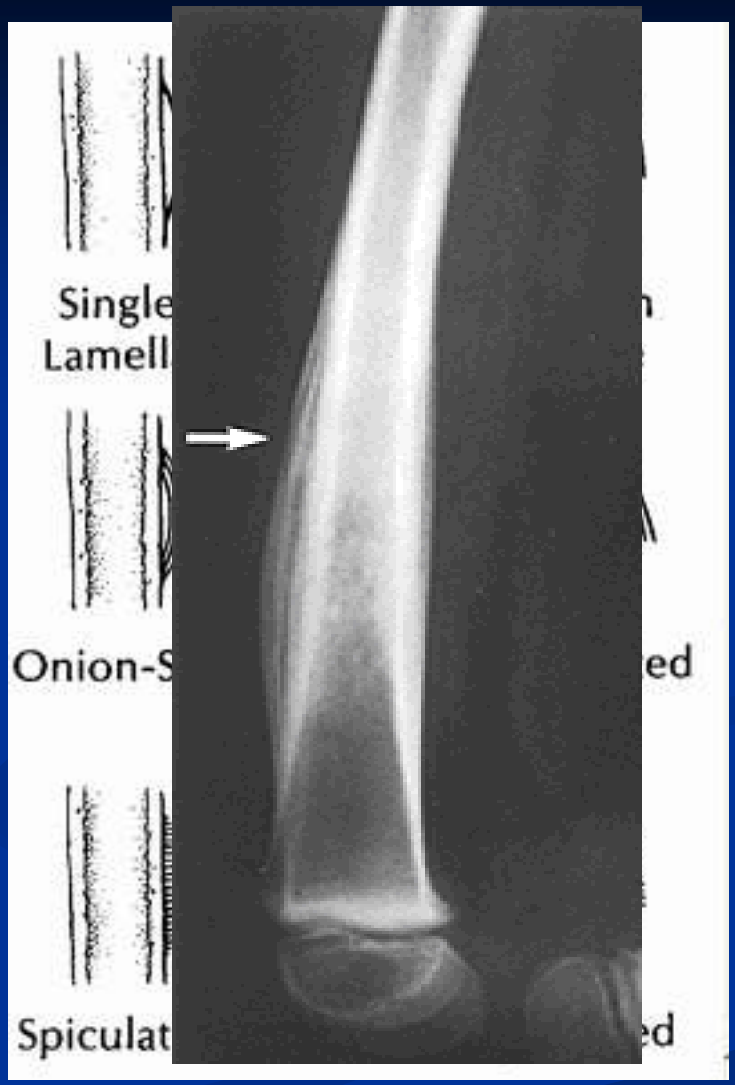
- 1 – Ewing's sarcoma
- 3 – osteoid osteoma
- 8 – Exostosis
- 9 – Ostesarcoma
- 11 - Osteoclastoma



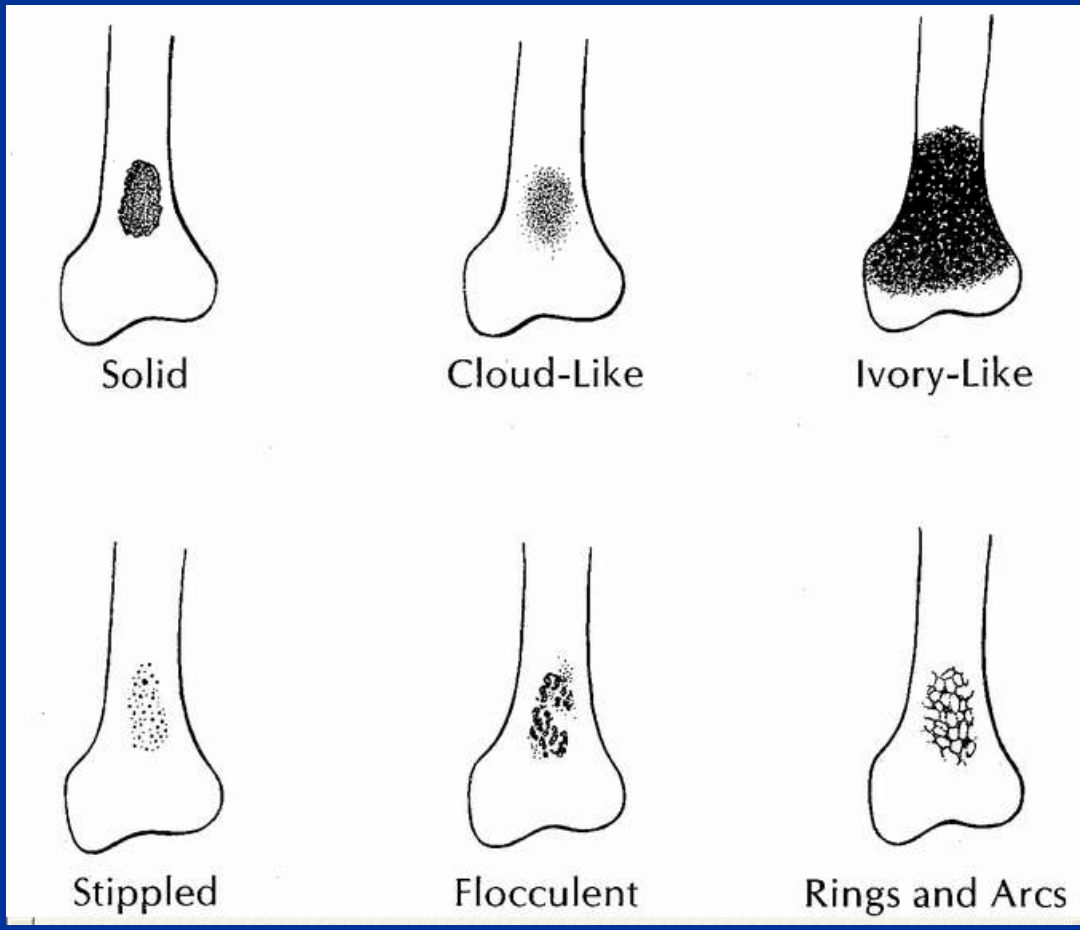



- Patterns of bone destruction
  - Geographical
  - Moth eaten
  - Permeative

- Periosteal reaction
  - Codman's triangle
  - Onion peel … Ewing's
  - Hair on end … Ewing's
  - Sun burst … osteosarcoma



- Visible matrix
  - Mineralized osteoid may be solid, cloud like or ivory like
  - Mineralized chondroid may be stippled, flocculent, or rings and arcs

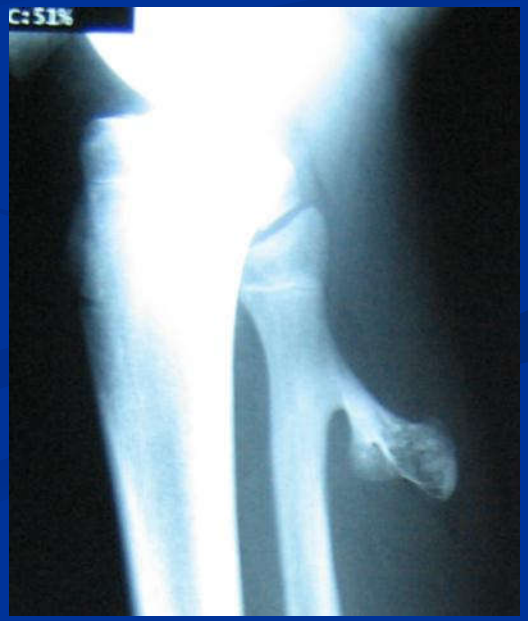


# Lab Investigations

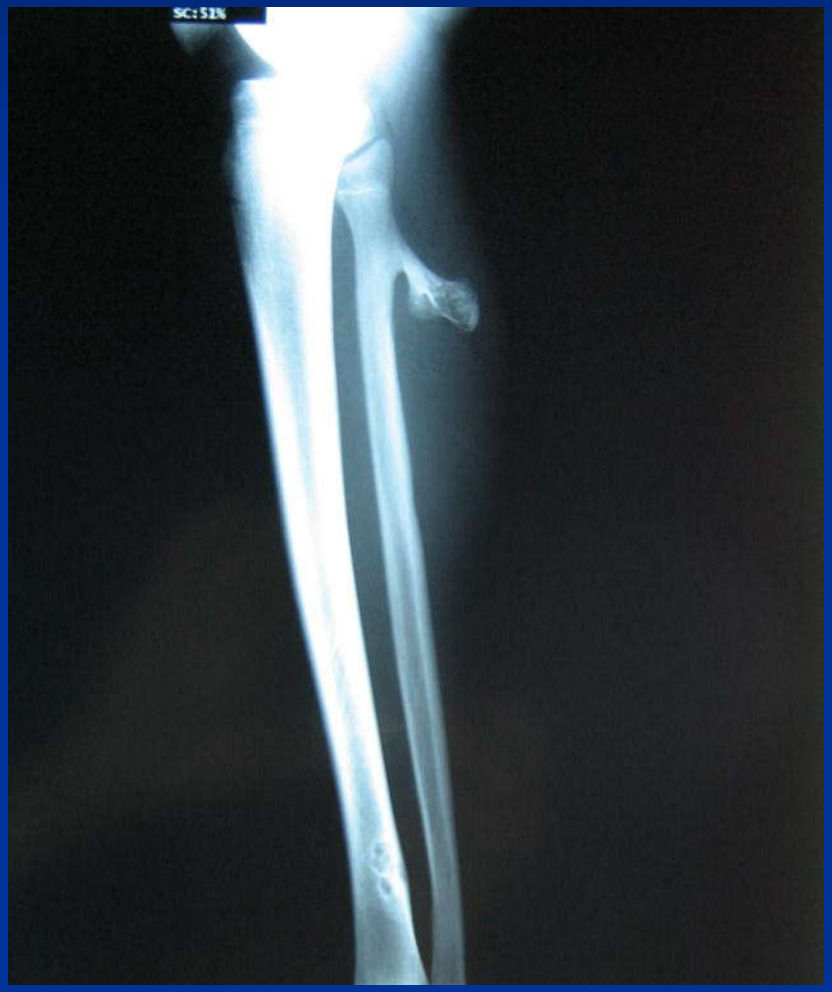
- Lab
  - CBC … infections and leukemia
  - ESR … infection, Ewing's, leukemia, lymphoma
  - S. protein electrophoresis … multiple myeloma
  - PSA … prostatic tumours
  - S. Ca … metastatic disease, multiple myeloma, hyperparathyroidism.
  - Blood urea and creatinine …
  - S. Alkaline phosphatase and urinary pyridinium cross links

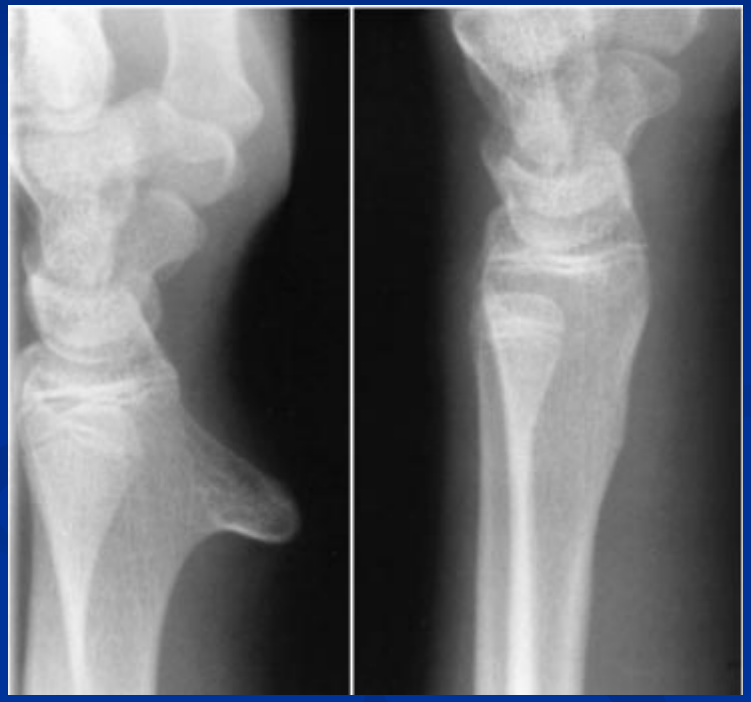
# Exostosis (osteochondroma)

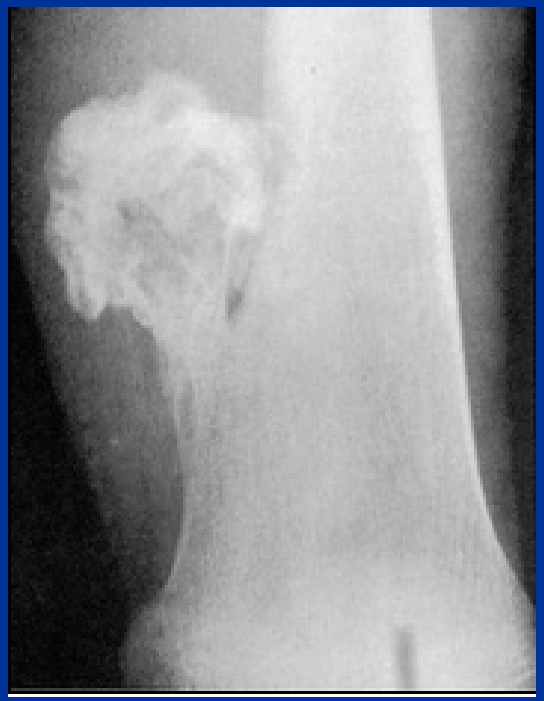
- Commonest benign tumour … 40% of benign tumours
- Age: Adolescents and young adults
- Site:
  - Metaphysis of any bone formed in cartilage
  - 1/3 around knee
- the lesion may develop from abnormal part of epiphyseal cartilage
- Complications
  - Fracture stalk
  - Sarcomatous change (chondrosarcoma)
  - Bursitis
  - Compression on neurovascular structures

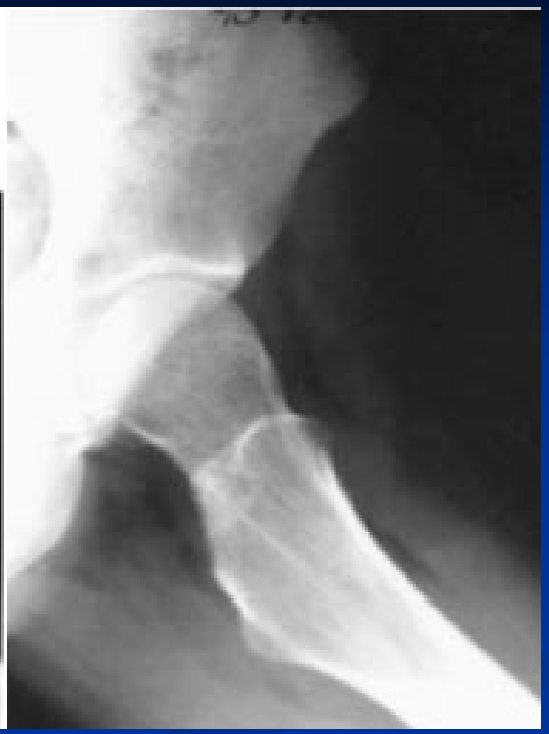


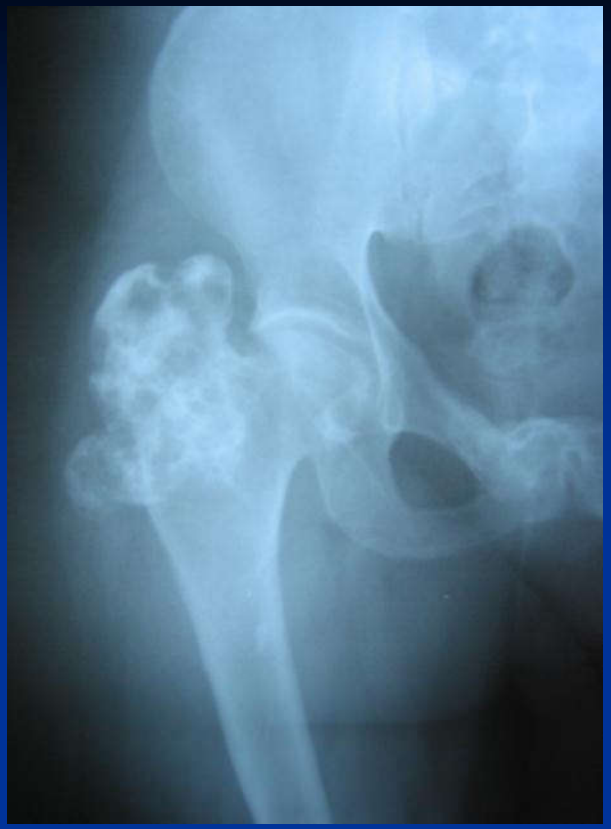
# Exostosis (osteochondroma)

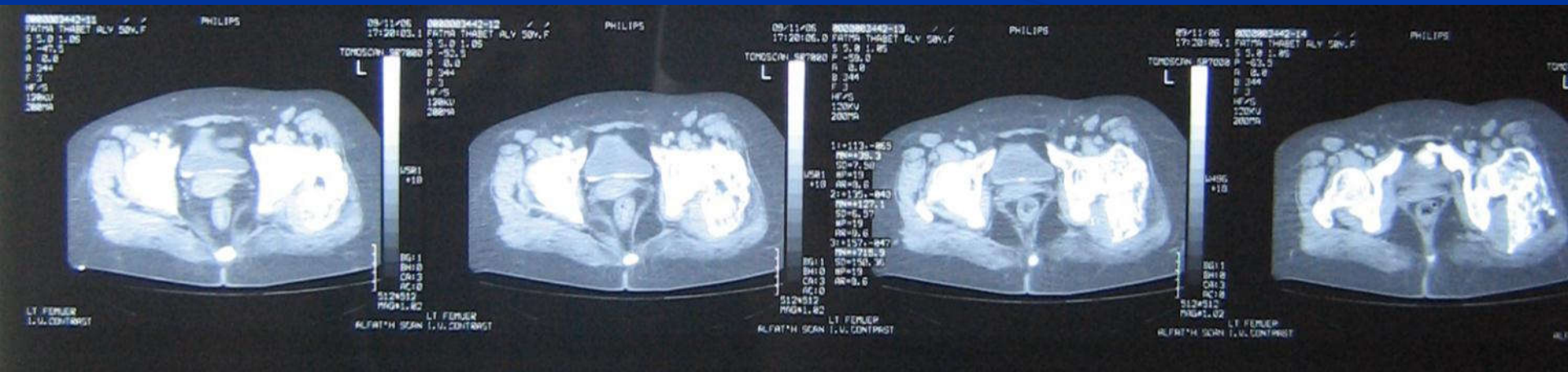








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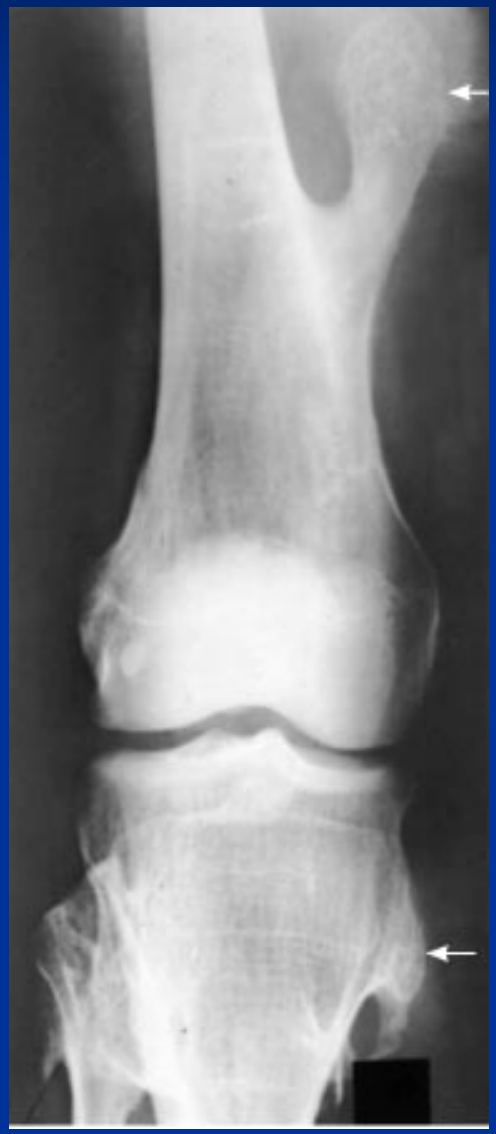
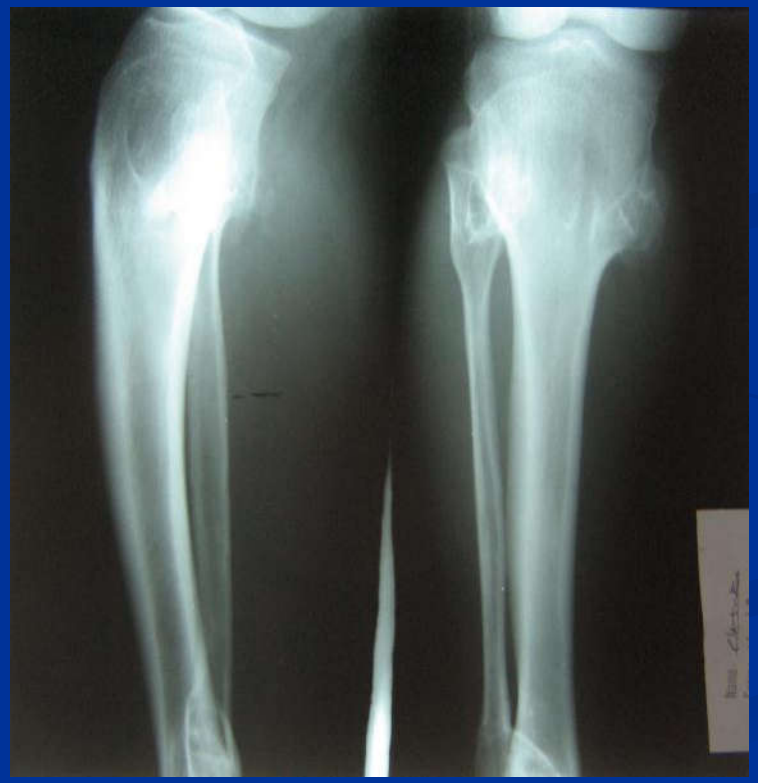
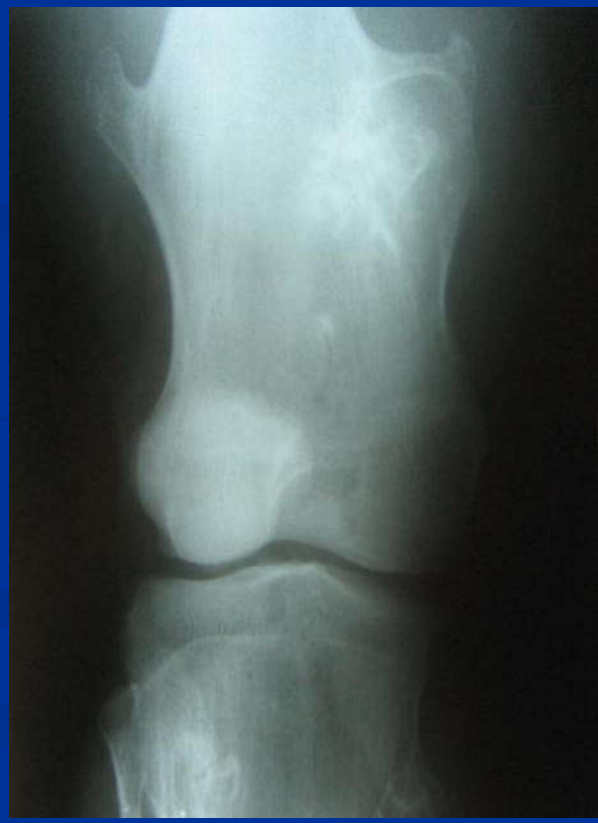
# Multiple hereditary exostosis

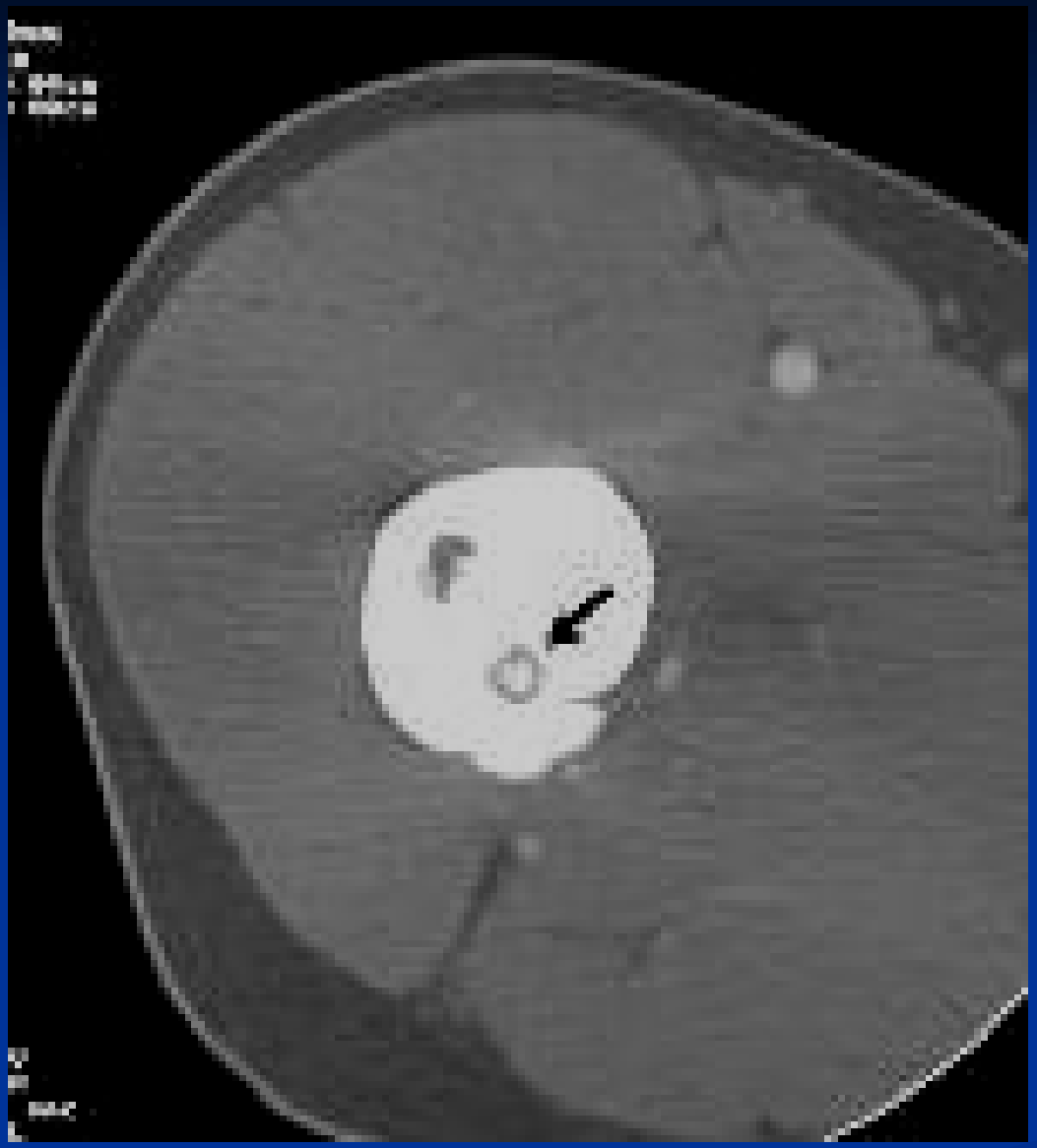


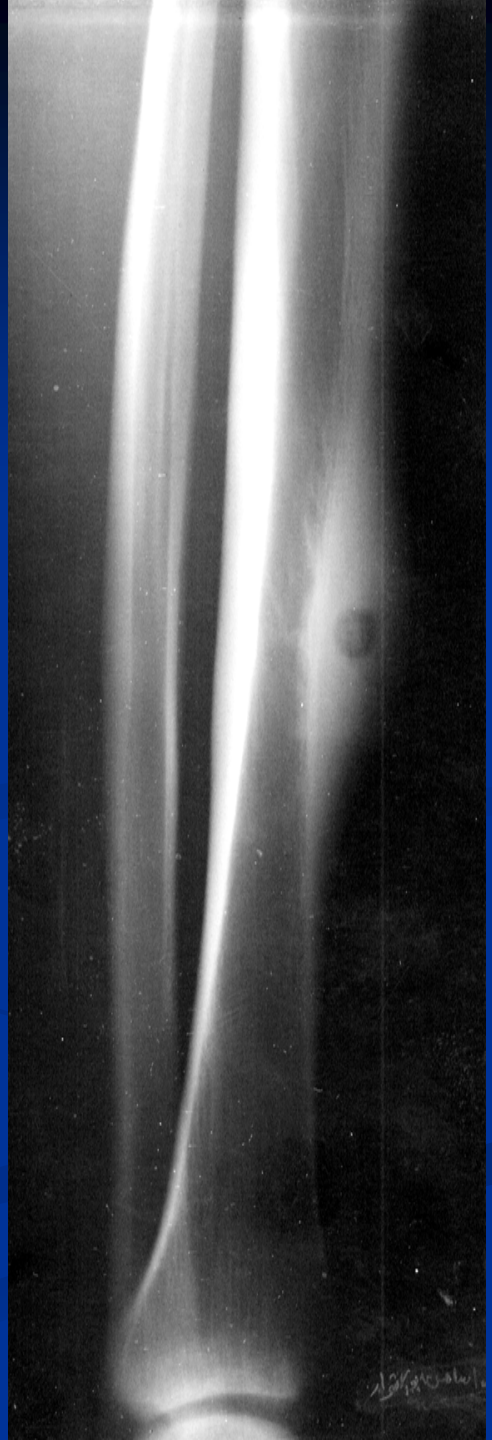


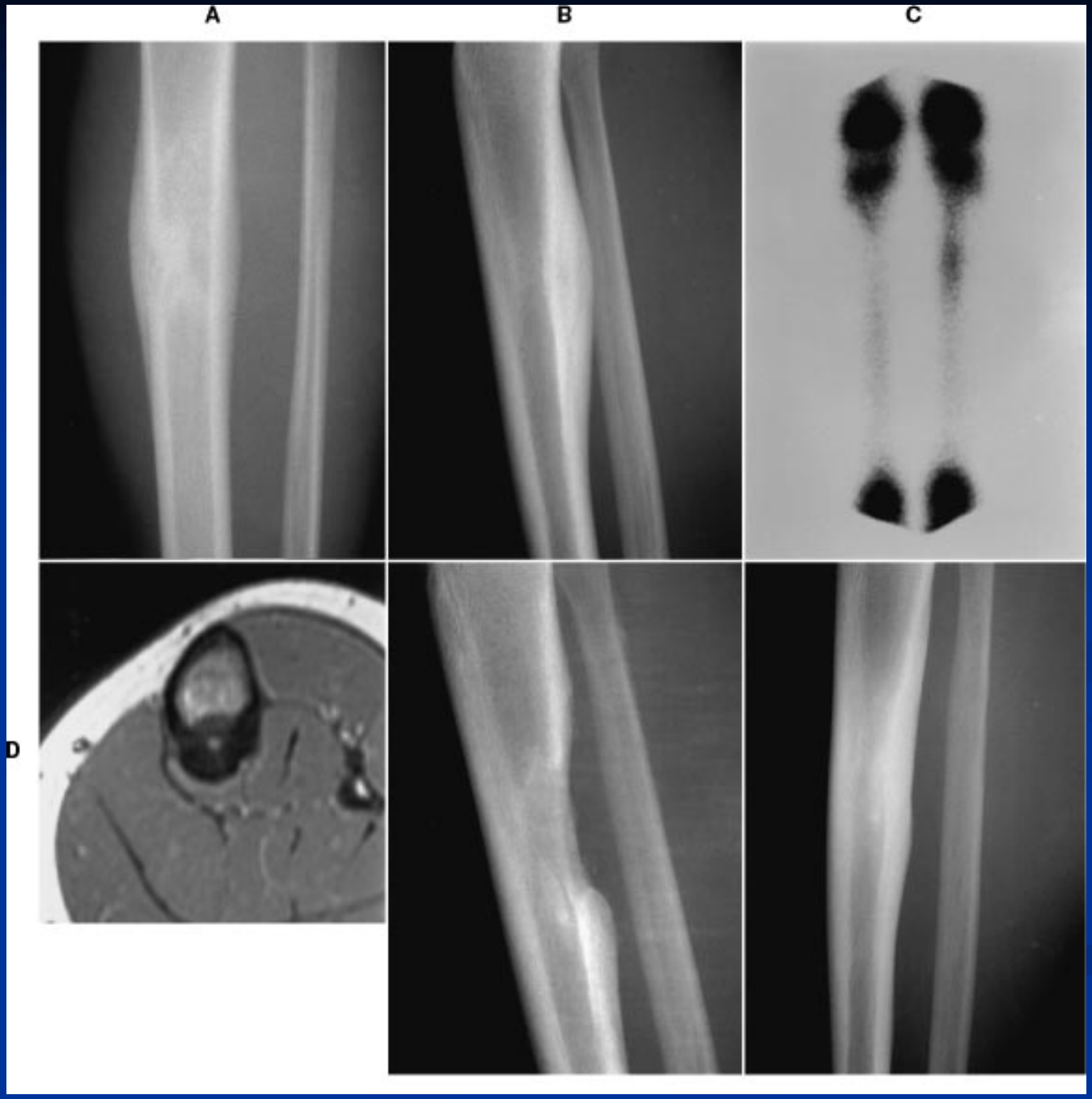


# Osteoid osteoma

- Age : Children and adolescents … 70% <20 years old
- Site: Long bones particularly shaft of femur and tibia
- X-ray
  - Sharply rounded or ovoid radiolucent area in one side of cortex
  - Less than 2 cm
  - Surrounded by dense sclerosis
  - Small dense shadow of calcified osteoid (nidus) may be present
- Bone scan … double density sign
- C.T. is often required to localize the lesion accurately. CT may detect the nidus, whereas roentgenograms show only sclerosis.
- Prognosis
  - Course is limited
  - After few years, osteoid tissue becomes completely calcified, pain disappear and radiolucent area become filled with bone
- Treatment
  - block resection of the nidus
  - shave the reactive bone with a sharp osteotome until the nidus is encountered, then curet the exposed nidus
  - outpatient percutaneous radiofrequency ablation



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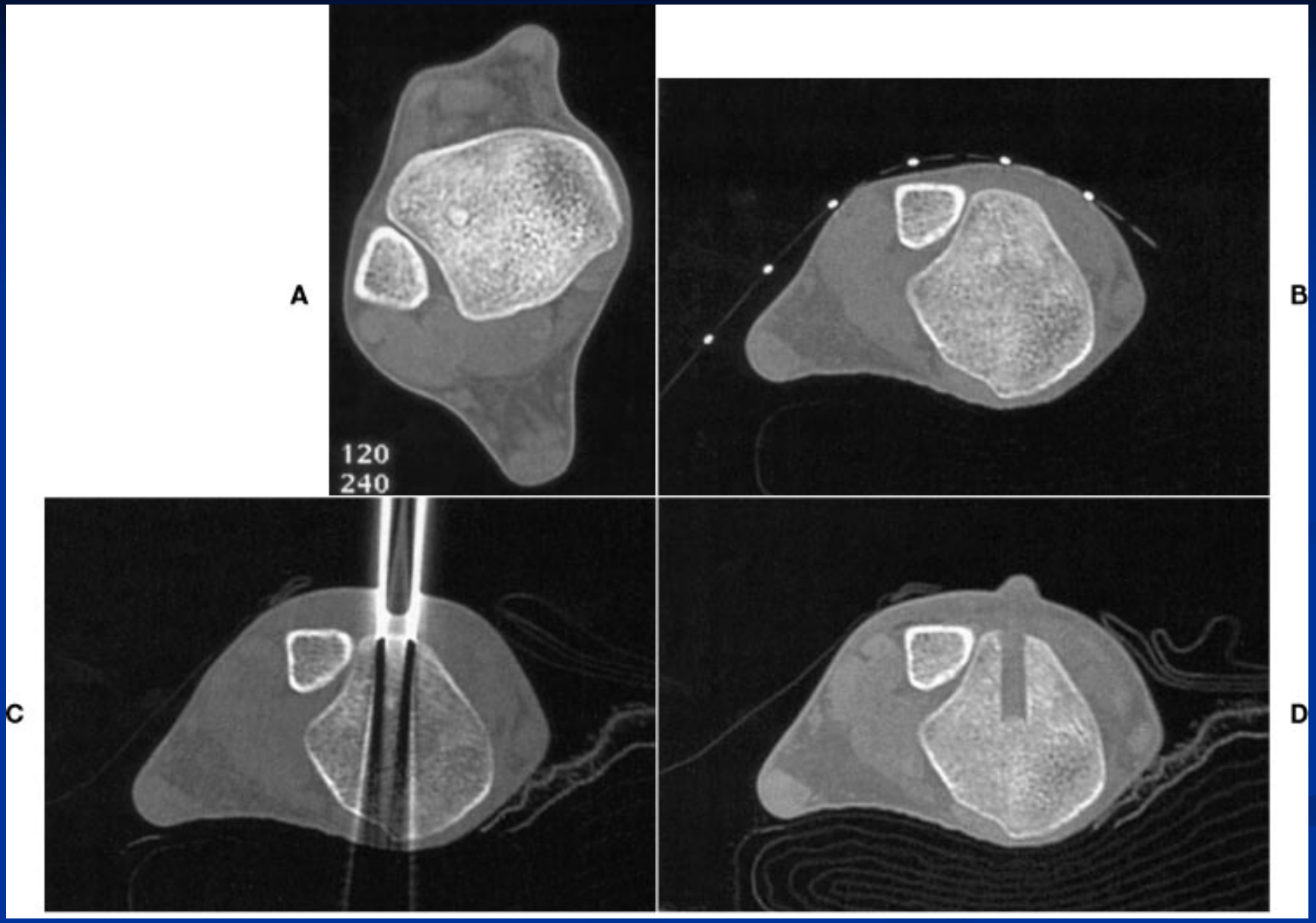
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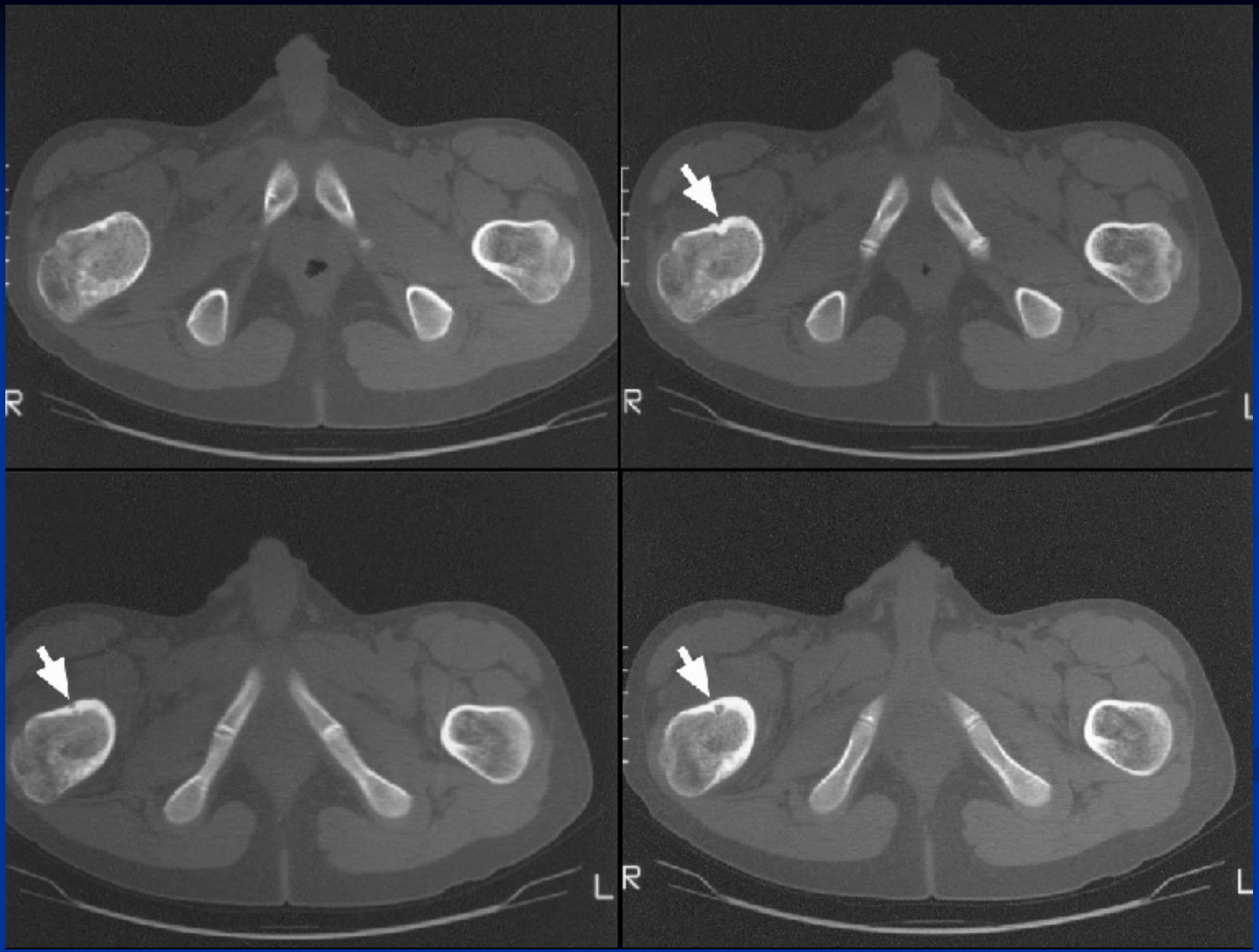
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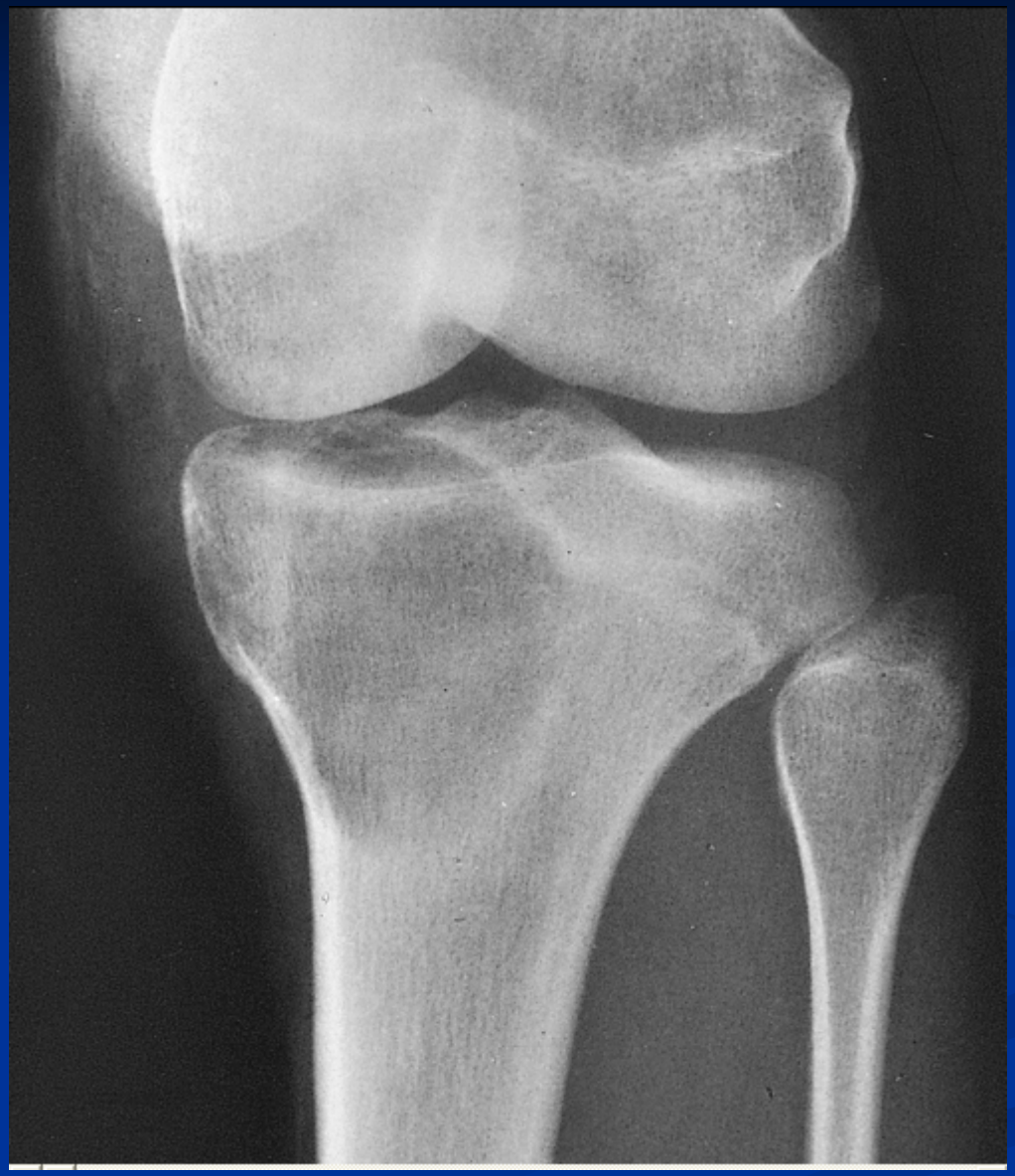
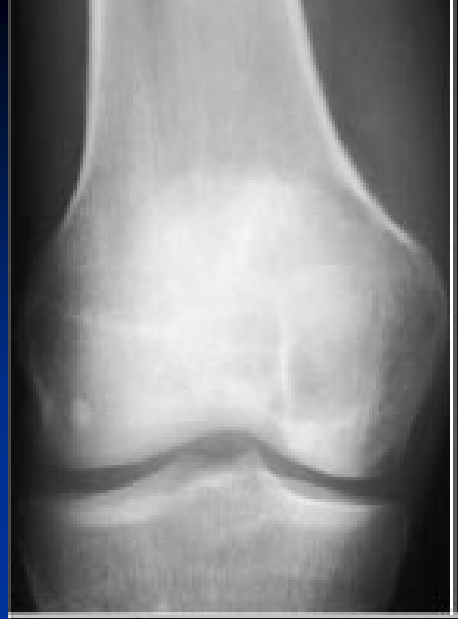
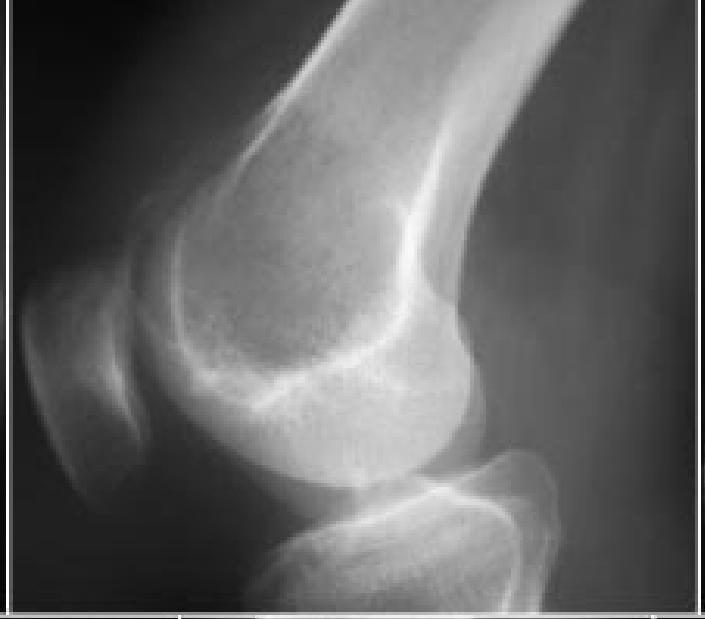
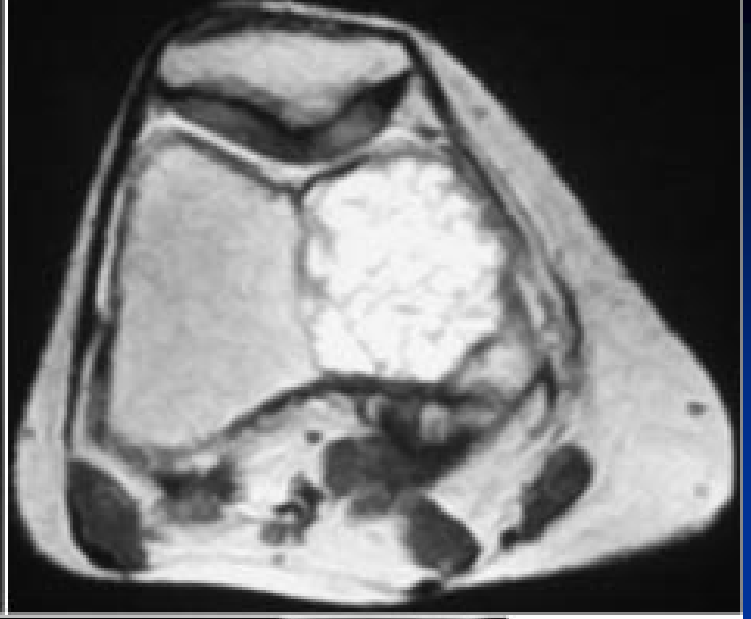
# Osteoclastoma

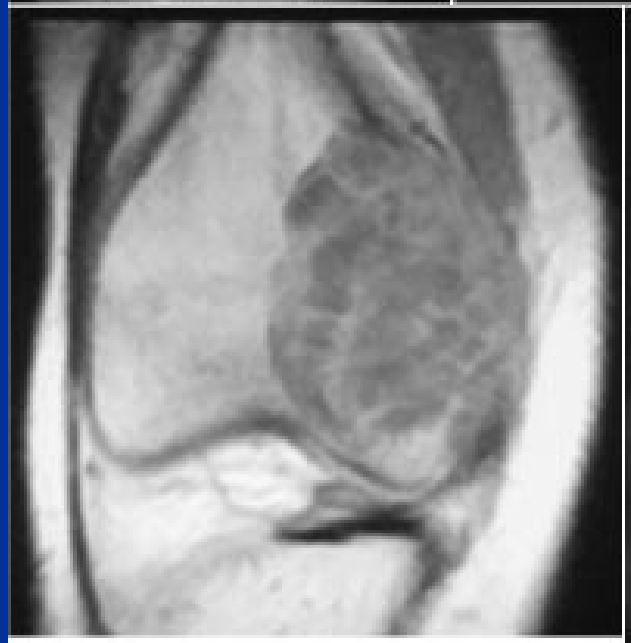
- Age: 20-40 years. Diagnosis prior to skeletal maturity is suspect
- Site:
  - 75% of GCT occur in ends of long bones and involve epiphysis. The hallmark of the tumour is extension into subchondral bone in close proximity to articular cartilage (perforation of cartilage may occur)
  - 75% of GCT occurs in ends of long bones, 75% of which is around knee. Distal end of radius is the next common site. Proximal end of humerus, phalanges, talus and mandible.
- X-ray
  - End of long bones is occupied by an osteolytic lesion which may reach articular surface
  - Cortex is thinned and may be expanded or fractured
  - Lesion is well defined with no extension into medullary cavity
  - Metaphyseal extension may be marginated but is not sclerotic
  - The outline of the lesion resembles “Soap bubble appearance”











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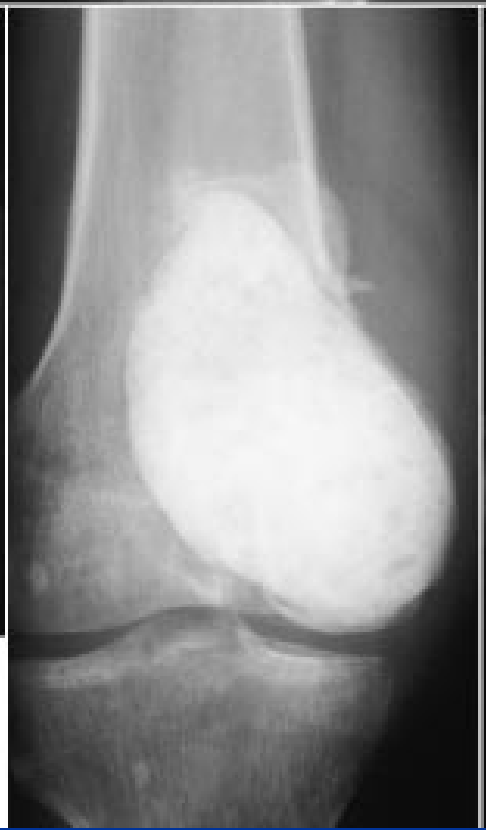

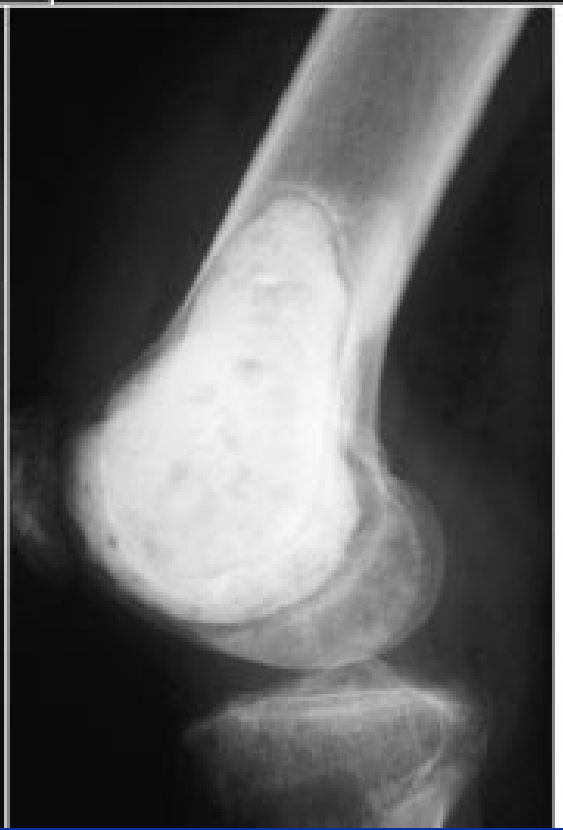

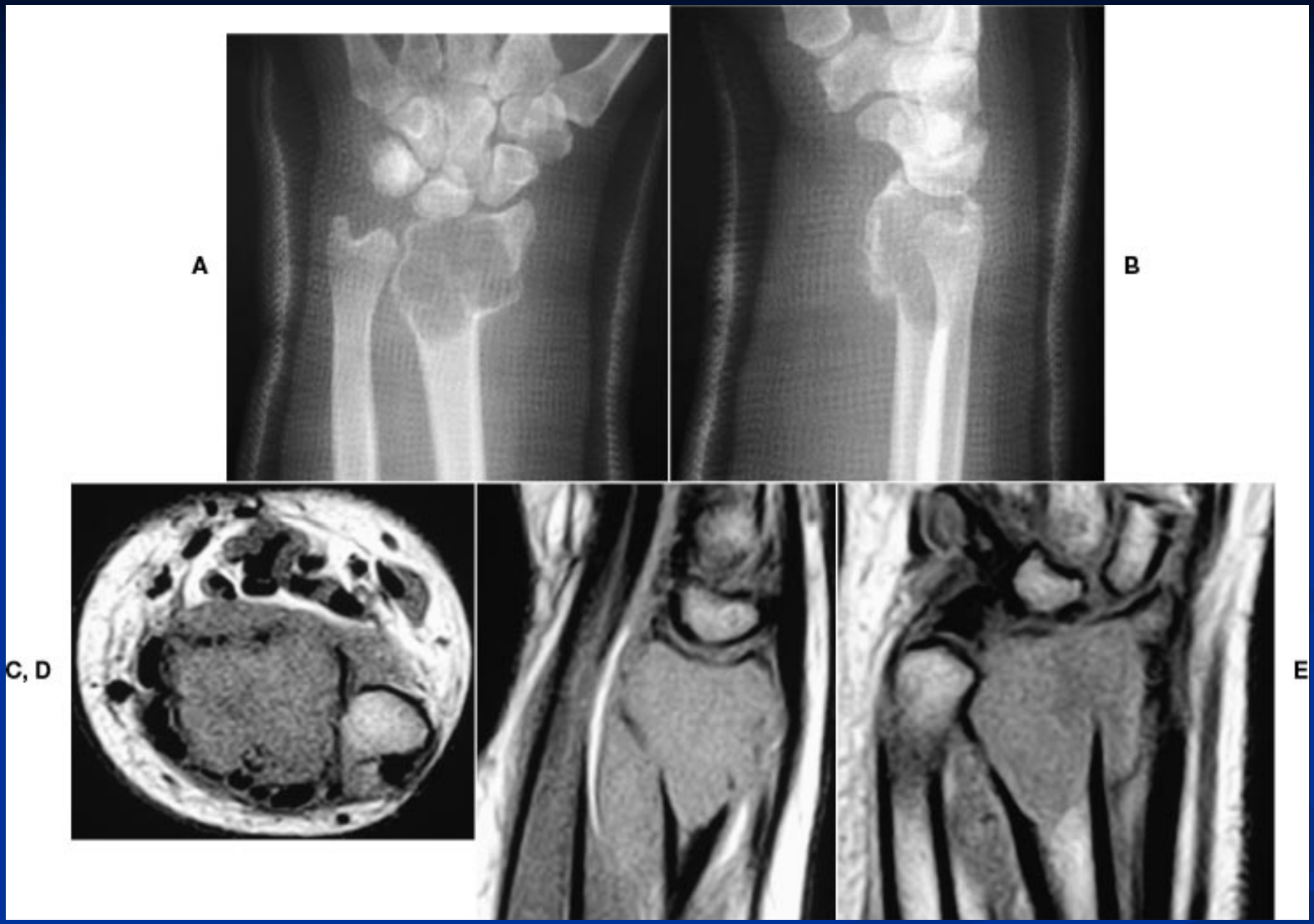
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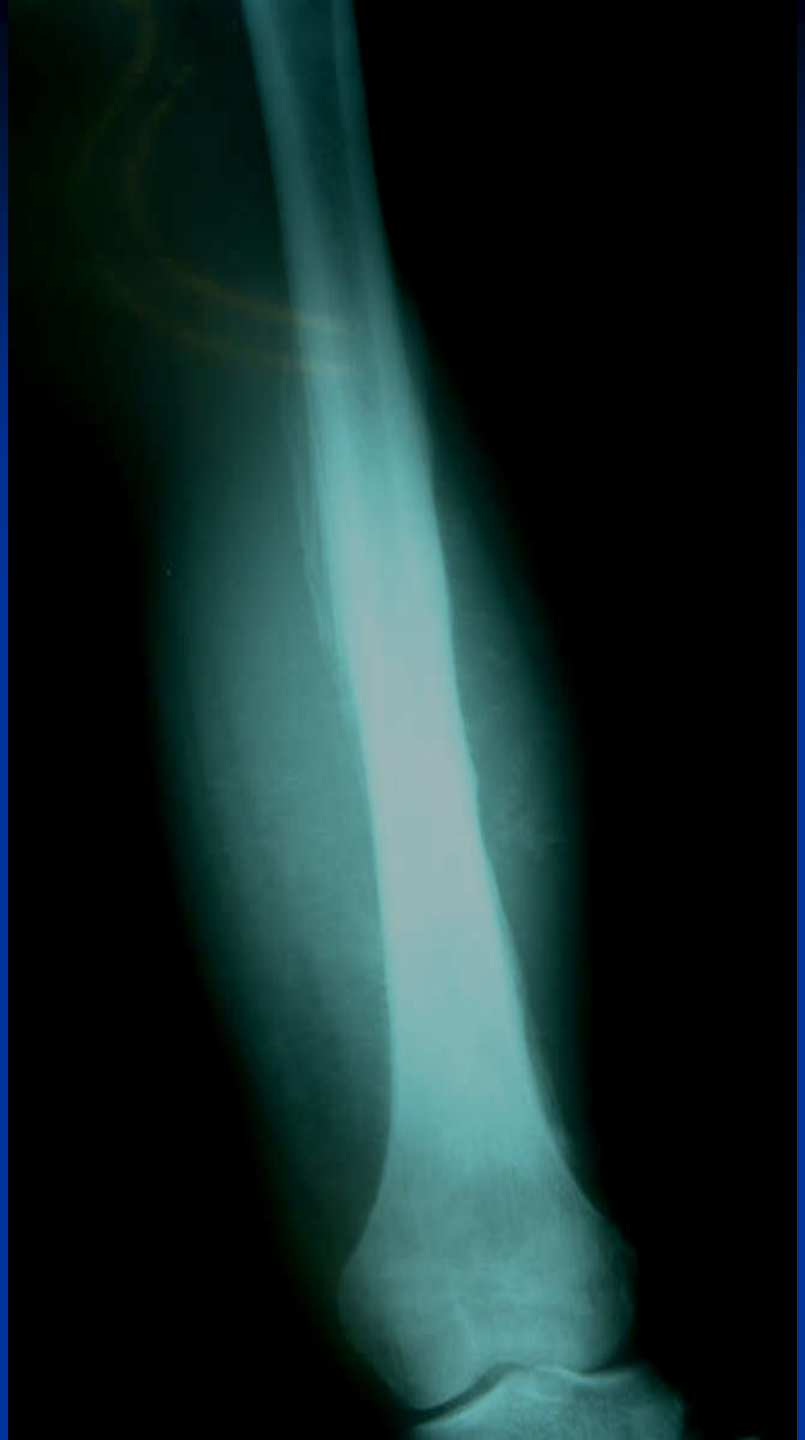
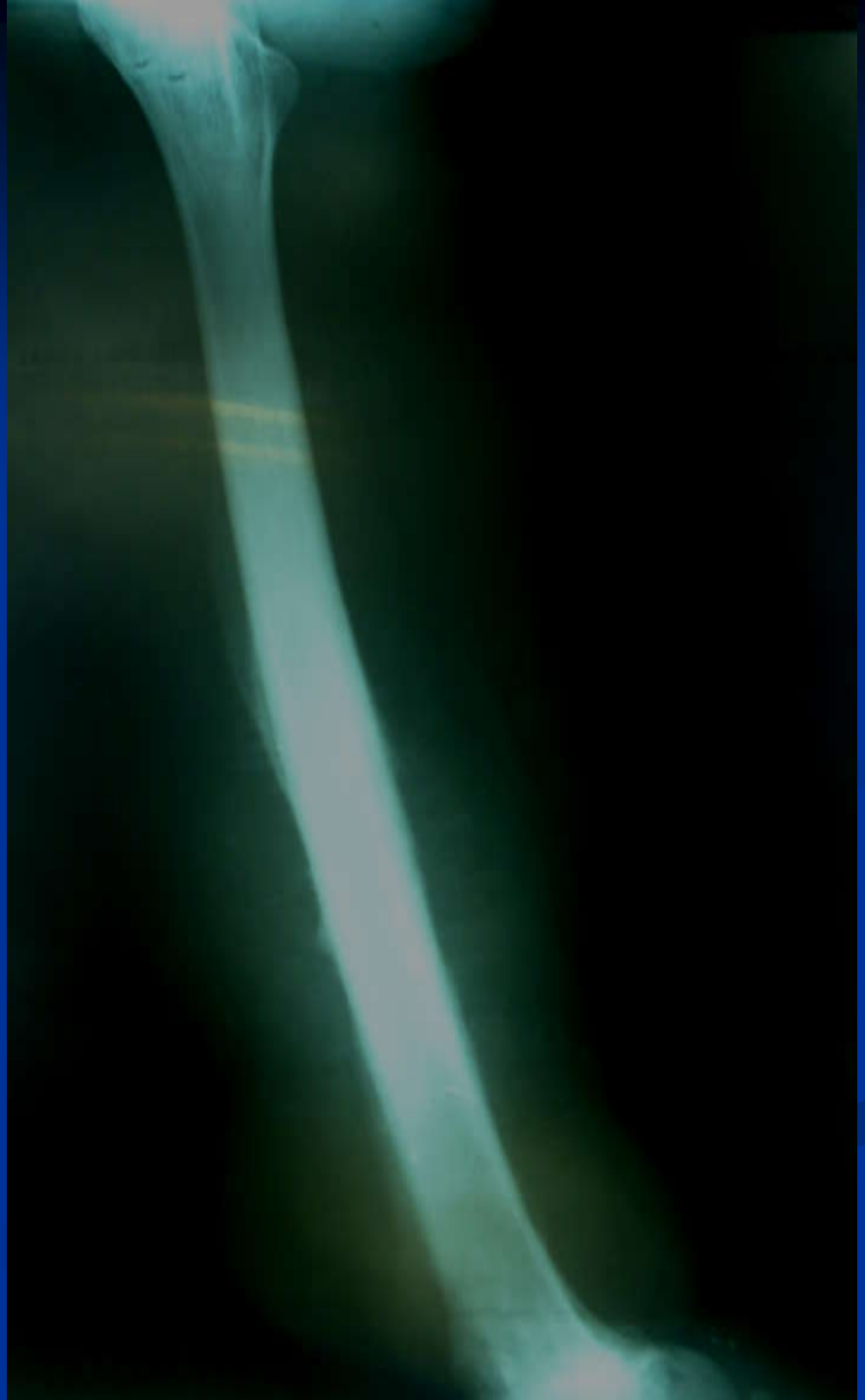
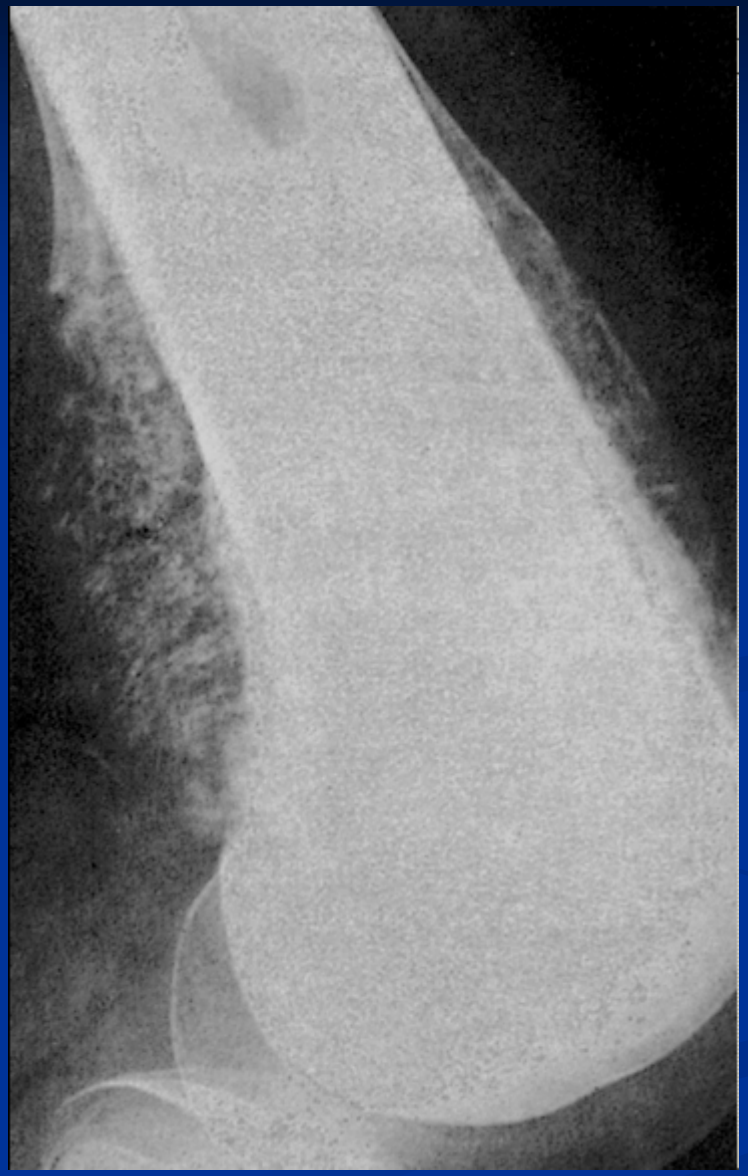
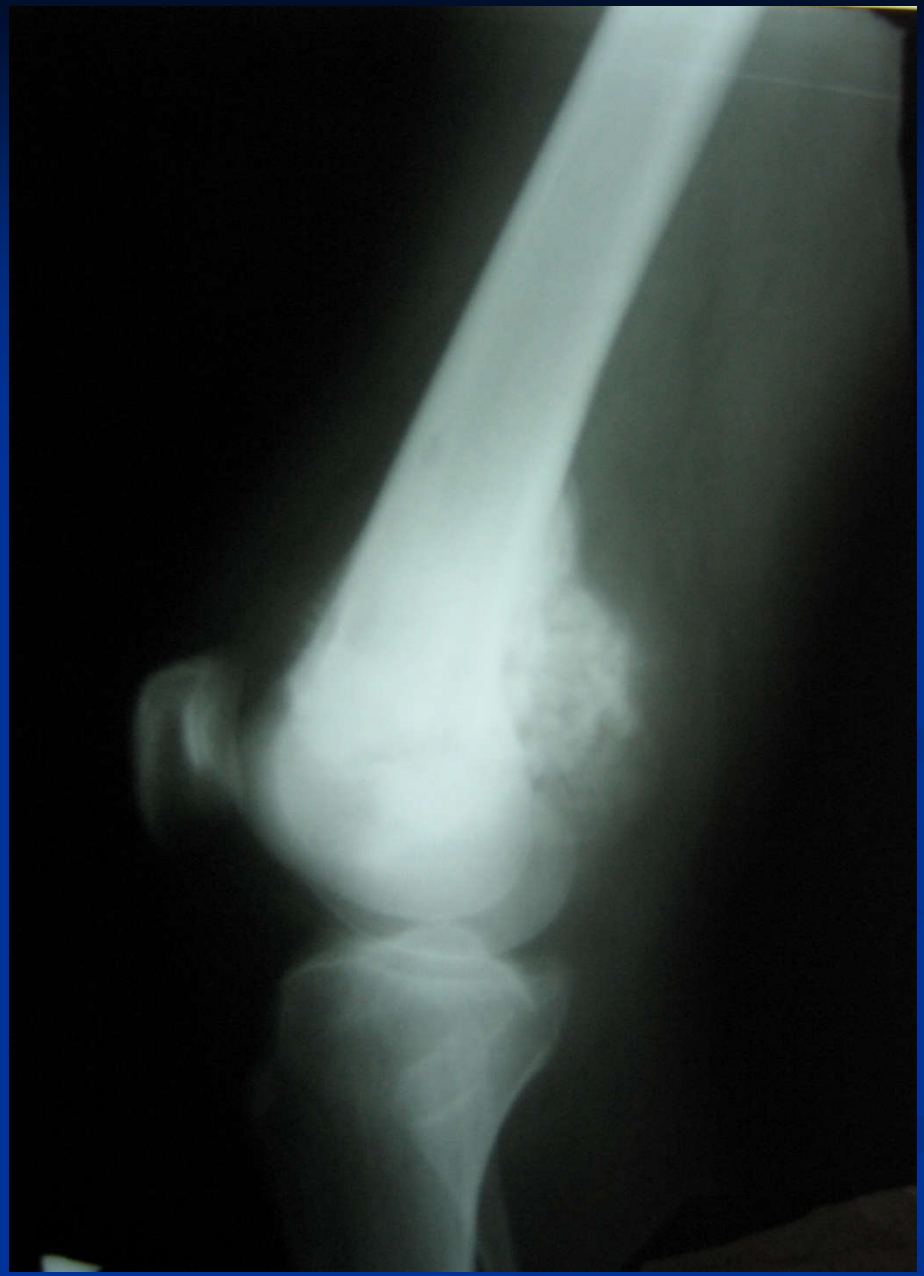
# Osteosarcoma

- Age:
  - 10-25 years
  - When it occur after 40 years, is usually due to …
    - Malignant change in Paget's disease
    - Irradiated bone
    - Polycystic fibrous dysplasia
- Site: Distal end of femur, proximal end of tibia, proximal end of humerus are commonest
- X-ray
  - Metaphyseal bone destruction with new bone formation together with permeative growth pattern, cortical destruction, sunrise periosteal reaction and Codman's triangle

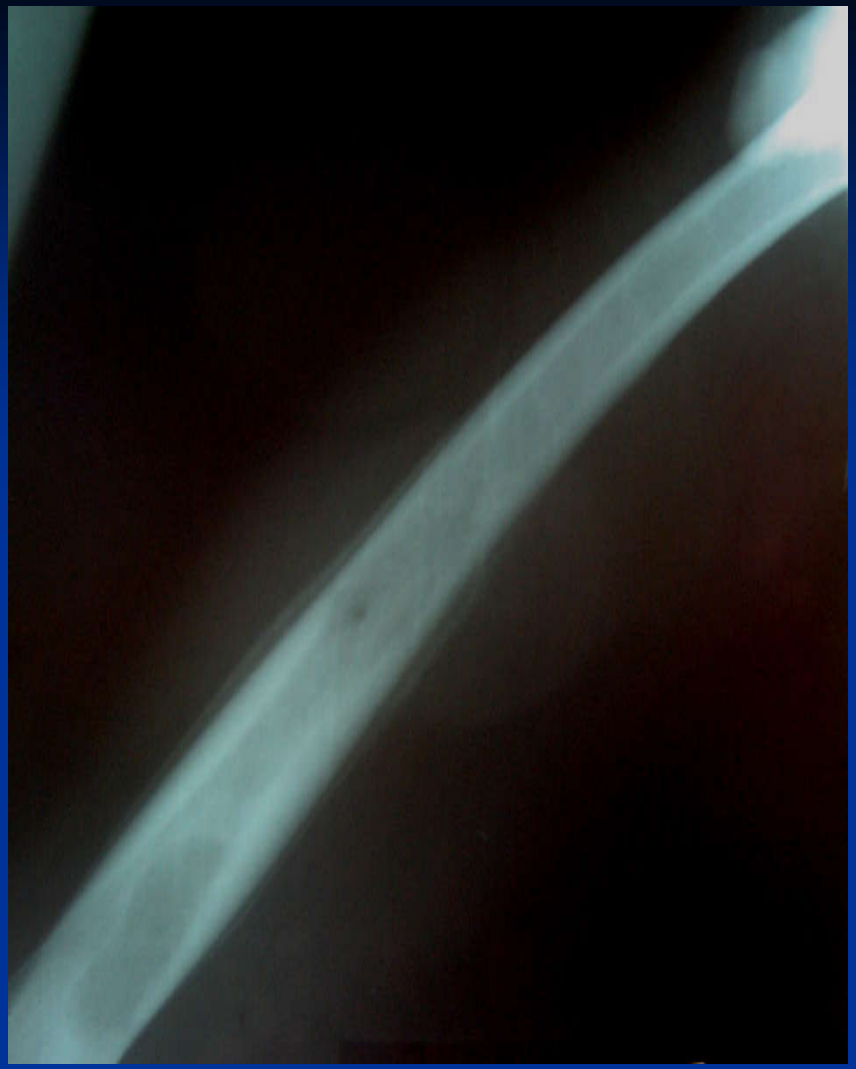



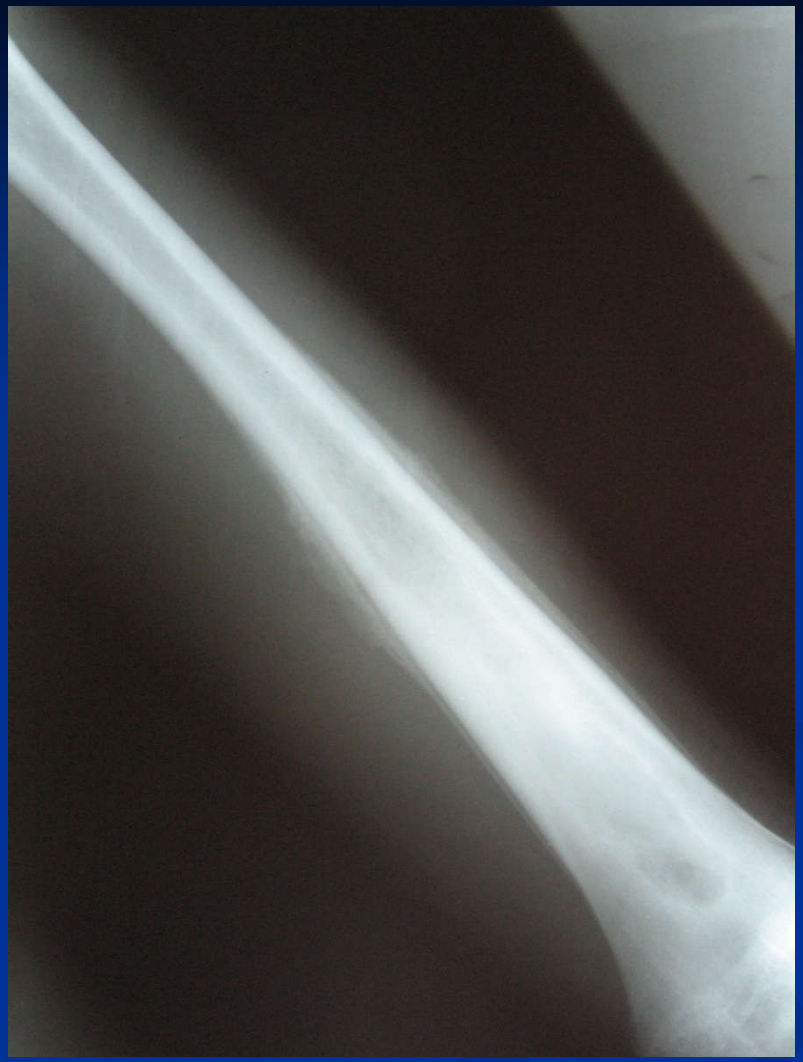


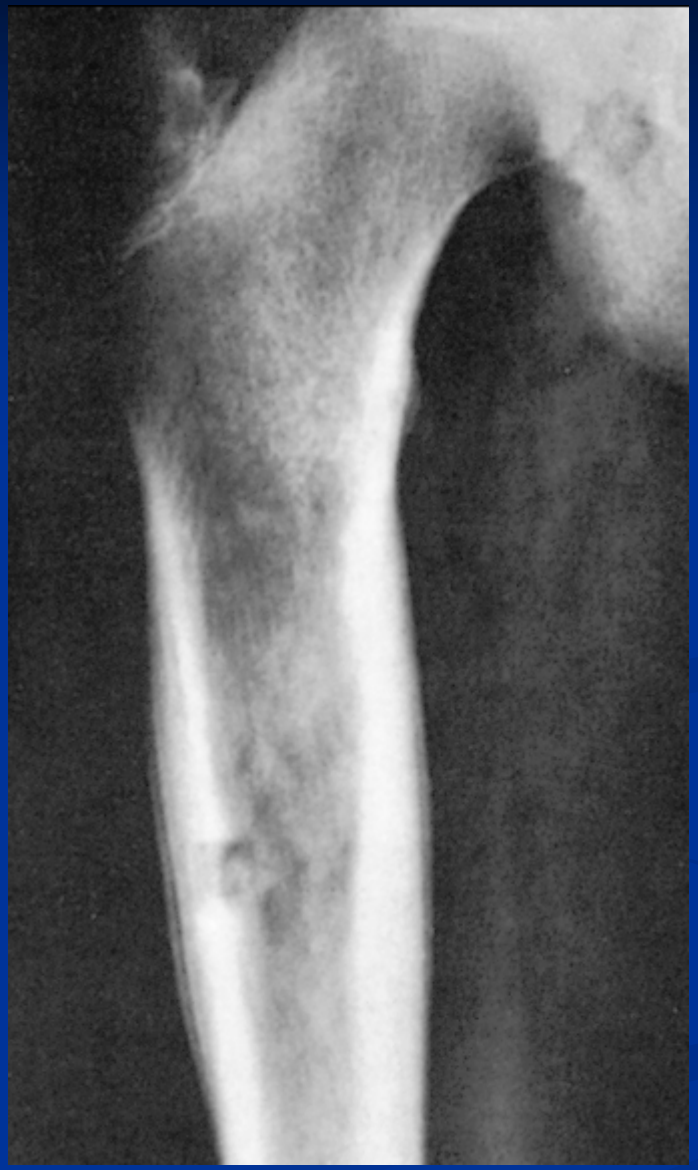


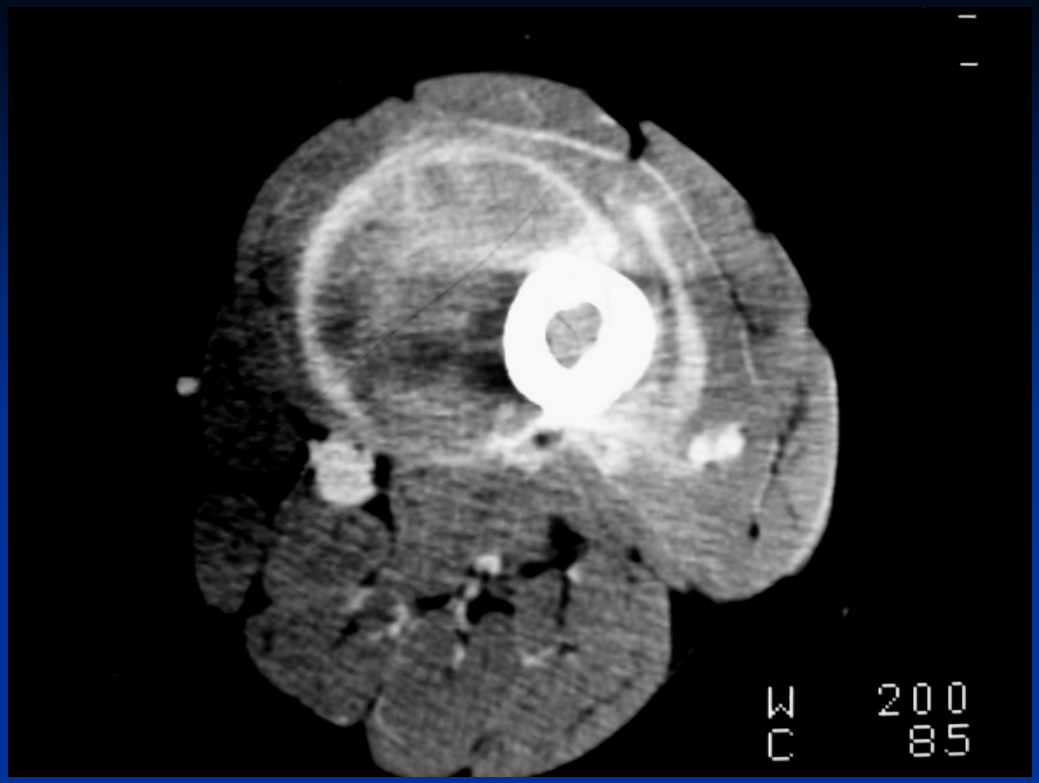
# Ewing's sarcoma

- Second most common bone sarcoma of childhood. It's approximately ½ as frequent as OS
- Age: 5-20 years, rare <5 years
- Site:
  - Pedeliction for long tubular bones. Femur is the single most common site (Ewing's is said to be typically diaphyseal but in several large series metaphyseal lesions dominate)
  - Pelvis and ribs are the most common flat bone sites
- Clinical picture … may mimic acute osteomyelitis
- X-ray
  - Permeative or moth – eaten areas of central destruction occurring especially in mid shaft of long bones without evidence of new bone formation
  - Lamellar periosteal reaction of " onion – peel type "or sun – burst appearance is seen
- MRI … MRI also is useful to evaluate the extent of the soft tissue mass, which often is very large
- Treatment
  - neoadjuvant or adjuvant chemotherapy, or both, to treat distant metastases that may or may not be readily apparent at the initial staging
  - Local treatment of the primary lesion is more controversial. Ewing sarcoma is very radiosensitive, large, central, unresectable tumors often are treated with radiation





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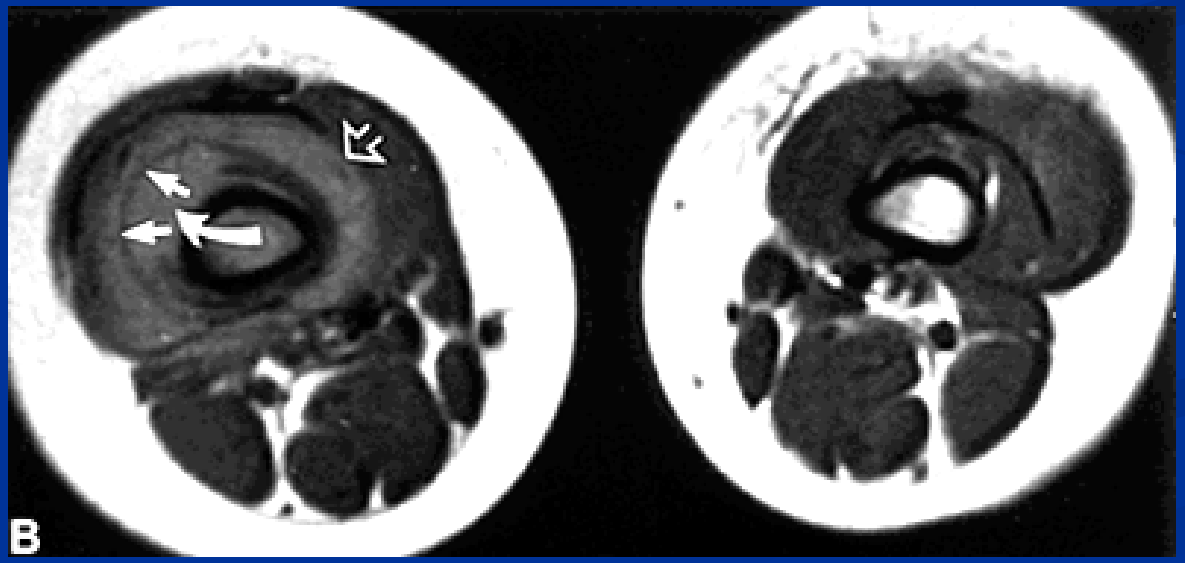
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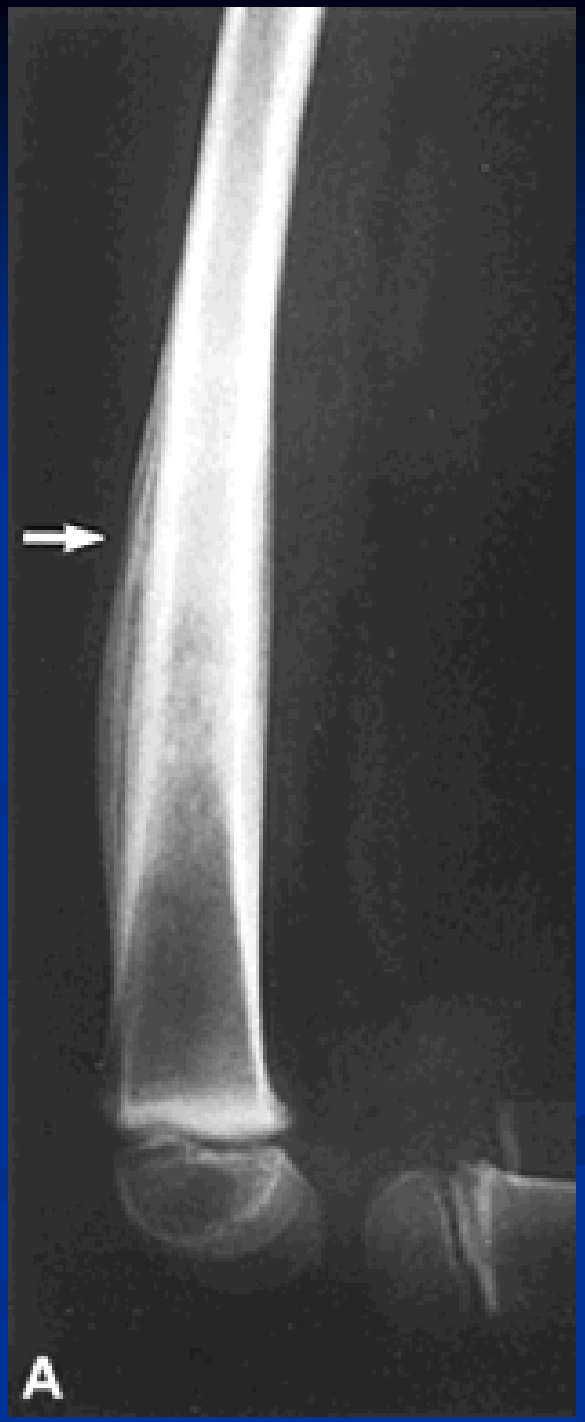
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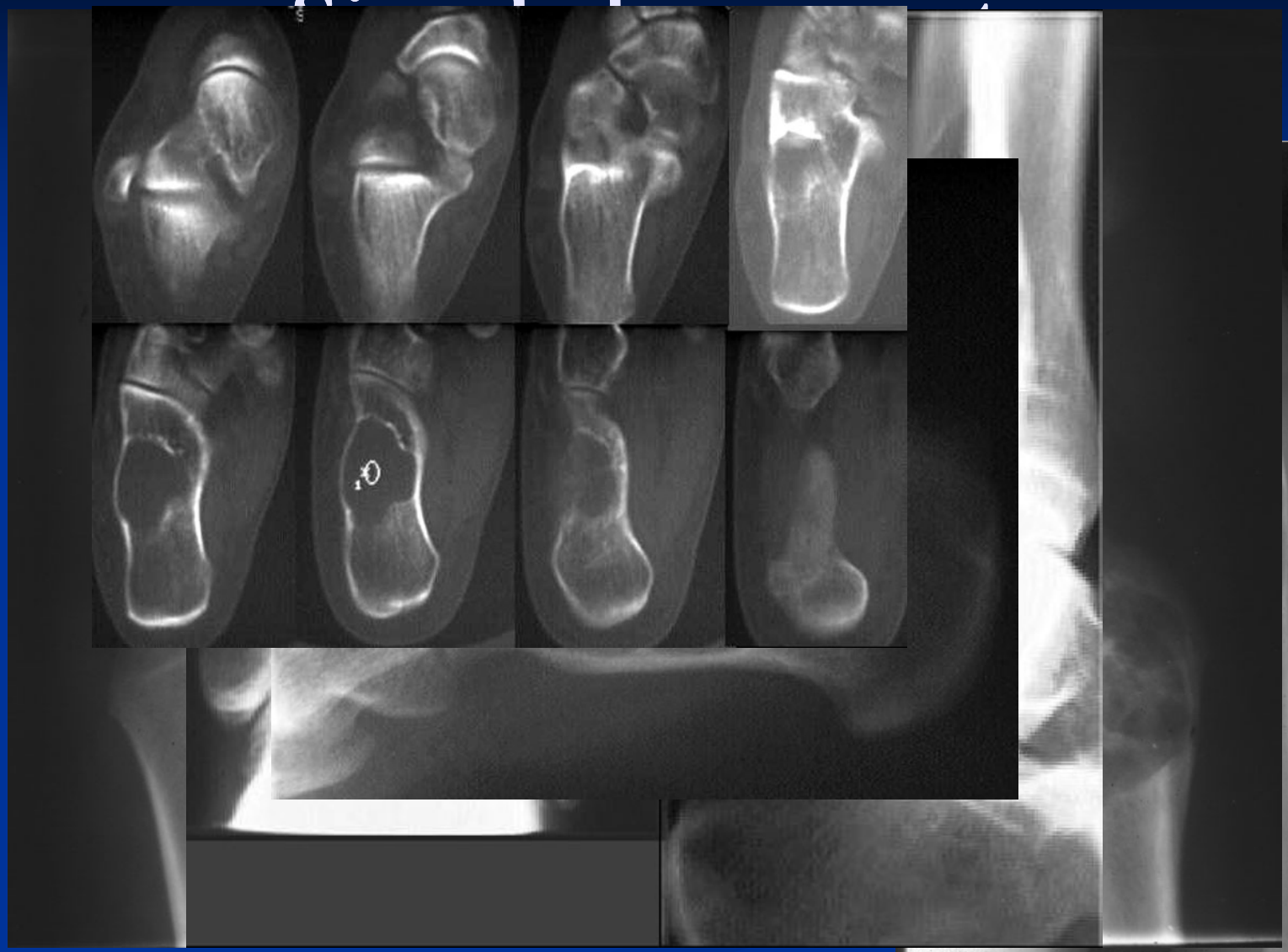

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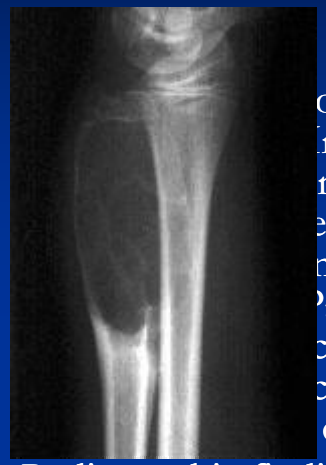

- one cyst is an unusual entity which is most likely the result of trauma or a tumor
  n approximately one third of cases, the pre-existing lesion can be identified.
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- Radiographic findings include an eccen
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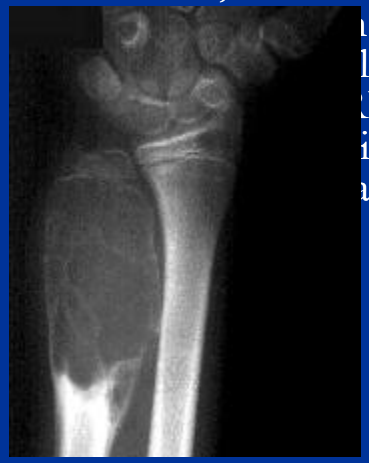

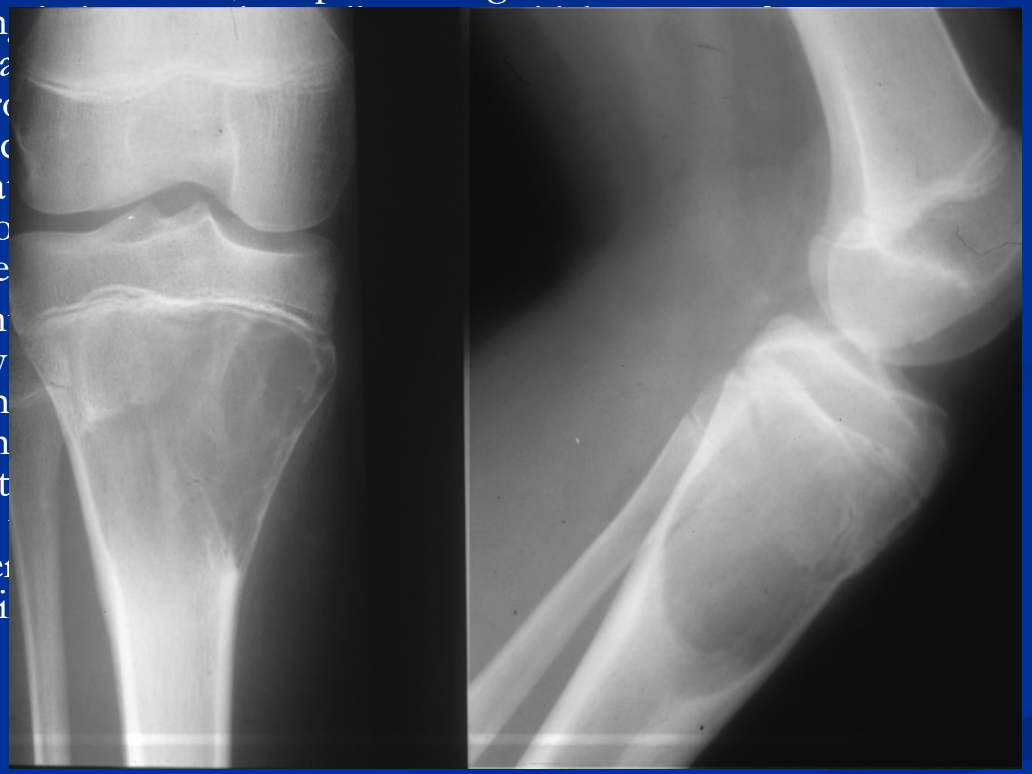

# Ankylosing spondylitis