UNIVERSITATEA DE MEDICINA SI FARMACIE "VICTOR BABES"

DISCIPLINA DE ORTOPEDIE SI TRAUMATOLOGIE

TUMORILE OSOASE

General notions

- An important chapter in the pathology of the locomotor apparatus
- *Large number of benign tumors,* with diverse tissues of origin and multiple locations
- *A lesser number of malignant tumors,* with extremely aggressive and fast evolution, mostly found at young ages
- Early diagnosis and a complex treatment can lead to a favorable evolution of bone cancer

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Etiopathogenesis

- Have been a concern since antiquity (Hippocrates, Celsus, Galenus)

Theories:

1. *Viral theory* (Borel 1903) – tumor occurs due to an ultravirus

   D. Morton – electronic microscopy study showed ephemereal viral particles in connective tissue sarcoma

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2. *Immune theory* (Green 1954) – origin of carcinogenesis is an altered state of cellular immunity
3. *Trauma theory* (Putti, Kocher) – signals frequency of injury in the history of pacients with malignant bone neoplasia

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Predisposing factors:

1. *Heredity* – certain for a small number of tumors, benign with malignant potential (i.e., multiple exostoses, chondromatosis, myeloplaxoma)

2. *Endocrine factor* - in some malignant tumors, decreased value of 17-corticosteroids in urine

=>severe affection of adrenal cortex

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Predisposing factors:

3. *Sex* – mostly male gender, except for the giant cell tumor, which affects females in 70-75% of cases
4. *Age* – primitive malignant bone tumors generally appear in young people, especially in the first 3 decades of life

Osteolytic osteosarcoma - 14-19 years

Ewing's sarcoma - 15-20 years

Conversely, *chondrosarcoma* – after 50 years

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5. *Location* – differs based on the type of tumor

osteolytic osteosarcoma → metaphysis of femur
→ proximal 1/3rd of tibia

chondrosarcoma → coxal
→ 1/3 proximal femur

reticulosarcoma → femur diaphysis

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1886-Victor Babes describes the notion of *pre-cancerous lesion or state*

- does not imply obligatory malignization
- possible within certain local or general conditions of the organism
- Degeneration into sarcoma can occur in: exostoses, giant cell tumors, fistula in chronic osteitis, heterogeneous ossifications

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Classification of bone tumors

- There are several classifications:

- Primary tumors
- Secondary tumors

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CLASSIFICATION OF BONE TUMORS

II. By morphological criteria-*Goidanich (1957)*

1. Tumors originating from bone tissue:

a) Benign-osteoma

-osteoid osteoma

-osteoblastoma

b) Malignant-osteosarcoma

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CLASSIFICATION OF BONE TUMORS

2. Tumors originating from cartilage tissue:

a) Benign-chondroma

-exostosis

-enchondroma

-chondroblastoma

b) Malignant-chondrosarcoma

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CLASSIFICATION OF BONE TUMORS

3. Tumors derived from connective tissue:
   a) Benign -fibroma
      -mixed chondrofibrous
      -bone cyst
      -aneurysmal cyst
      -giant-cell tumor
   b) Malignant-fibrosarcoma
      -giant-cell sarcoma

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CLASSIFICATION OF BONE TUMORS

4. Tumors derived from mucous tissue
   a) Benign-myxoma
   b) Maligne-myxosarcoma
5. Tumors derived from reticulo-endothelial tissue:
   -Ewing tumor
   -reticulosarcoma
   -angiosarcoma
   -plasmacytoma
   -lymphosarcoma
   -malignant lymphogranuloma

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CLASSIFICATION OF BONE TUMORS

6. Tumors derived from neural tissue:
   -neurofibroma (may become malignant)
7. Tumors derived from notochord:
   -chordoma
8. Tumors derived from included epidermal cells:
   -adamantinoma

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CLINIC SYMPTOMATOLOGY

-Clinical symptoms are generally few

Clinical signs:

- *Pain* – occurs in 80% of cases
  - -localization often inconclusive
  - mechanical character
  - -can reach paroxystic intensity, exacerbated at night

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Clinical signs:

- *Swelling* – present in over 90% of cases
  - -upon deep palpation may detect profound swelling
  - -massive tumefaction – a late sign, usually evokes advanced tumor
- *Muscular hypotrophy* – usually as a complication of antalgic immobilization
- *Spontaneous fracture* – frequent complication, appears after minimal injury
- *Other clinical signs*: - limb position vicious, limb axis changes

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IMAGING AND PARACLINIC DIAGNOSIS

1. **Biological and biochemical exams**

VSH **î , ***leukocytes* **î**

- Electrophoresis: *total proteins* **î**
  albumins **î**
  fibrinogen **î**
  gammaglobulin **î**
- *Phosphatases and oxydases :* modified in quantity and quality

  - There are no modifications characteristic to the tumor process
- LDH **î**
- In tumoral tissue – H+ ions **î**

IMAGING AND PARACLINIC DIAGNOSIS

2. **Radiological exam**:
   - Mandatory
   - AP, lateral, and other projections
   - Specifies location, extent, sometimes tumor type
   - Quantifies rate of growth and tumor aggressiveness

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2. **X-ray exam**:

- Upon interpreting X-ray, *must consider:*
  -osteolysis
  -osteocondensation
  -mixed forms
  -periostal reactions
- *Need to be assessed:*
  -tumoral matrix
  -bone mass
  -cartillaginous matrix
  -soft tissue aspect

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PARACLINICAL AND IMAGING DIAGNOSIS

3. **Tomodensitometry(TDM)**
   -can inform subsequent explorations
   -useful in following treatment efficiency

4. **Computer assisted tomography (CAT)**
   -location, size and stage of tumor

5. **Magnetic resonance imaging (MRI)**
   -advantages:-no irradiation
   -offers contrasted image
   -minimal contribution vs. other techniques
   -can assess extent of tumor and therapy efficiency

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6. **Bone scintigraphy**

-Views the skeleton

advantages:-explores osteoplastic activity

-permits assessing metastases

-permits surveillance

must always be correlated with radiography

7. **Angiografia**

-apreciaza raporturile tumorii cu axele vasculare, vascularizatia tumorii, posibilitatile de embolizare

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8. Hystological exam

-most important method of diagnosis

-important role in therapeutic planning and prognosis

Conditions for a correct hystopathological exam:

-explicit clinical and anamnestical data

-conclusive lab results

-microscopic aspect of tumor and its relation to environs

-presence of pathologist physician in operating room

PRINCIPLES OF TREATMENT

1. **Chemotherapy**

-"selective" destruction of cancer cells

-must be proportional to number of DNA-synthesizing cells

-more efficient in tumors with short doubling time

-less effective against massive tumors

-decrease in tumor volume under treatment – positive factor

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1. Chemotherapy

Clasification of cytostatic drugs:

1. Alkylant agents
2. Antimetabolites
3. Anti-tumoral antibiotics
4. Derivates of vinca and podoxifiline
5. Various agents

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1. **Chemotherapy**

Adverse reactions:

a. Hematologic toxicity (medullary hypoplasia, chronic pancytopenia, cumulative toxicity)
b. Gastrointestinal toxicity
c. Allopecia
d. Immunosuppression
e. Cardiac toxicity
f. Renal toxicity
g. Neural toxicity
h. Allergic reactions
i. Risk of infection

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1. **Chemotherapy**

Can be used:

a. *Neoadjuvant chemo*
b. *Intraoperatory chemo*
c. *Perioperatory chemo*
c. *Post-operatory chemo*
e. *Palliative chemo*

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2. **Radiotherapy**

Must correlate: *dose-volume-time of exposure*

Indications:

a. *Curative purpose*
b. *Symptomatological treatment*

Depending on surgical stage:

1. pre-op radiotherapy
2. intra-op radiotherapy
3. post-op radiotherapy

- *can be associated with chemotherapy*

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3. Surgical treatment

- *conservative* or *mutillating*
- benign tumors : removal ± limited resection
- giant cell tumor grade II: resection + osteoplasty
- malignant tumors:

a) Bone resection + reconstruction by:
   - Bone graft
   - Inert implant (endoprosthesis)
   - Acrylic cement
   - Biovitroceramics

b) Mutillating surgical treatment (amputations, disarticulation)

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Rules of mutillating surgical treatment:

1. Definitive diagnosis is mandatory
2. Chemo-radio-adjuvant treatment
3. Obligatory sacrifice of invaded muscle compartments
4. Possibility of maintaining a functional joint above amputation for the purpose of prosthetic implant
5. Ensure adjuvant treatment
6. Treatment applied in a timely fashion

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BENIGN OSSEOUS TUMORS

Osteoma

-***benign tumor, rare, unique or multiple, develops through hyperplasia of mature bone, of membranous origin***

-*Frequency* ↥ in children and youths

-*Location* – any segment of the skeleton

- most frequently parietal and occipital bones, facial bones, orbits, frontal and sphenoidal sinuses, maxilla and mandible.

- can appear in pelvis, especially iliac crest

Depending on starting cortical

-*exostosis process*

-*endostosis process*

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Osteoma

Pathological anatomy

- *Microscopic:* - small medullar spaces, filled with connective-vascular tissue
  - Little difference from normal bone
- Based on bone tissue appearance, there are **3 forms:**
  - Spongy osteoma
  - Compact osteoma
  - Ebumated osteoma
- Osteoma has a high development potential, but *never becomes malignant*

- *Exostosising osteoma* (peripheric)
- *Endostosising osteoma* (central)

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Osteoma

Radiological exam

-Helps certain diagnosis

-Compact form differs from spongy

Compact osteoma – rounded opacity, resembles exostosis

-large base

-high density, no visible structure

-diameter >/= 2cm

Spongy osteoma - opaque

-foggy density

-fuzzy edges

-compresses and thins the cortical, but does not break it

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Osteoma

Differential diagnosis

- *Osteogenic exostoses*
- *Heterotopical osteoma*
- *Periphery osteochondroma*

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Osteoma

Treatment

-Surgical

-Depends on tumor location, volume, alteration of functions determined by it

-Consists of tumor ablation into healthy tissue, resection of base

-In voluminous osteoma of the viscerocranium, skull is remodeled after resection, usually with graft taken from iliac crest

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Osteoid osteoma

- Benign, usually unique tumor, more frequent in the male gender (♂/♀ = 4/1), especially in youths (20-25 years), less frequent in children and adults
- Location – usually in the long bones of the lower limb, especially proximal end of femur
  - Not considered to affect clavicle, sternum, cranial bones
- Jaffe-1935-establishes tumor as benign
  - Previously called *subperiostal abscess* or *aseptic necrosis of microtraumatic origin*

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Osteoid osteoma

Clinical signs

-insidious onset, with intermittent pain and nocturnal apparition, which exacerbates progressively

-Upon palpation – hard tumefaction with bone contact

-pain can occur at neighboring joints associated with accelerated functional impotence, joint stiffness, possibly effusion

-on the vertebral body - associated with paravertebral muscle contracture and secondary scoliosis

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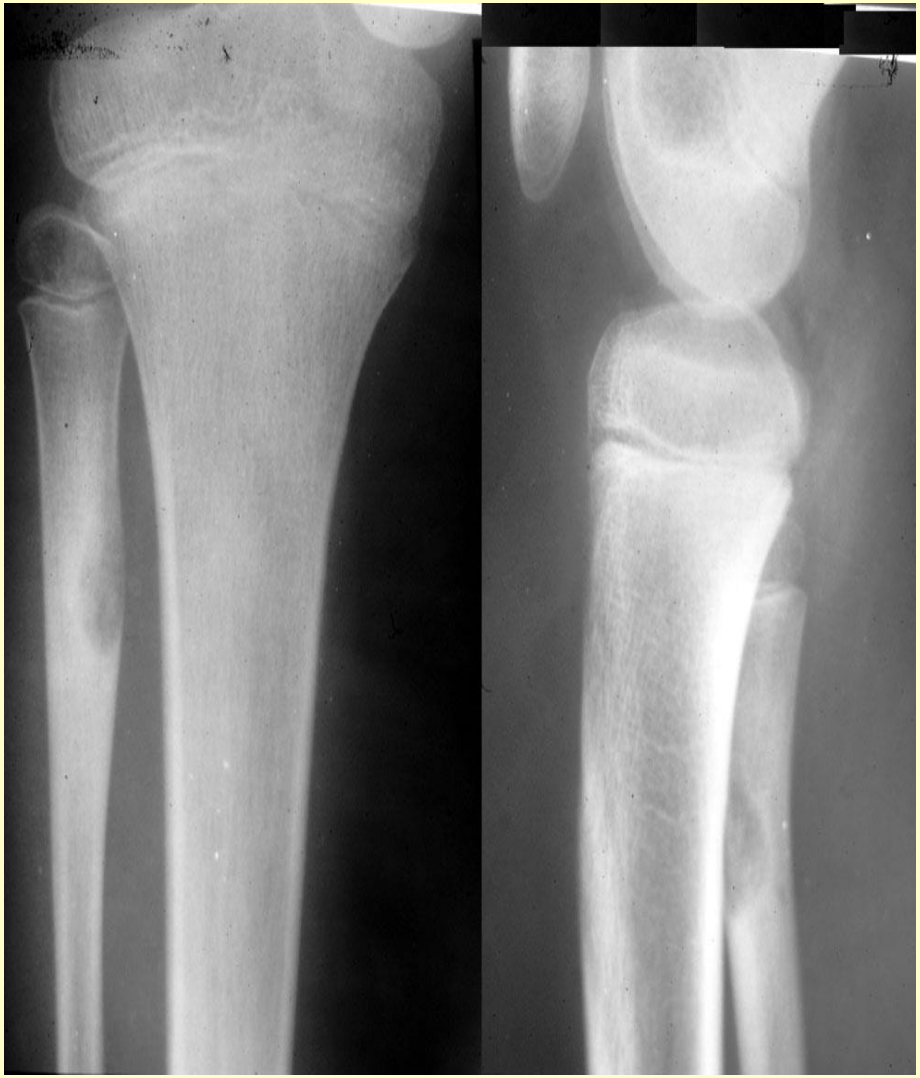
Osteoid osteoma

Radiological exam

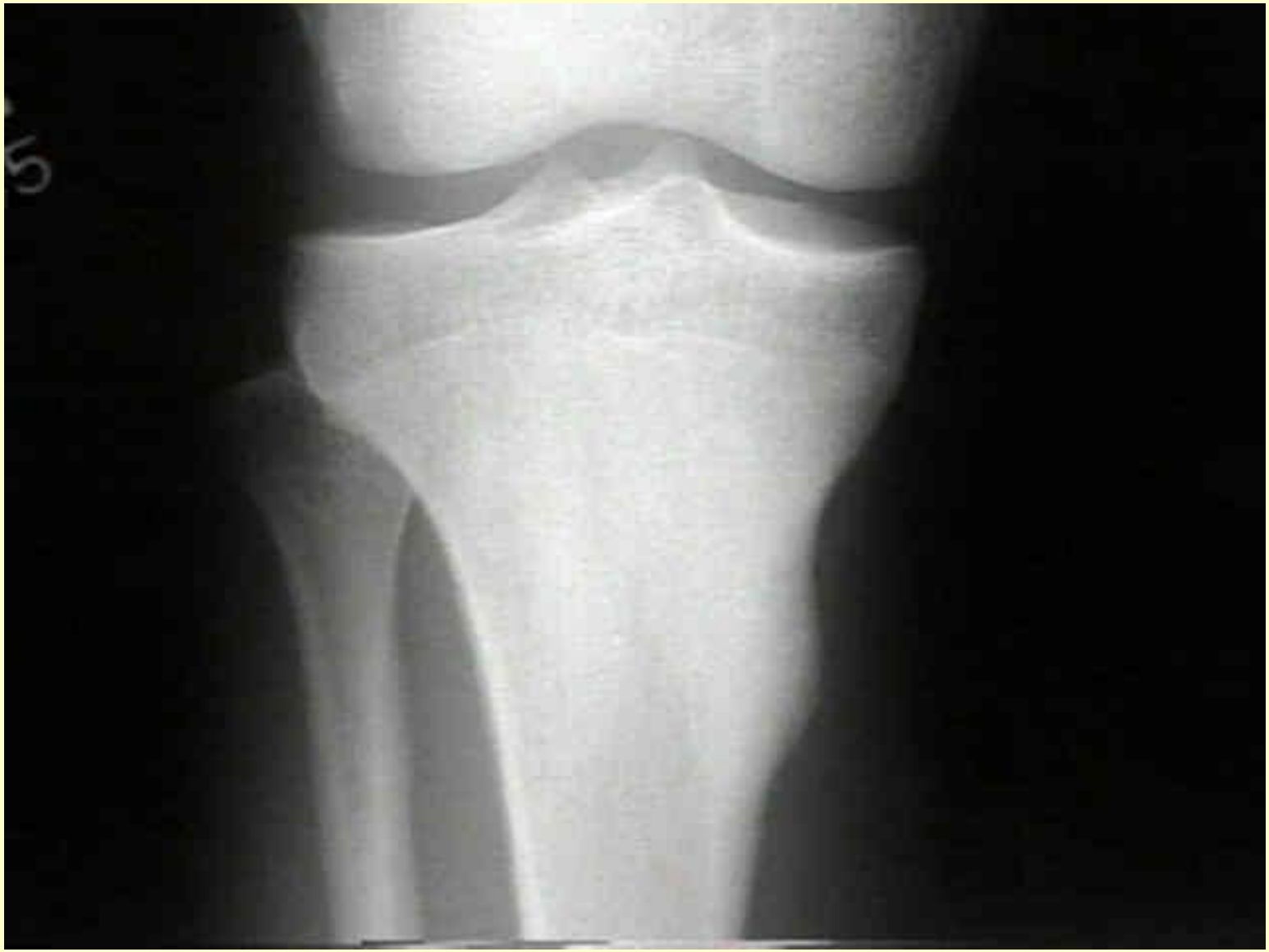
-3 forms, depending on localization

1. **Cortical –** most frequent
   - Centrally – the nydus
   - *Cockade-like image*
   - Perifocal cortical bone appears condensed, periostal neoformation
   - Cortical appears curved, with integrity preserved

2. **Subperiostal osteoid osteoma**
3. **Spongy osteoid osteoma**



Osteom osteoid



Osteom osteoid

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Osteoid osteoma

Differential diagnosis

-Early-stage chronic osteomyelitis – arteriography, the nydus being hyper-vascularized

Treatment

-exclusively surgical

-Large resection of tumor is necessary, with block removal of nydus

-Requires osteoplasty with cortico-spongiform graft or filling with cancellous bone from iliac crest, then firm metallic implants (pin-plate, rods, plates with screws)

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Chondroma (osteochondroma)

Benign tumoral formation, solitary or multiple, in an area of bone of cartillaginous origin, developed via proliferation of adult cartilage tissue

- More frequent in adults of both sexes
- Localisation – frequently the short bones of hands and feet, especially joint cartilage and at the diaphyseal-epiphysis level
- Also in periosteum and medullary canal
- Most frequent skeletal tumor (up to 15% of total)
- Malignant potential, through transformation into sarcoma

TUMORILE OSOASE

Chondroma (osteochondroma)

Pathological anatomy

-**2 forms**, depending on location and relation to medullary cavity

- *Central chondroma* – inside the bone
  - Starts at the metaphysis, then invades epiphysis and diaphysis
  - Presents numerous calcifications inside the bone
- *Peripheric chondroma (juxtacortical)* – at the surface of the bone, peeling off the periosteum, which leads to confusion with malignant tumor

TUMORILE OSOASE

Chondroma (osteochondroma)

Clinical signs

- Differ depending on location
- Frequently asymptomatic in *carpal and hand bones*, is highlighted via x-ray exam
- Marked increase can lead to *limited mobility of adjacent joints*
- Can be spotted via the occurrence of pathologic fractures
- Located in *long bones* gives painful symptoms, and frequently malignant degeneration
  - First symptoms of malignant degeneration are: Permanent pain, rapid increase in tumor volume, neighboring joint function is affected

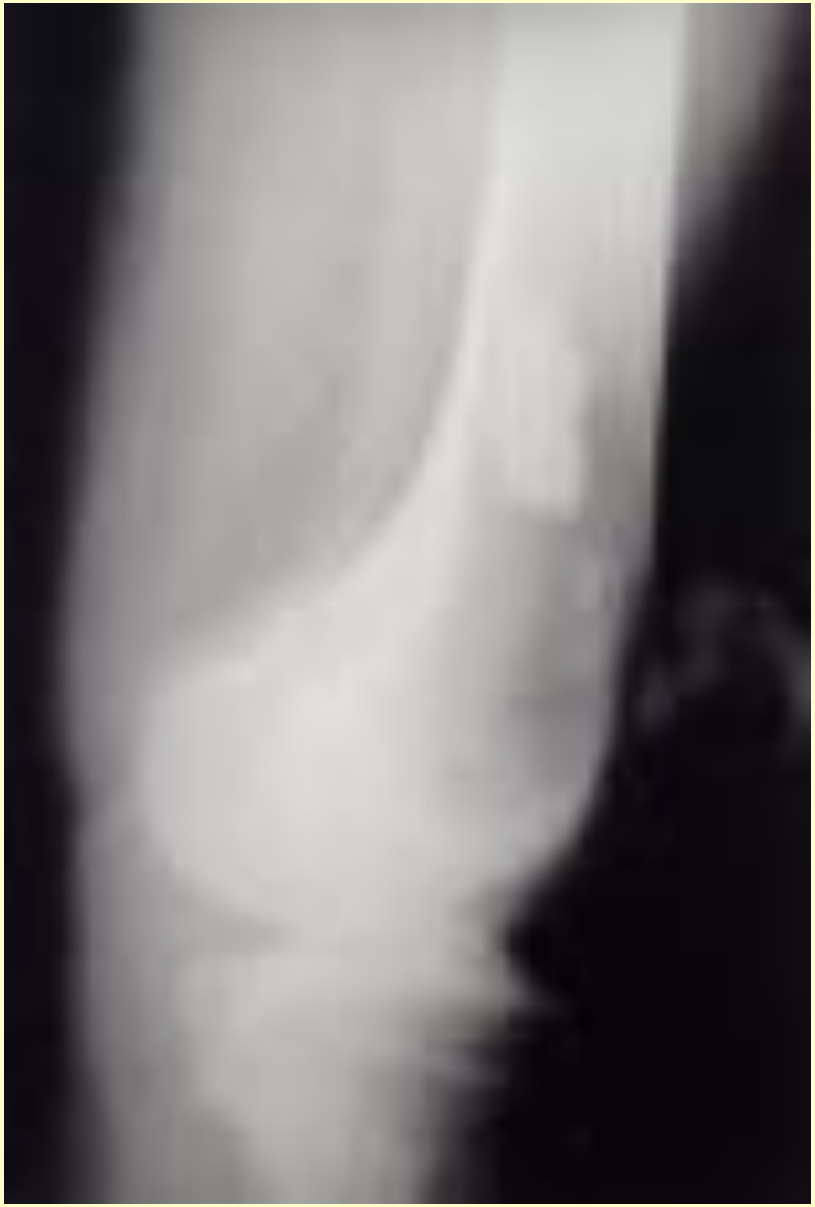
TUMORILE OSOASE

Chondroma (osteochondroma)

Radiological exam

- Usually sufficient for diagnosis
- *Central chondroma (enchondroma) – clear zone, with calcifications*
  - *Small bones:* marked thinning of cortical
  - *Long bones:* initially the clear zone is barely visible, later becomes obvious
  - Rarely the cortical is interrupted, differentiation from malignant tumors being difficult
- *Peripheric (echondroma)* – unique or multiple
  - Subperiostal formation, with clear boundary

Chondroma



Chondroma

TUMORILE OSOASE

Chondroma (osteochondroma)

Differential diagnosis

- *secondary chondrosarcoma* – long evolution, thinning or interrupting the cortical

-lack of pain and uniform distribution of calcareous zones = BENIGN

1. Appearance and intensification of pain
2. Modified X-ray during evolution
3. Increase in transparency of tumor area, cortical interrupted
4. Periostal reactions, invasion of soft tissue, frequent fractures

MALIGN

Chondroma (osteochondroma)

Treatment

- Must consider biopsy result
- Election treatment – *surgical*
- Small tumors, in short bones: curettage and filling the cavity with spongy bone from iliac crest, and in case of relapse, resection into healthy tissue
- Long bones: metallic implants associated with bone grafts or endoprostheses

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Chondroma (osteochondroma)

Radiotherapy

- Limited effect, since chondroma has low radiosensitivity
- Result – slowing or stopping the evolution for a while
- Growth of tumor volume under radiotherapy requires surgical treatment

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Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

-belongs to group of benign osteolytic bone tumors

Localization:

-Frequently in epiphysis of femur, tibia and radius

-More rarely in the sacrum, iliac crests, vertebrae

Frequency: Female gender (75%)

Age 20-30 years

-In the long bones, originates from epiphysis (or epiphyseo-metaphyseal zone) – *vital diagnostic criterium*

TUMORILE OSOASE

Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

Etiopathogeny

-unique injury or repeated microtrauma

-infectious agents

-malfunction of osteoblastic mesenchyme

-osteoblastic hyperplasia

Presently considered blastomatous tumor, with benign evolution, but malignant potential

TUMORILE OSOASE

Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

Anatomo-clinical forms (by evolution):

1. *Regressive form* – favorably reacts to conservative surgical treatment
2. *Extensive (hemorrhagic) form* – requires radical surgery

TUMORILE OSOASE

Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

Malignant transformation has **3 grades**:

- Grade I: absolutely benign tumors
- Grade II: transitional tumors, with evident cell proliferation activity
- Grade III: malignant tumors, with sarcoma-like morphology
  - Great capacity for metastasis
  - Reduced frequency
- It is considered that *benign forms rarely become malignant, but relapses do so more frequently*

TUMORILE OSOASE

Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

Clinical signs

- Generally reduced symptoms
- Insidious debut, rheumatoid or neuralgic-type pain, slow evolution
- Several months from debut, tumor can be seen as irregular swelling, tough or elastic, non-adherent to superficial strata
- Local warmth, collateral circulation – reduced intensity
- Swelling of adjacent joint, without loss of function
- Regional lymph nodes unaffected

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Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

- Sometimes sudden debut, after pathologic fracture
- Generally slow evolution, but may also be fast, with marked growth of tumor and frequent relapses
- 10% malignization potential

TUMORILE OSOASE

Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

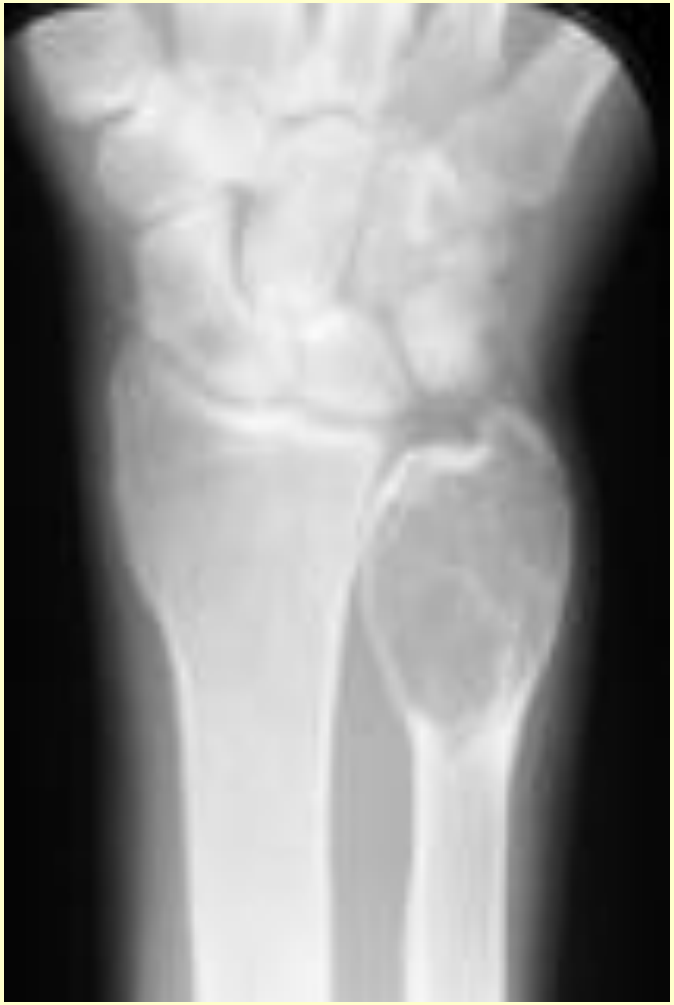
Radiological exam

-**excentric osteolysis zone**

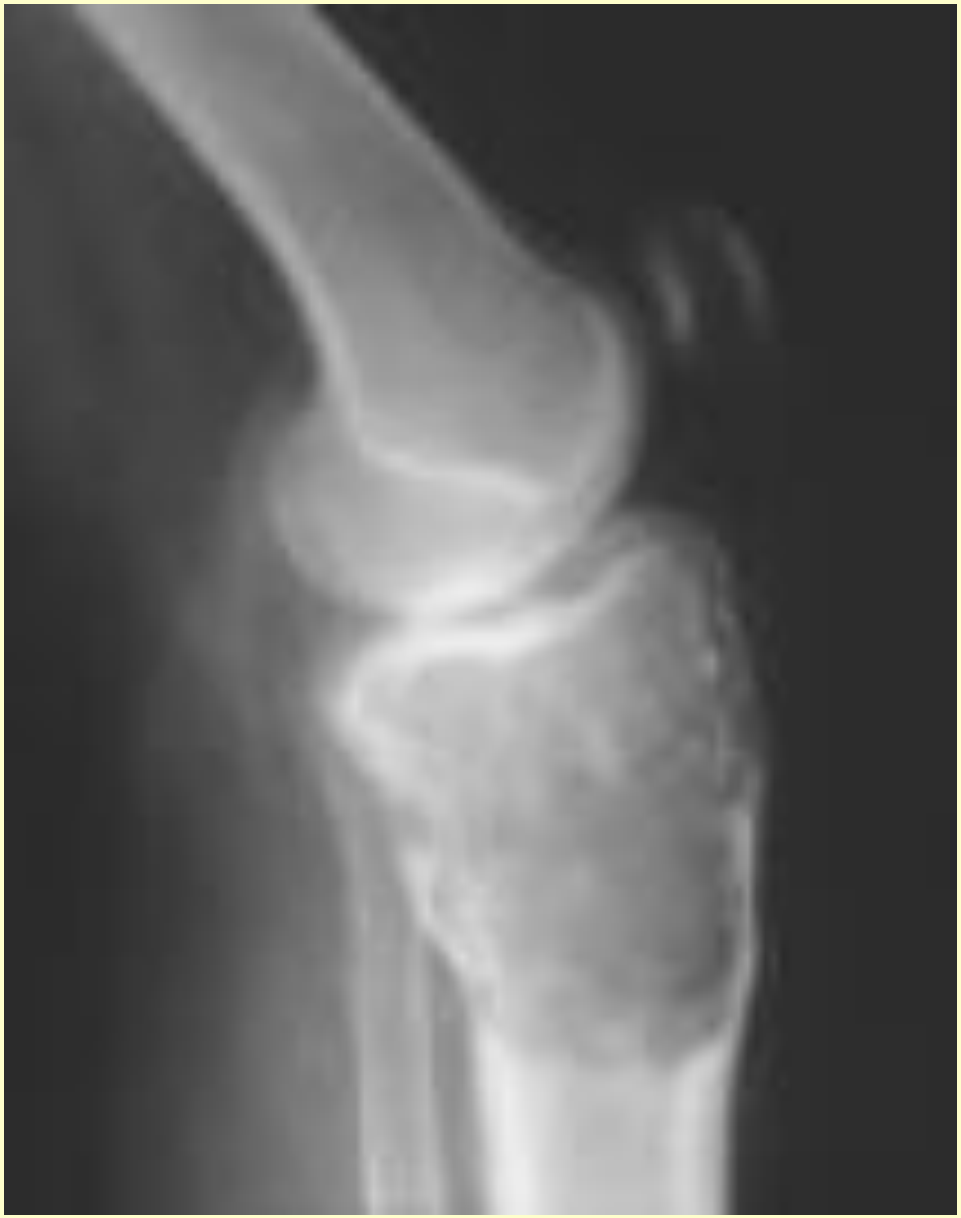
-Typical aspect is multi-locular

-Exceptionally, unilocular aspect appears (in small bones)

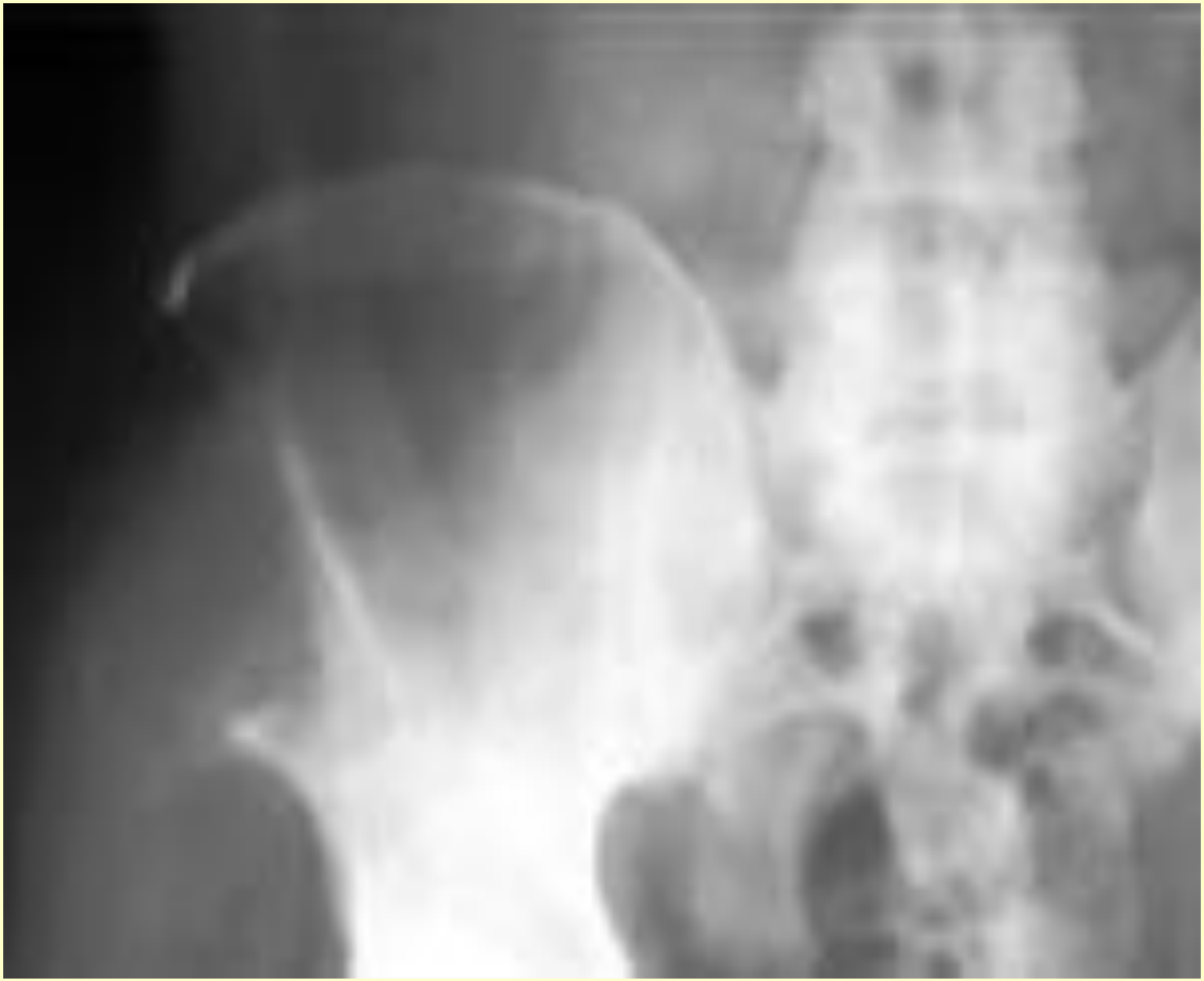
-Resembles “honeycomb”, “foamy bone”, “bread dough”, “soap bubbles”



Giant-cell tumor



Giant-cell tumor



Giant-cell tumor

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Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

Aspect differs by location:

- In long bones, epiphyseal formation, frequently excentric, reducing cortical thickness.
- *Cartilage of neighboring joint is unaffected*
- In small bones (metacarpals, metatarsals, phalanges), the bone is completely destroyed and no visible on X-ray
- Vertebrae are flattened

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Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

Differential diagnosis

1. Essential bone cyst
2. Aneurysmal cyst
3. Non-ossifying fibroma
4. Bone angioma
5. Benign tumors from hyperparathyroidism
6. Unique metastasis of hypernephroma
7. Plasmacytoma
8. Ecchinococcosis

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Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

Treatment

1. *Radiotherapy*

   -controversial

   -used when surgical treatment is not possible (vertebrae, sacrum)

   -useful if the tumor has bone lamellae

   -if not, can lead to malignization

   -small doses are inefficient, large doses can lead to late malignization (sarcomatous)

Giant-cell tumor of bone (myeloplaxa tumor, osteoclastoma, localized fibrous osteodystrophy)

2. *Elective treatment is surgery*

- Curettage:
  - Localized in function epiphyses (inferior femur, superior tibia), even in the case of later re-intervention
  - Remaining cavity filled with spongy bone
  - Frequent infectious complications
- Resection:
  - In tumors with intermediate evolution, aggressive or destructive forms, early relapses
- Amputation: repeated relapses and signs of malignization

Malignant bone tumors

Osteosarcoma

Primitive bone tumor, of connective origin and extreme severity

-among the most frequent bone tumors (approx.30%)

-most aggressive malignant bone tumor

-more frequently affects young ages (10-20 years), male gender

-Frequent localization: lower extremity of knee, superio tibia, superior humerus, superior femur, iliac bones, even femur shaft

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Osteosarcoma

-two anatomo-clinical forms:

- *Osteogenic Osteosarcoma (ossifying)*
  - *Osteoblastic*
  - *Chondroblastic*
  - *Fibroblastic*

- *Osteolytic Osteosarcoma*

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Osteosarcoma

Pathological anatomy

-increased malignity due to early invasion of blood vessels

-*microscopic:*-polymorphous aspect

-central element - osteoclast

- Osteolytic osteosarcoma - lysis
- Osteogenic osteosarcoma – lysis and formation

- Frequently, both forms coexist

- Tumor is poorly limited, destroys cortical bone, invades soft tissue

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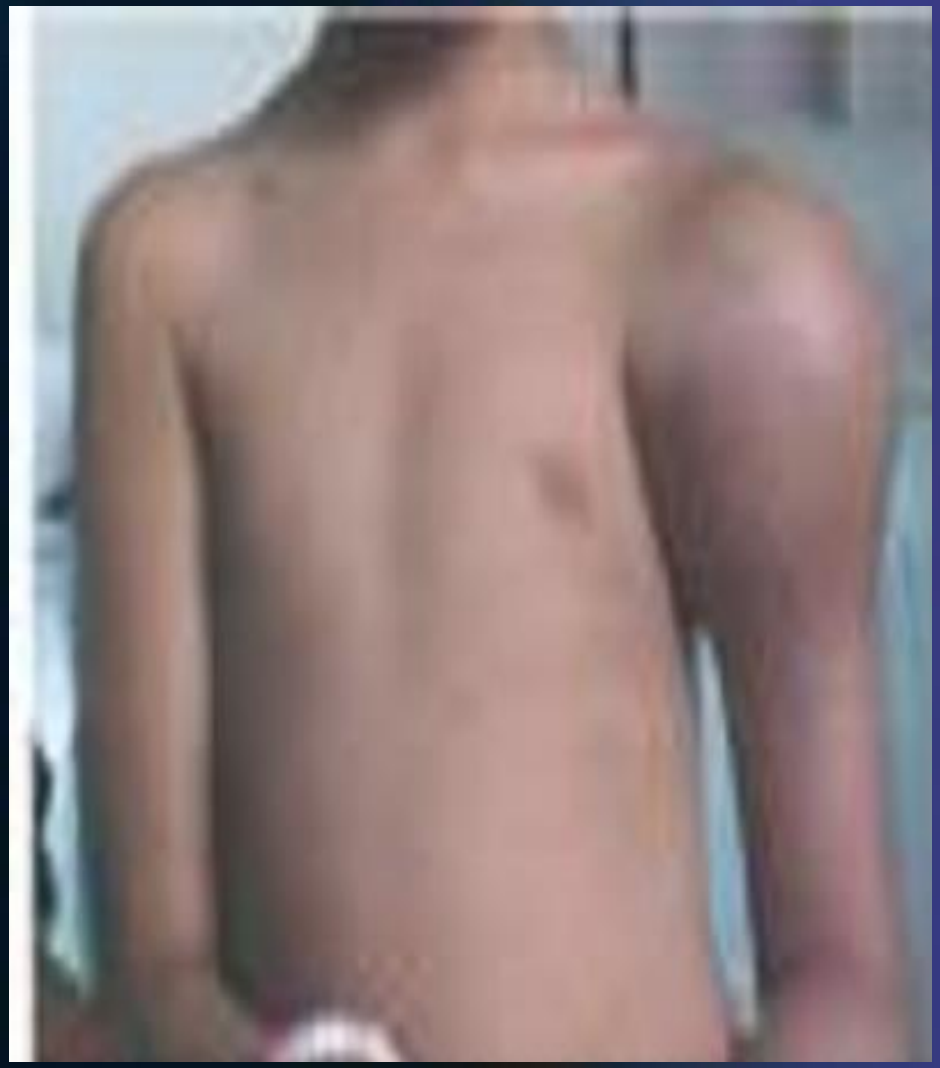
Osteosarcoma

Clinical signs

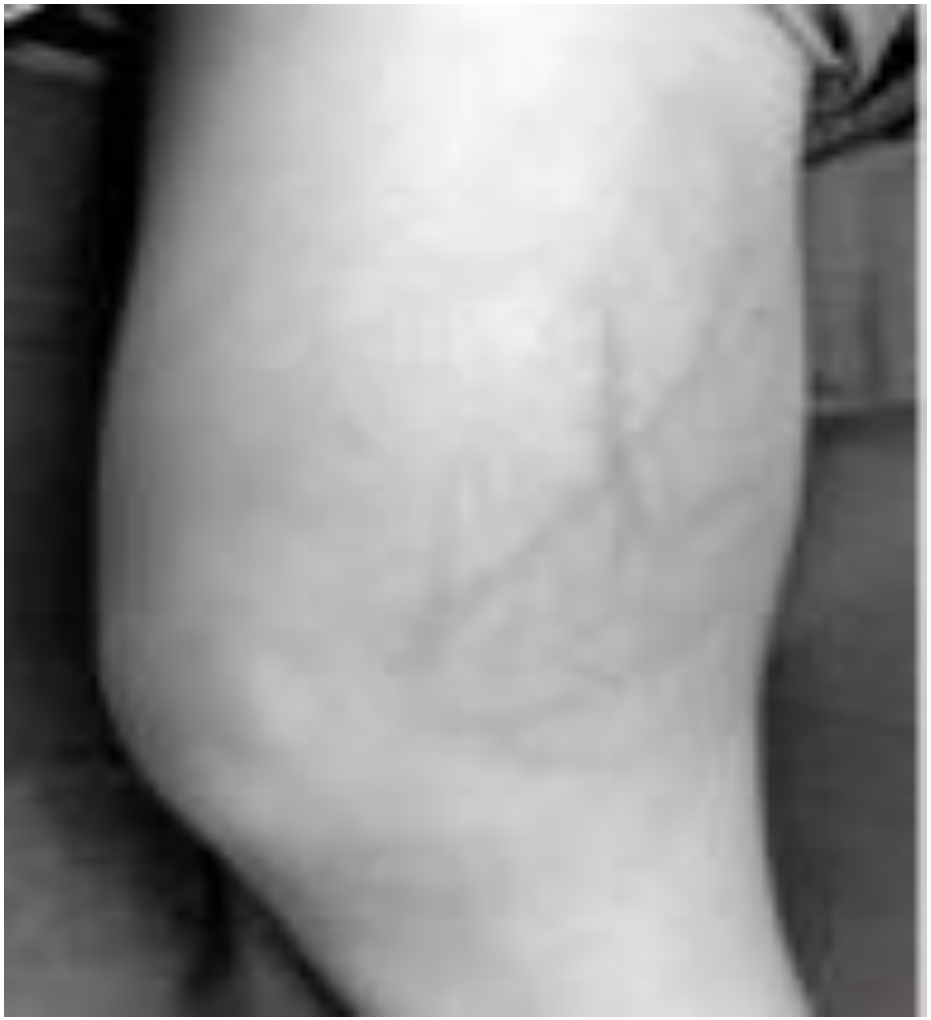
1. Pain
   - Intense, constant, usually the first symptom increases at night
2. Local swelling associated with pain determines loss of function
3. Soft tissue compression leads to superficial venous relief
4. Pathologic fractures
5. Weight loss, generally altered state, secondary anemia, neoplasic impregnation

Evolution and prognosis are severe. Medium extent of survival is 2 years.

Lung metastases occur early, worsening prognosis.



osteosarcoma



Osteosarcoma-superficial vein relief

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Osteosarcoma

Radiological exam

Displays location and extent of tumor, anatomo-clinical form, periostal reaction

Most frequently, shows osteolysis zones alternating with osteogenesis (mixed forms)

Osteogenic Osteosarcoma

- Affected zone is denser than normal
- Strong periostal reaction
- Imprecise boundary, periostal spiculi

Central osteogenic osteosarcoma

- Centrally located tumor develops towards medullary canal

Peripheral osteogenic osteosarcoma

- subperiostal structure density increased

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Osteosarcoma

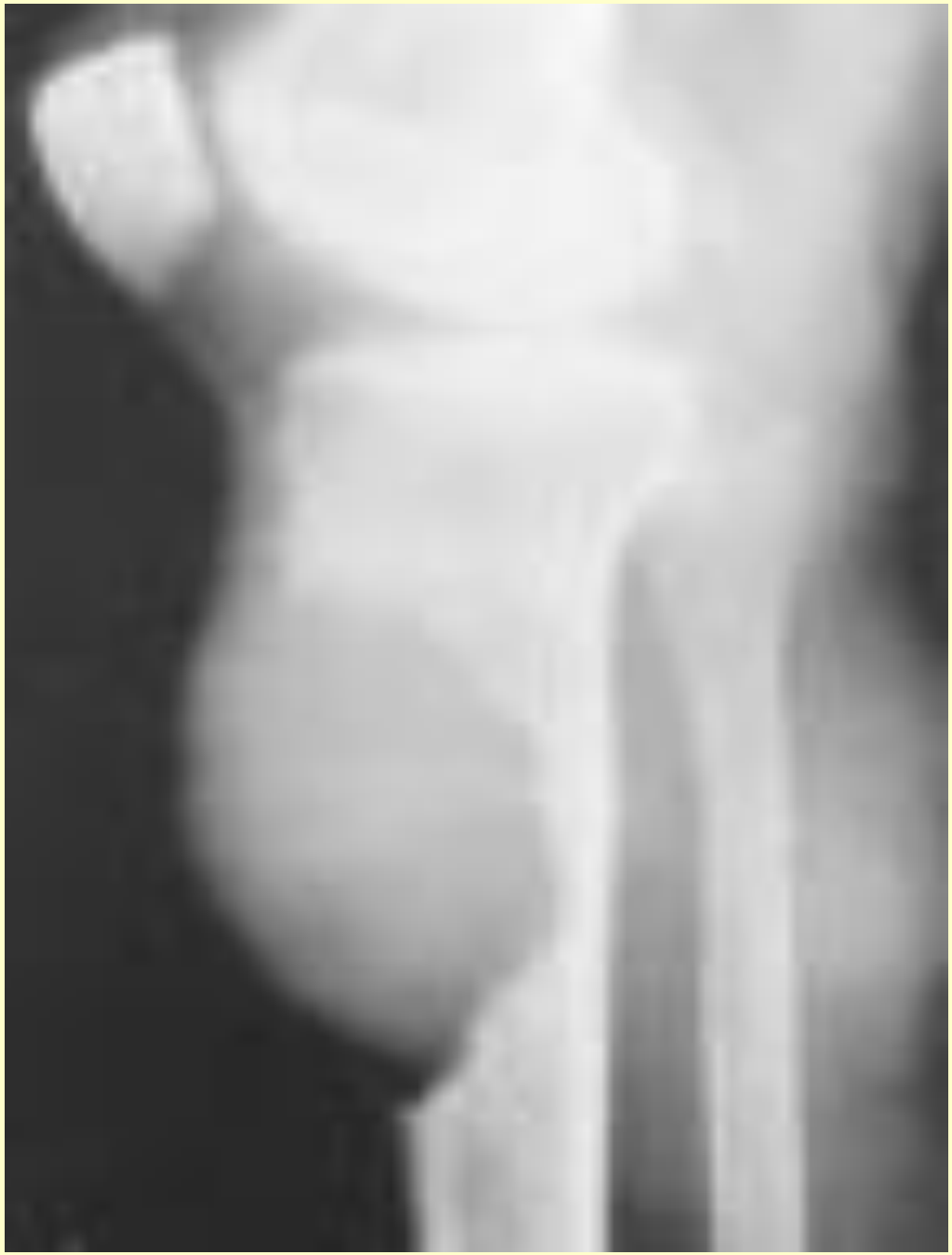
Central osteolytic osteosarcoma

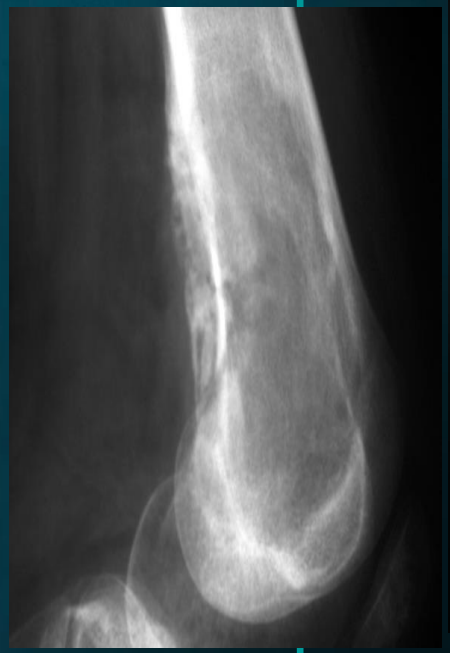
- Destruction of bone structure in the centre of metaphysis
- Codman's triangle – appears at the boundary between tumor and healthy tissue

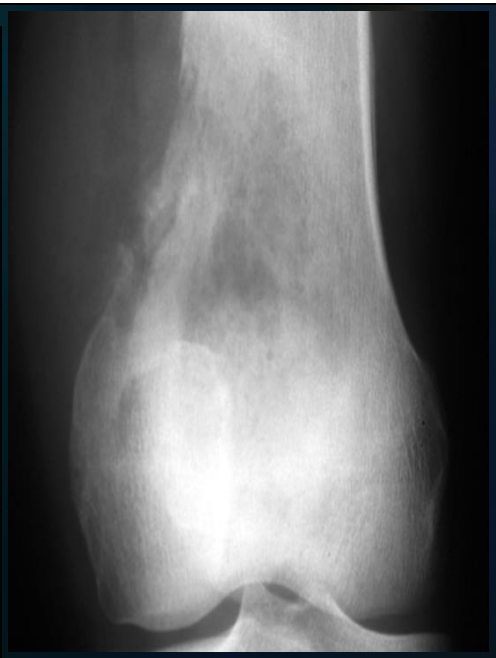
Peripheral osteolytic osteosarcoma

- External cortical is intially thinned, then completely destroyed
- Periostal reaction absent or discrete

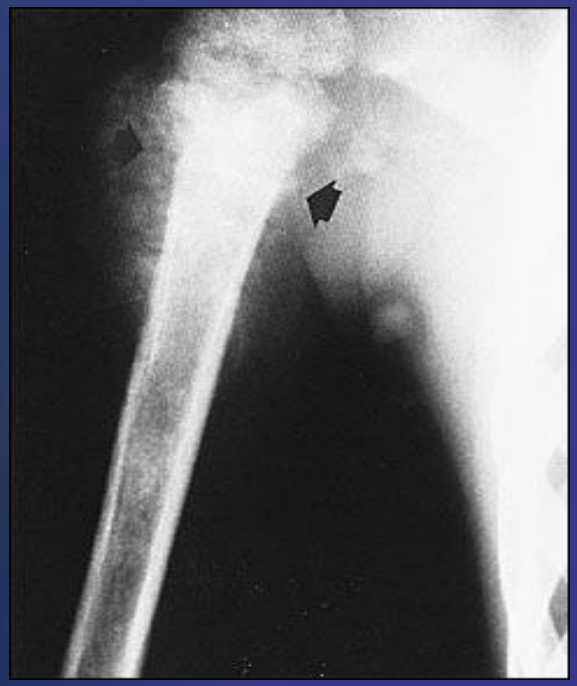
osteosarcom



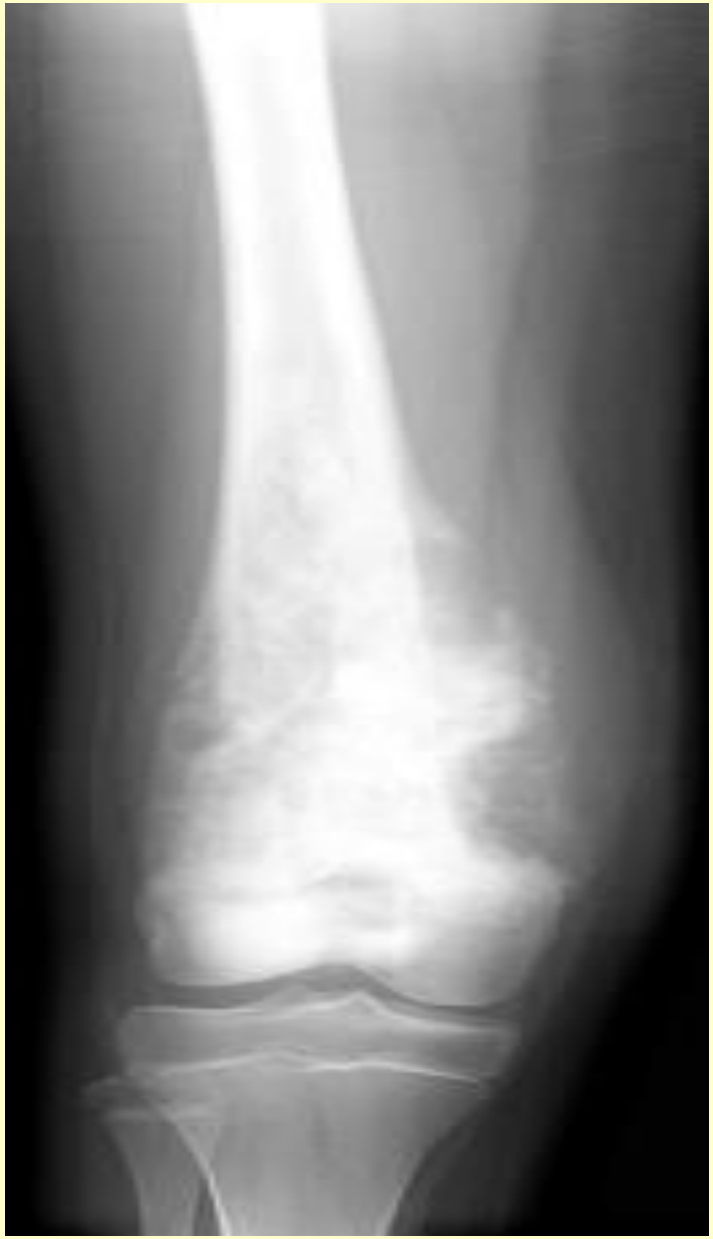




OSTEOSARCOMUL OSTEOLITIC CENTRAL



OSTEOSARCOMUL OSTEOLITIC PERIFERIC



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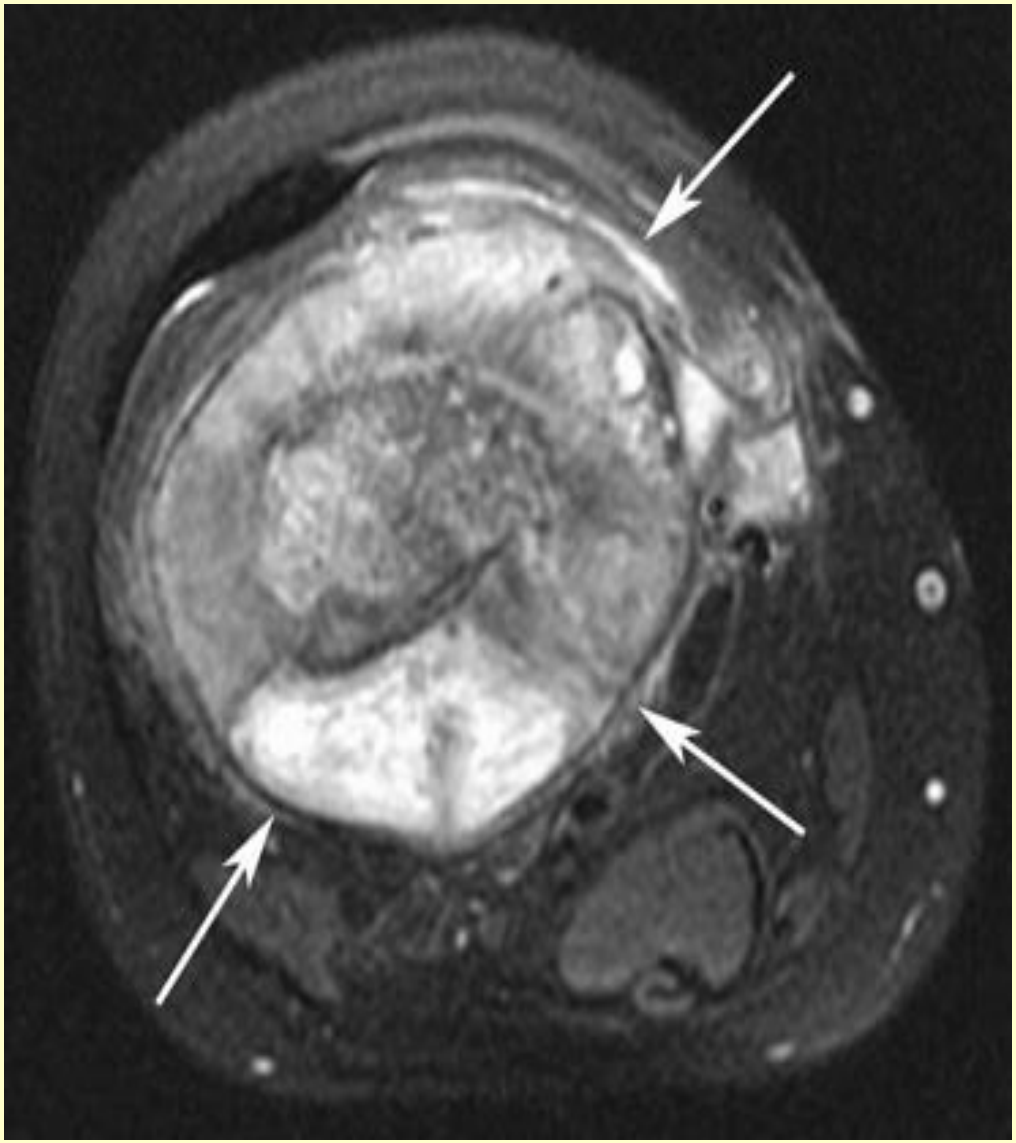

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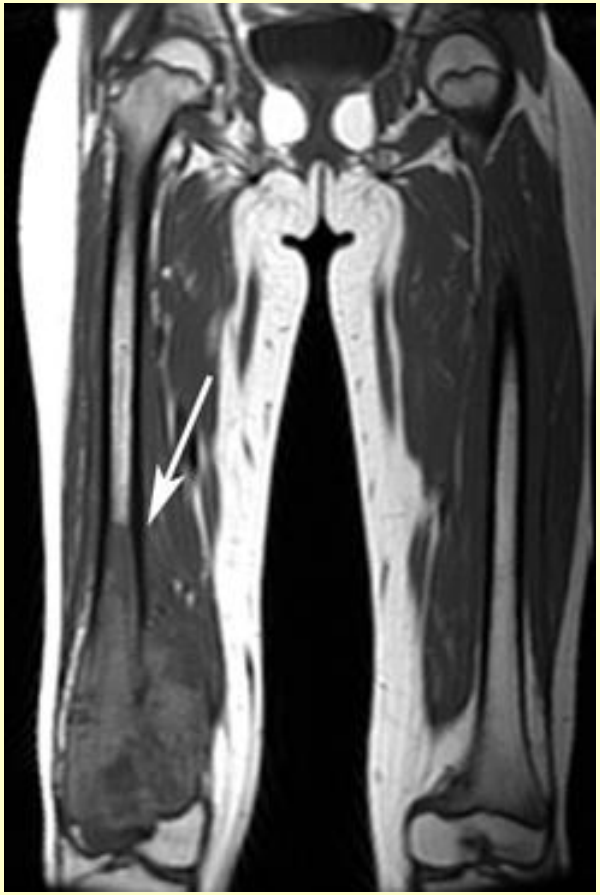

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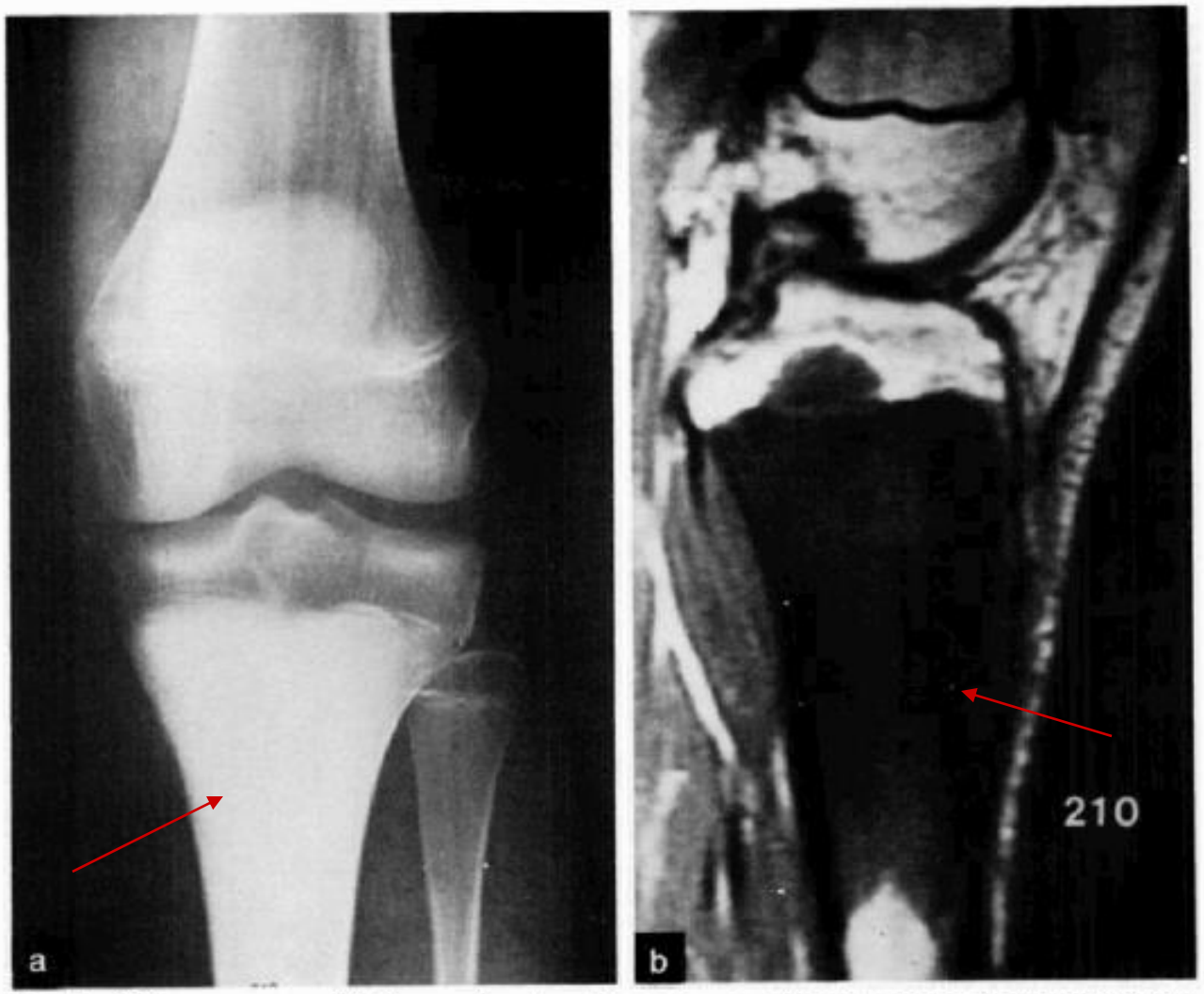


Fig. 7. Osteosarcoma. (a) Conventional radiography reveals an increase in density in the proximal portion of the tibia. (b) MRI reveals the loss of intensity of the marrow cavity and replacement by the tumor, the soft tissue extension posteriorly, and invasion of the epiphysis. (Courtesy of Murray Dalinka, MD, Hospital of the University of Pennsylvania, Philadelphia.)

osteosarcom

Osteosarcoma

Differential diagnosis

1. Osteolytic Osteosarcoma:

- Periarticular ossifications
- Condensing osteitis
- Acute or chronic osteomyelitis
- Solitary myeloma
- Osseous chondrosarcoma
- Osseous fibrosarcoma
- Bone tuberculosis
- Bone syphilis

Osteosarcoma

Differential diagnosis

2. Osteogenic Osteosarcoma:

- Giant-cell sarcoma
- Angiosarcoma

TUMORILE OSOASE

Osteosarcoma

Treatment

-complex; must consider clinical and evolutionary characteristics, medium duration of survival

-Classical treatment

- Ample surgical treatment

- Recommends amputation or disarticulation at a distance, within oncological security limits: superior (proximal) of the joint comprising the affected bone

-Since survival after 5 years is below 20%, this treatment has been discarded in favor of combined radio-chemo-surgical treatment

TUMORILE OSOASE

Osteosarcoma

Radiosurgical treatment

-Pre-op radiotherapy – decreases neoplasic dissemination, in the absence of metastses surgical intervention after 6 months (amputation or disarticulation)

-Rapid appearance of metastases counter-indicates amputation or disarticulation

Clinical signs of favorable response to radiotherapy:

- Decrease or disappearance of local pain
- Decrease in local swelling
- X-ray: clear boundary, calcification of tumor

-Preventative pulmonary radiotherapy

-Pulmonary metastases – exeresis

-Intra-arterial chemotherapy, active immune stimulation

TUMORILE OSOASE

Osseous chondrosarcoma

-Malignant tumor, of cartillaginous origin,

-Can be primary or secondary malignant tumor, via malignization of a benign tumor (chondroma, osteochondroma)

-More frequent in adults (45-60 years), especially men

-Can appear in youths (from 10 years)

Location of primary chondrosarcoma – more frequent in the lower extremity of femur, upper tibia

Location of secondary chondrosarcoma – more frequent in upper extremity of femur, upper humerus

Represents 10-20% of malignant bone tumors

Osseous chondrosarcoma

Pathological anatomy

- Primary chondrosarcoma:
  - Limited invasion of soft tissue, imprecise boundaries
  - Passes cortical and enters marrow cavity
- Secondary chondrosarcoma:
  - Clear boundaries, only penetrates peritumoral soft tissue

Osseous chondrosarcoma

Clinical signs

- Usually slow clinical debut
- First symptom – pain, initially light, intermittent
- In central forms, appears before local swelling
- In peripheral forms, local swelling appears before or at the same time as pain
- Pathologic reaction in rapidly evolving phases

Medium evolution is 3-5 years, faster in young ages

Secondary chondrosarcoma – slower evolution, less tendency to metastasize.

Osseous chondrosarcoma

Radiological exam

- Initial stages: clear images with small, irregularly-bounded osteolysis areas
- Thinned cortical, discrete periostal reaction

Characteristic – amorphous calcareous impregnation zones around the osteolysis area

- Advanced stages:

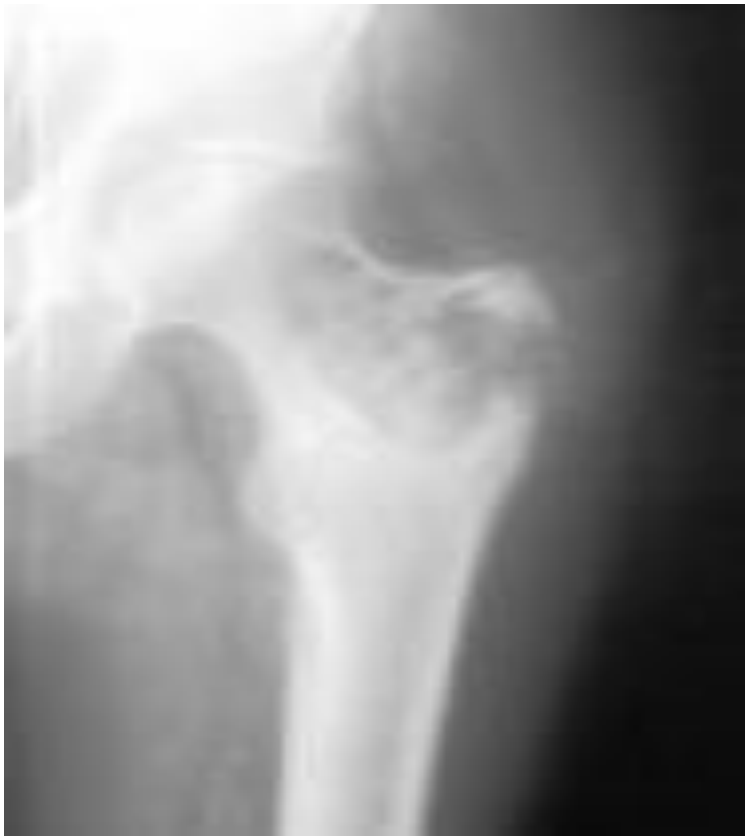
central chondrosarcoma

central area of reduced intensity at the metaphysis, limited by well-defined sclerous areas

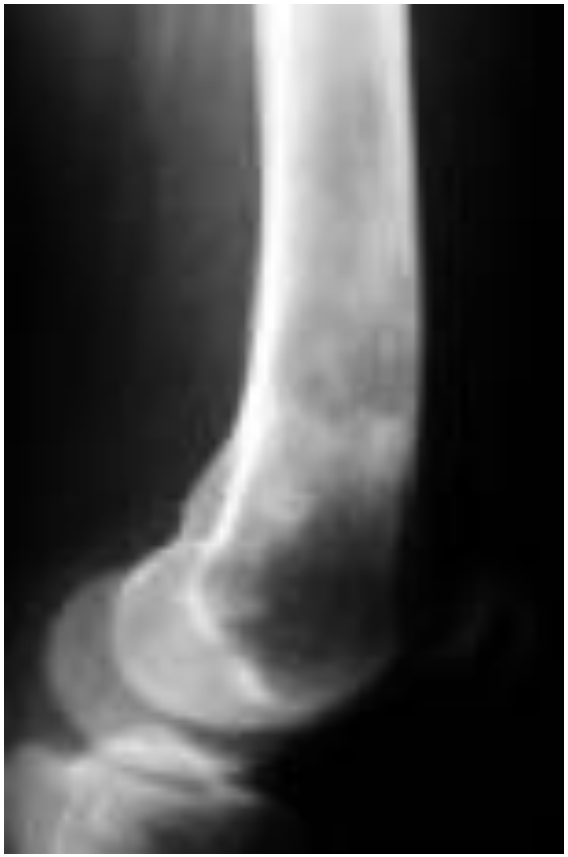
inside the tumor, unique or multiple calcifications

peripheral chondrosarcoma

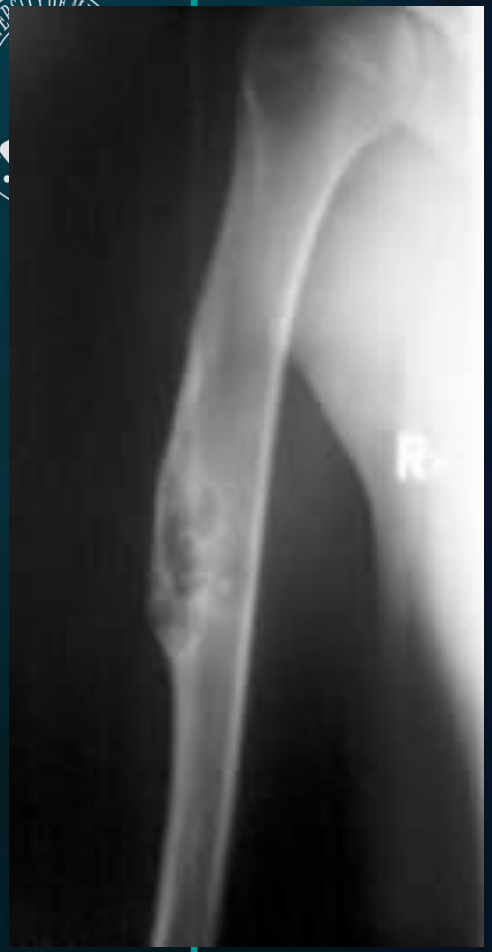
- Large, irregular opacities in soft tissue
- Cortical intact (rarely) or with weakly defined edges, rarely affected marrow canal



chondrosarcoma



chondrosarcoma



Chondrosarcoma *rezectie larga si grefon pediculat de fibula +OSM*

TUMORILE OSOASE

Osseous chondrosarcoma

Differential diagnosis

- *Peripheral chondrosarcoma :*
  - Parostal sarcoma
- *Central chondrosarcoma :*
  - Osteolytic osteosarcoma
  - Solitary myeloma
  - Metastatic bone tumors

Osseous chondrosarcoma

Treatment

- Tumor has slow evolution, frequent local relapses, late metastasis
- Radio-resistant tumor
- Surgical treatment:
  - Curettage is insufficient
  - Large exeresis, into healthy tissue at the members is the only efficient method
  - Requires osteoplasty with cortical and spongy grafts and firm osteosynthesis
  - Incomplete exeresis leads to rapid relapse

TUMORILE OSOASE

Osseous fibrosarcoma

Malignant mesenchymal tumor

-Less frequent and aggressive than osteosarcoma

-1-5% of total malignant bone tumors

-Purely osteolytic tumor, characterised by lack of production of chondroid or osteoid tissue

-*central (medular*) or *peripheric (periostal)*

-more frequent in men of adult age (3^{rd}-4^{th} decade)

-more rarely appears at extreme ages (10 or 70 years)

-more frequent in long bone metaphyses of lower limbs (inferior femur, superior tibia)

-wide bones – at advanced ages

Osseous fibrosarcoma

Pathological anatomy

- **Central fibrosarcoma**
  - Invasion of medullary canal, thinning and penetration of cortical => bone segment increased in volume
  - Neighboring joint cartillage unaffected
- **Peripheric Fibrosarcoma**
  - Excentrically developed, greatly increased in volume

Osseous fibrosarcoma

Clinical signs

- Debut – pain, growing in intensity until it becomes unbearable and permanent
- Pain localized at the site and neighboring joint
- Tumefaction initially slightly noticeable in *central fibrosarcoma*
- In *peripheric fibrosarcoma,* swelling is evident
- In advanced stages, peripheral vein network is visible
- Pathologic fractures can sometimes be the first sign
- General state is altered, tumoral impregnation appears
- Evolution is slow, in correct treated cases can take up to 5 years
- Metastasis occurs late

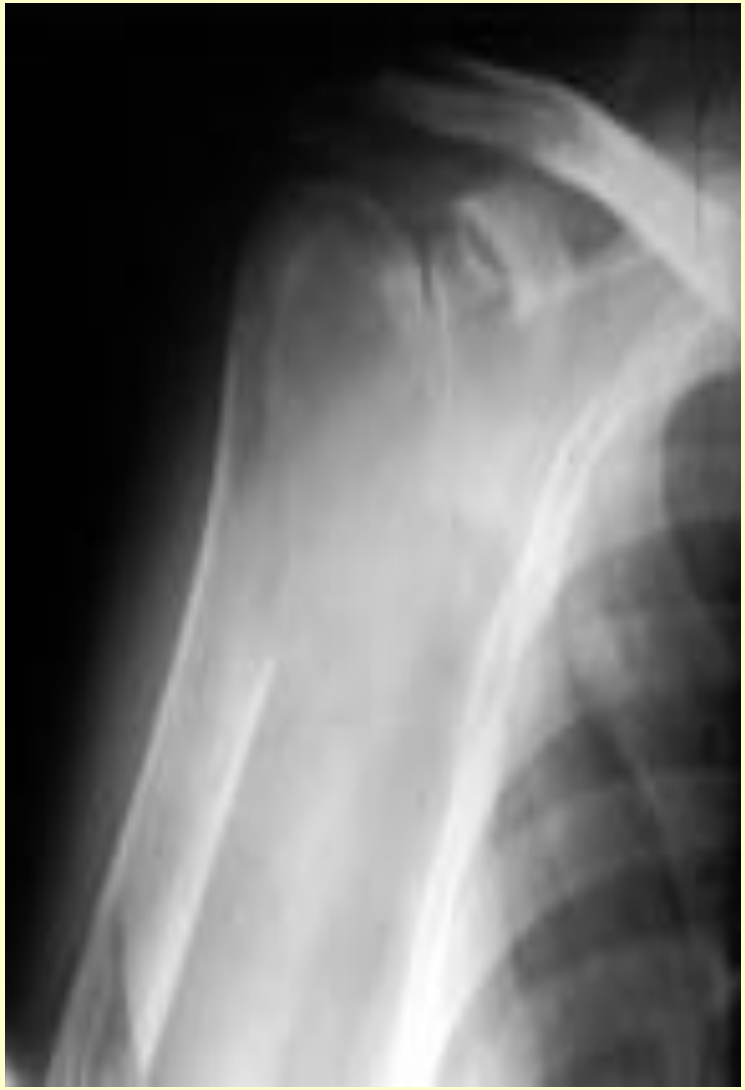
TUMORILE OSOASE

Osseous fibrosarcoma

Radiological exam

Purely osteolithic, thinned cortical

- Central fibrosarcoma
  - Non-homogenous osteolytic zone, with irregular edges
  - Interrupted cortical
  - Moderate periostal reaction
- Peripheral fibrosarcoma
  - Resorbtion of cortical, soft tissue shadow
  - Enters marrow canal
  - Bone sequestration appears



fibrosarcoma

Osseous fibrosarcoma

Differential diagnosis

- Forms with slow evolution and clear edges on X-ray:
  - Solitary bone cyst
  - Aneurysmal cyst
  - Giant-cell tumor
- Aggressive and osteolytic forms:
  - Osteolytic osteosarcoma
  - Osteogenic osteosarcoma
  - Central chondrosarcoma
  - Metastatic bone tumors

TUMORILE OSOASE

Osseous fibrosarcoma

Treatment

Depends on type of evolution

Cytostatic drugs – limits tumor process

Radiotherapy – isolated, limited value

- associated with chemotherapy gives good pre-op results in limiting and stabilizing the tumor

Surgical treatment

- For slow-evolving cases – local exeresis and segment reconstruction
- For aggressive cases – large exeresis or amputation

TUMORILE OSOASE

Multiple myeloma (reticulosarcoma, Rustitki – Kahler disease)

Malignant bone tumor of reticulohistiocytic origin, from red bone marrow

- Multiple tumor foci, both on the skeleton and elsewhere
- Great invasive tendency
- Usually several tumor foci exist simultaneously
- Rarely, a solitary tumor – myeloma or plasmocytoma. After years, this can metastasise into bone or other tissue
- Characteristic of adults, frequently afte 40 years of age, exceptionally under 30, men/women = 2/1
- 3% of malignant bone tumors

TUMORILE OSOASE

Multiple myeloma (reticulosarcoma, Rustitki – Kahler disease)

Pathological anatomy

- Cell type: erythrocytoma, myelocytoma, plasmacytoma
- Bone as well as visceral lesions may appear
- Excentric evolution, leads to cortical thinning and destruction, exceeds the periosteum and invades soft tissue
- Bones with hematopoietic activity are affected (calvaria, ribs, sternum, clavicle, pelvis, proximal epiphyses of humerus and femur)
- Neighboring bone reaction is absent

TUMORILE OSOASE

Multiple myeloma (reticulosarcoma, Rustitki – Kahler disease)

Clinical signs

- Insidious debut, resembling that of chronic rheumatism or anemic syndrome
- Pain – initially diffuse, in torso, lumbar or sacral, ribs or pelvis – worsened by effort
  - Over time, increases in intensity, associated with neurological symptoms, astenia, weight loss
- Can be associated with spotting the tumor
- Pathologic fractures may appear
- Associates renal, pulmonary, gastrointestinal affections

TUMORILE OSOASE

Multiple myeloma (reticulosarcoma, Rustitki – Kahler disease)

Multiple myeloma tumor syndrome:

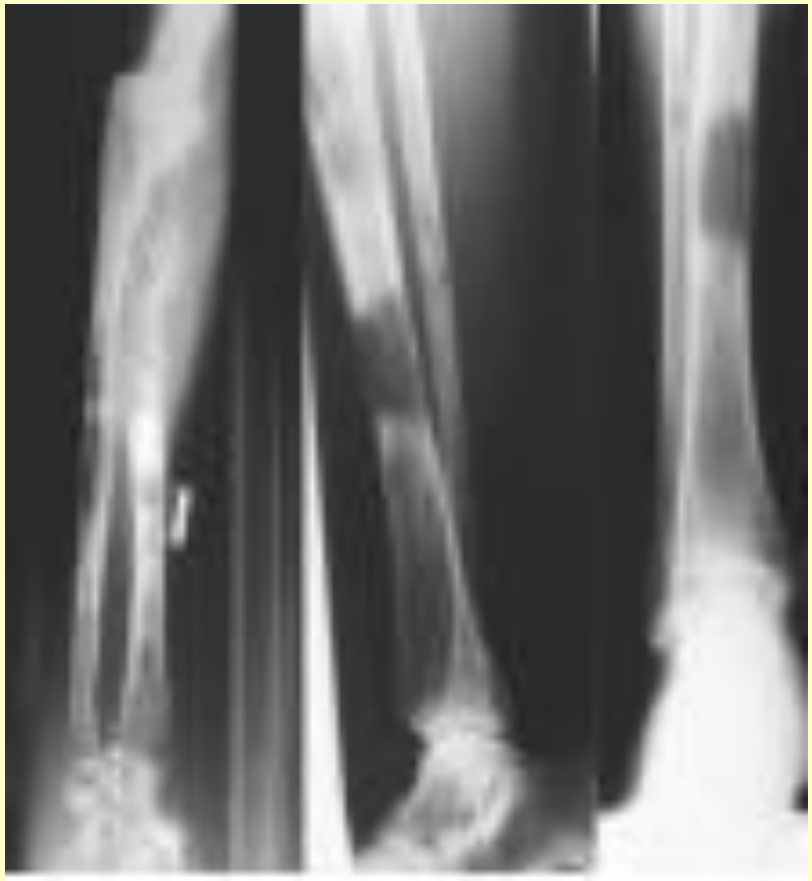
- Hyperproteinemia
- Hyper-gammaglobulinemia
- Anemia
- Increased ESR
- Increased leukocytes
- Reversal of albumin/globulin ratio
- Hypercalcemia

TUMORILE OSOASE

Multiple myeloma (reticulosarcoma, Rustitki – Kahler disease)

Radiological exam

- Multiple osteolysis foci (geodes)
- Extended osteolysis zones
- Diffuse osteoporosis
- Extended osteosclerosis
- Osteolysis areas associated with invasion of peritumoral soft tissue
- Skull has a "bullet-riddled" aspect
- Spinal column – localized geodes
- Costal arches – low-intensity geodes



Multiple myeloma

Multiple myeloma

TUMORILE OSOASE

Multiple myeloma (reticulosarcoma, Rustitki – Kahler disease)

Differential diagnosis

1. Recklinghaussen's disease
2. Metastatic carcinoma
3. Senile osteoporosis
4. Cushing's disease
5. Poliostic fibrous dysplasia
6. Generalized chondromatosis
7. Lymphoma

Multiple myeloma (reticulosarcoma, Rustitki – Kahler disease)

Treatment

- *Radio-sensitive* tumor
- In a dose of 6000-8000 rad, can prolong survival 4-10 years
- Determines significant remission
- Palliative in multiple forms, in smaller doses, associated with *chemotherapy*
- **Surgical treatment**
  - Limited indication, especially in solitary myeloma
  - Osteosynthesis of pathologic fractures (palliative)

TUMORILE OSOASE

Metastatic bone tumors

- Most frequent bone malignant tumors
- Can lead to tertiary metastases
- Departure point: known/unknown

TUMORILE OSOASE

Metastatic bone tumors

Mode of dissemination

- Hematologic (emboli)
- By contiguity
- Via lymph

Pulmonary metastases may also appear, pulmonary x-ray is required

TUMORILE OSOASE

Metastatic bone tumors

Most frequent point of departure is the breast, then prostate and thyroid

Localisation – most frequently the trunk, spine, pelvis, ribs, calvaria, proximal extremity of femur

More rarely found in radius, ulna, tibia, fibula and small bones of the hand and foot

Spinal column and pelvis metastases – prostate carcinoma

Metacarpal, metatarsal and phalanges – primary lung tumors

Long bones of the limbs – renal carcinoma

The majority appear in the latter half of life, equally in both sexes

In young people – exceptionally neuroblastoma, Ewing's reticulosarcoma

Metastatic bone tumors

Clinical signs

- Most important-pain
  - Initially low intensity, increases rapidly, continously, not relieved by opioids
- Tumefaction – when superficially located
- Pathologic fractures
- Neurological symptoms, especially when located near vertebrae

TUMORILE OSOASE

Metastatic bone tumors

Pathological anatomy

May be:

- osteolytic
- osteoblastic
- mixed

Primitive fast-evolving visceral tumors give osteolytic-type metastases

Primitive slow-evolving visceral tumors give osteoblastic metastases

TUMORILE OSOASE

Biological picture

Osteolytic-type metastases:

- Hypercalciuria
- Moderate hypercalcemia
- Alkaline phosphatase increased

Osteoblastic metastases:

- Acid phosphatase increased

- ESR usually increased
- Myelogram – moderate plasmacytosis

TUMORILE OSOASE

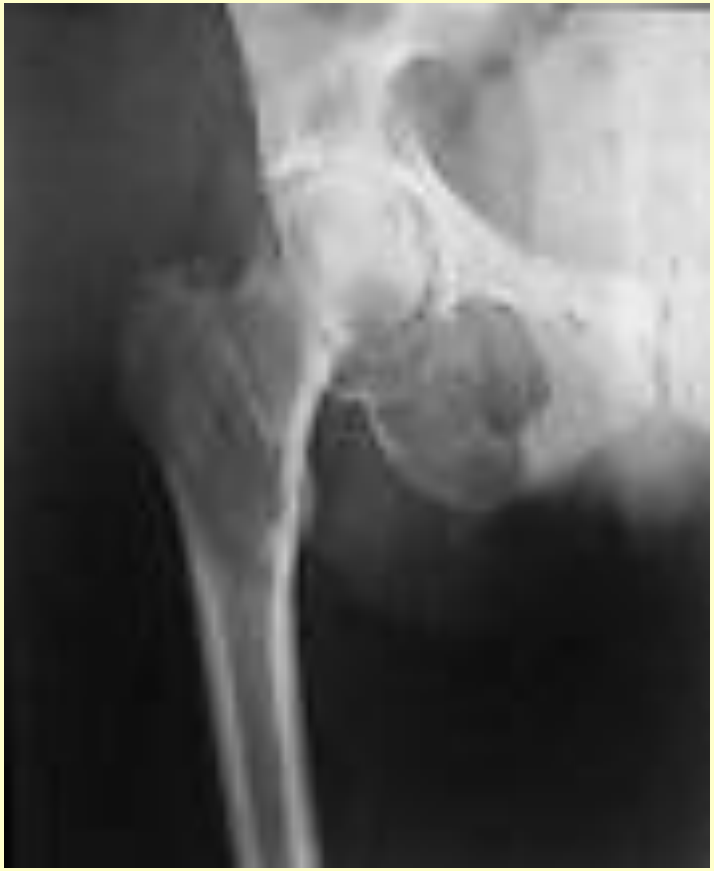
Radiological exam

3 radiological forms:

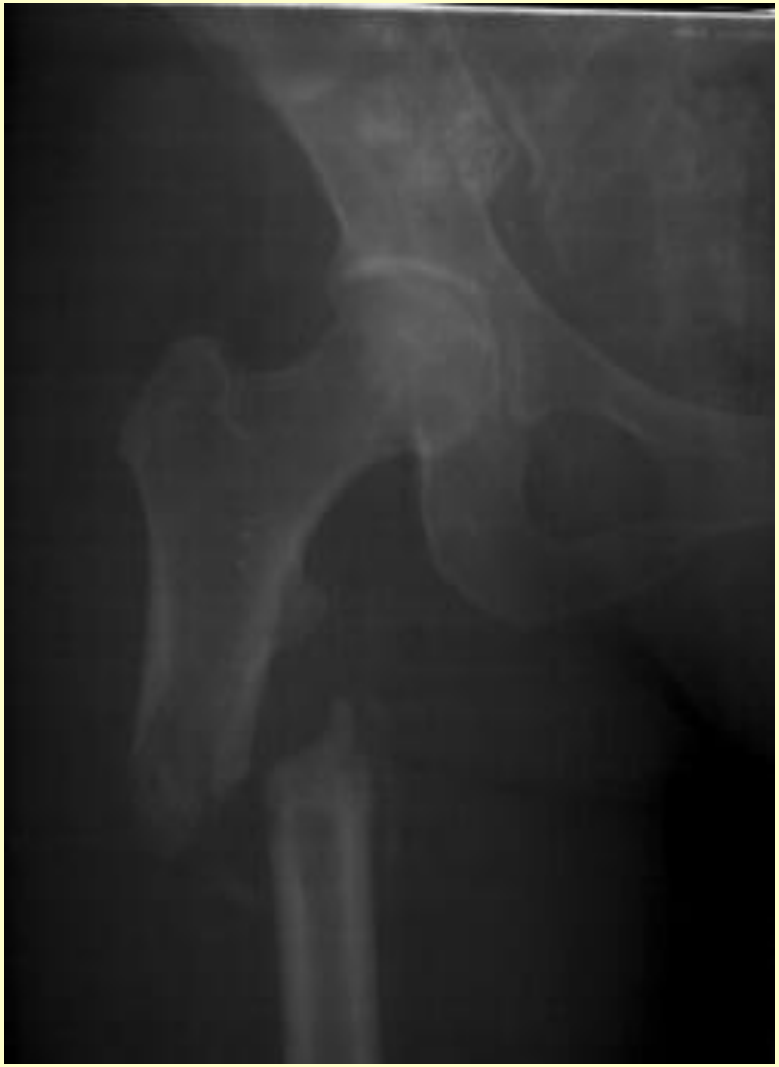
- Osteolytic
- Osteoblastic
- Mixed

Most frequently – *osteolytic*. These affect diaphyseal cortical and spongy structures, do not give periosteal reaction and are usually multiple

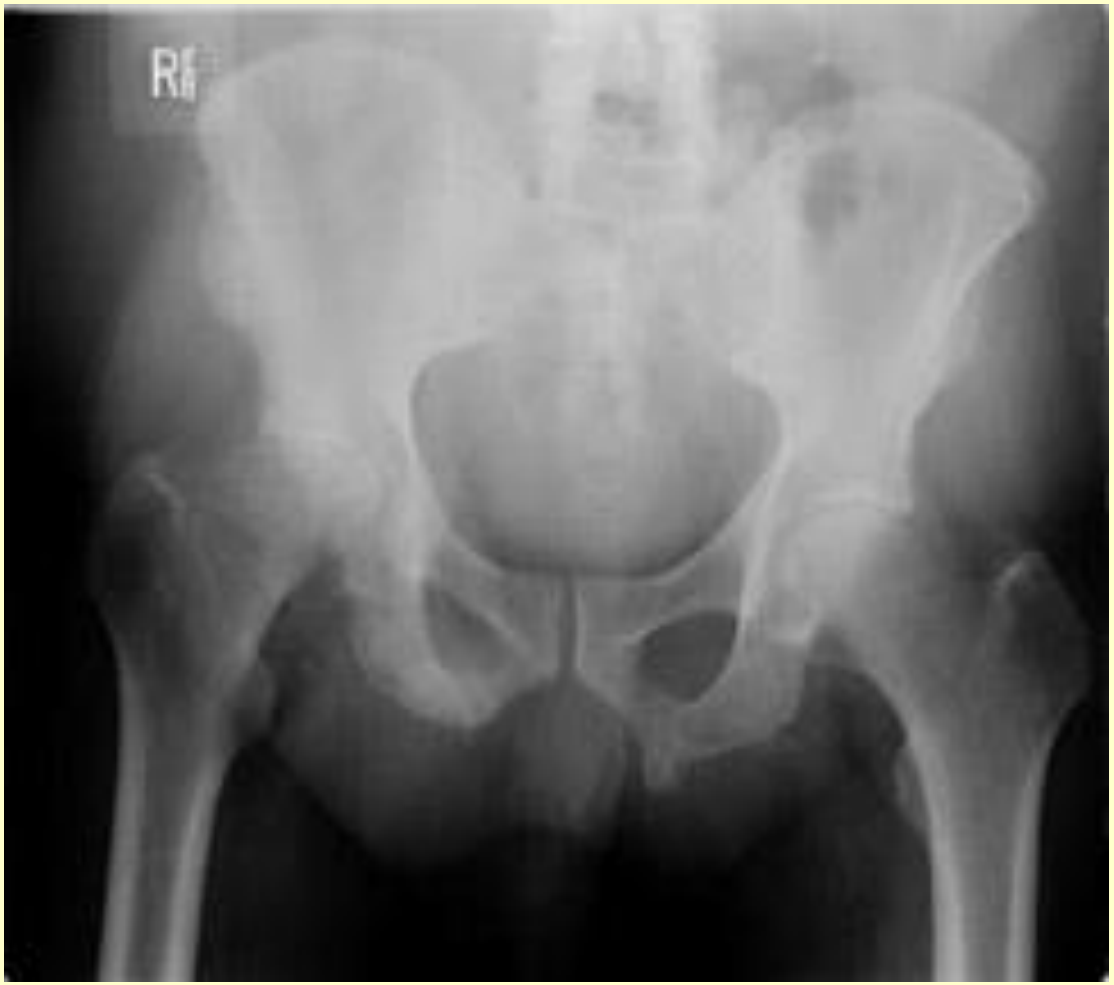
Osteoblastic metastases – exclusively in spinal column and pelvis, are areas of increased intensity, homogenous, have periostal reaction



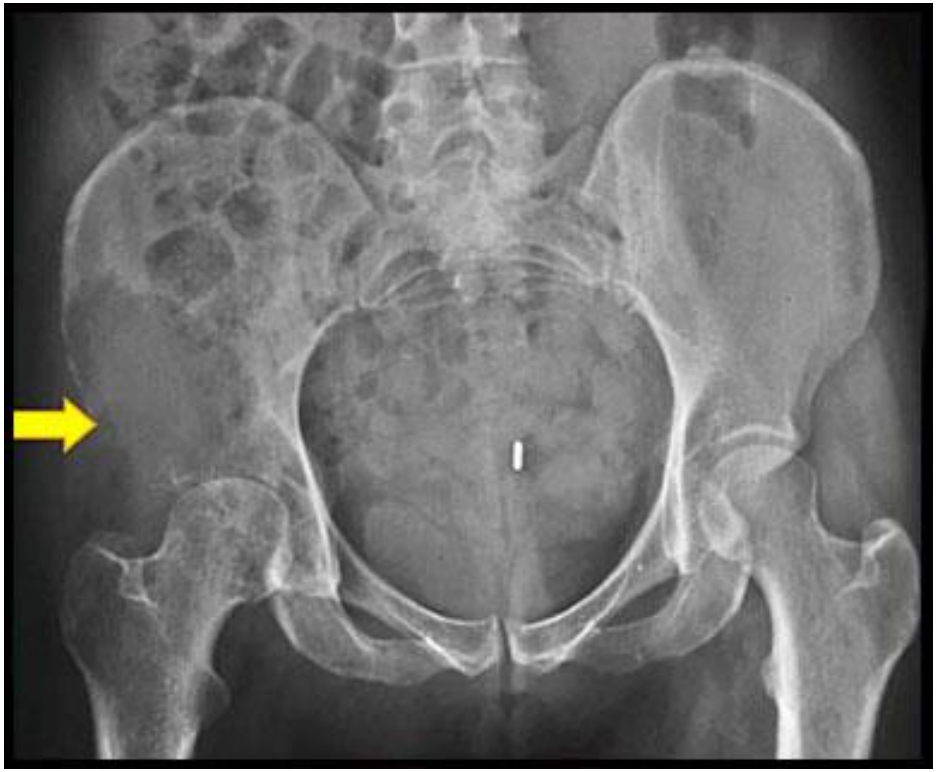
Osteolytic bone metastasis



Osteolytic metastasis – mammary neoplasm



Osteoblastic metastasis – prostate neoplasm



TUMORILE OSOASE

Differential diagnosis

Osteolytic metastases:

1. Multiple myeloma
2. Recklinghausen's hyperparathyroid osteoporosis
3. Miliary osteolytic metastases
4. Central form of osteomyelitis
5. Vertebral myelomatosis
6. Pott's disease
7. Xanthomatosis

TUMORILE OSOASE

Differential diagnosis:

Bone condensing metastases:

1. Paget's disease
2. Bone syphilis
3. Osteopetrosis
4. Fluorosis

TUMORILE OSOASE

Treatment

-after a clinical, biological, radiological evaluation:

Non-specific medication: analgesic, antiinflamatory, corticotherapy, psychotropes, narcotics

Chemotherapy

- **Major indication** in radio-sensible metastases
- As adjuvant to radiotherapy
- In multiple metastases, visceral metastasis association, chemotherapy is preferred

TUMORILE OSOASE

Treatment

Radiotherapy

-**main indication** is one or a few bone metastases

-less important role as local analgesic and antiinflamatory

-isolated radiotherapy is rarely indicated, more frequently associated with chemotherapy

Hormone therapy

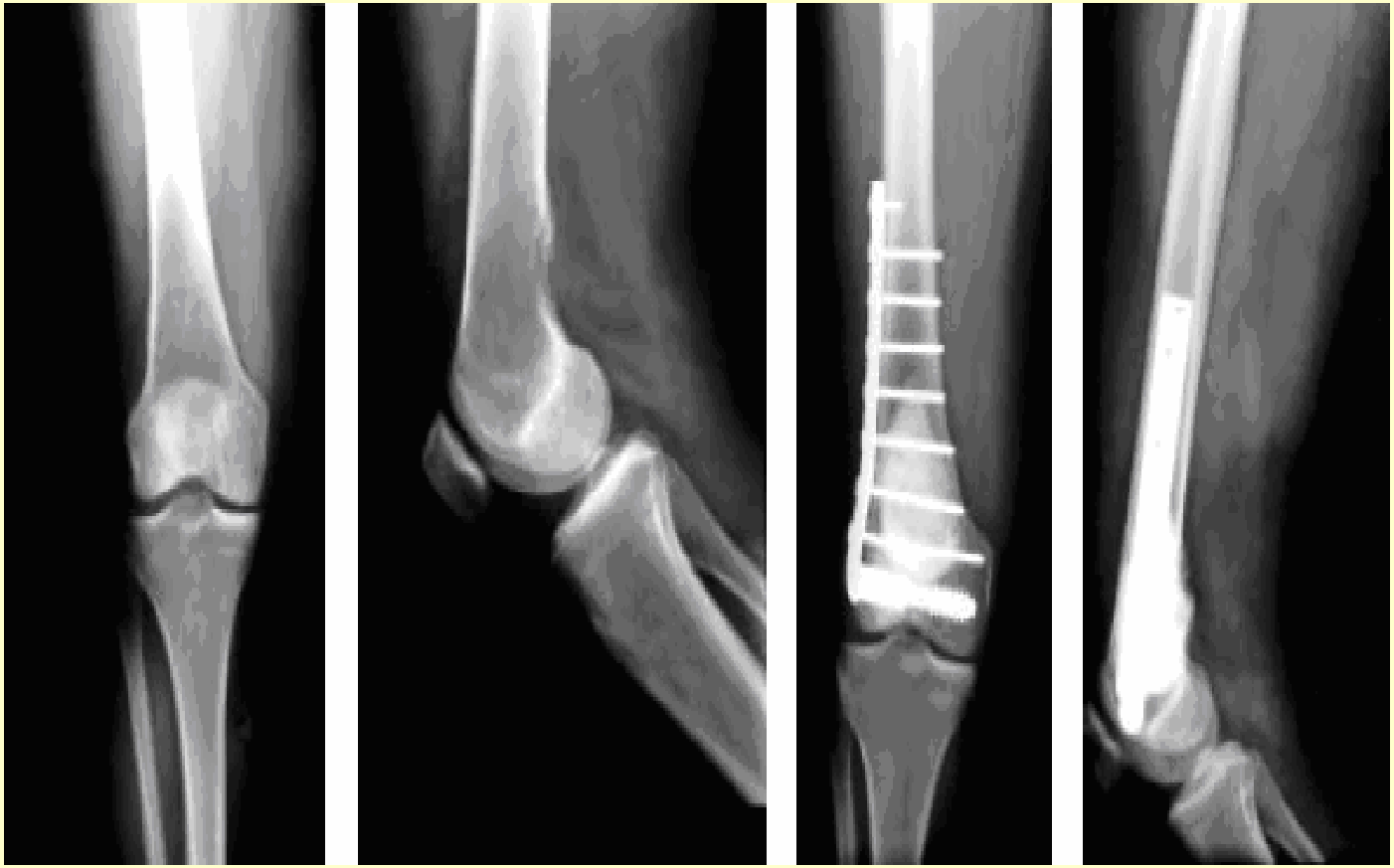
-for the primary tumor as well as metastases

TUMORILE OSOASE

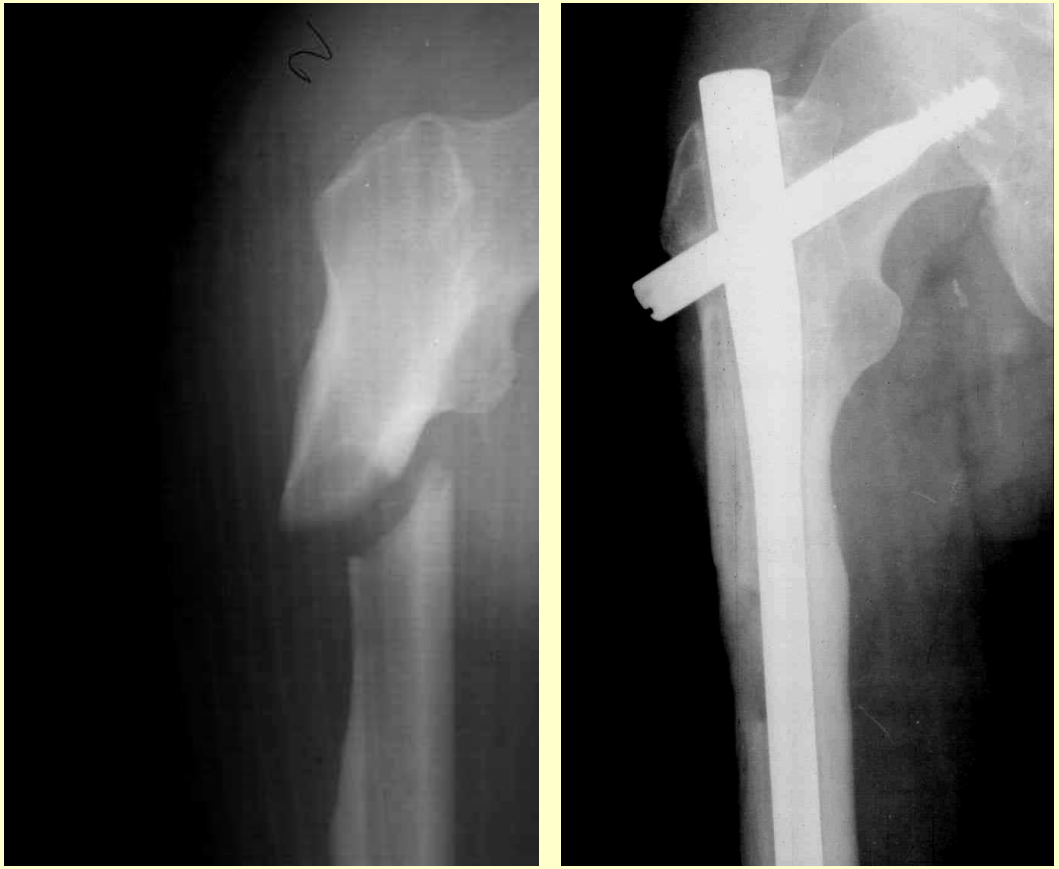
Surgical treatment

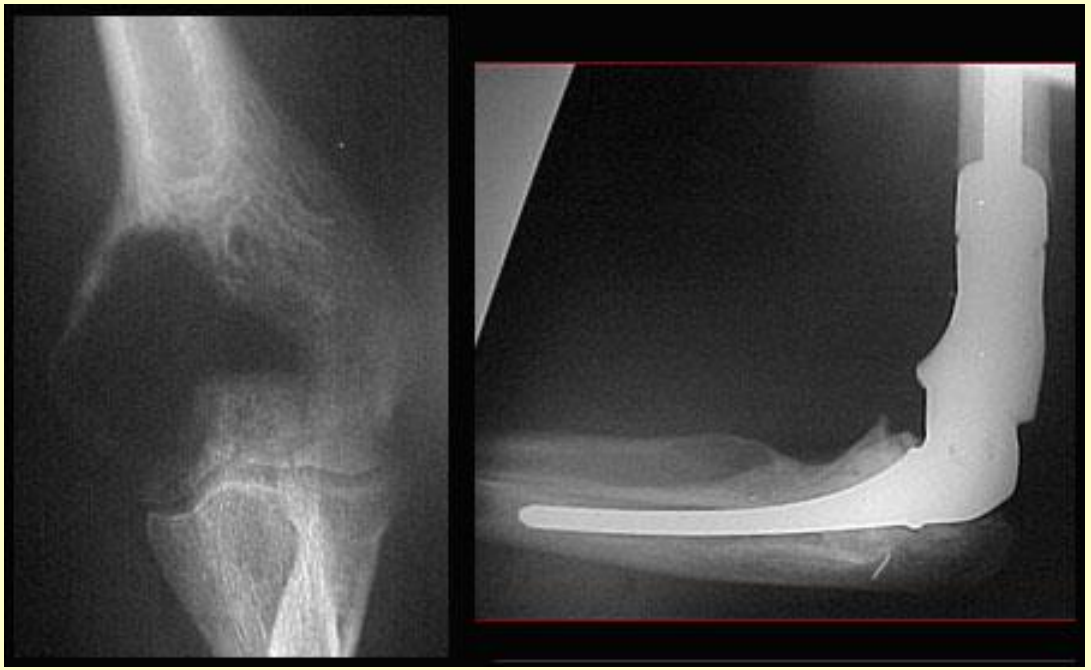
-For preventing or treating pathological bone fractures, analgesis

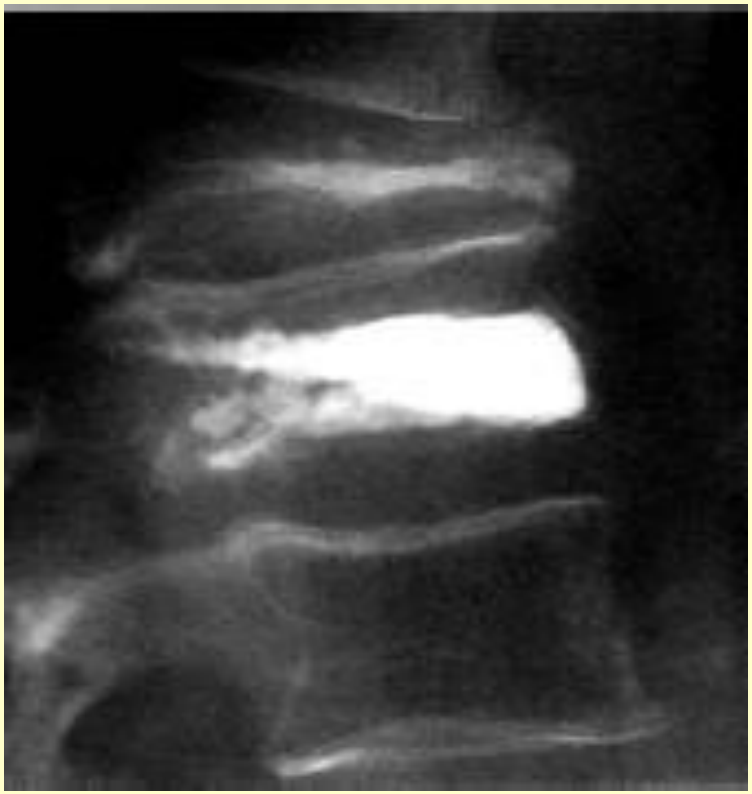
- Curettage, cementing and metallic osteosynthesis
- Resection within oncological limits, self-transplant or allograft and metallic osteosynthesis
- Resection and reconstruction with modullar endoprosthesis
- Spinal column – kifoplasty or decompression and stabilization



Plombare cu ciment si osteosinteza metalica







kifoplastie