# Benign lesions

| Lesion | Properties | Radiological description | Radiology | Treatment |
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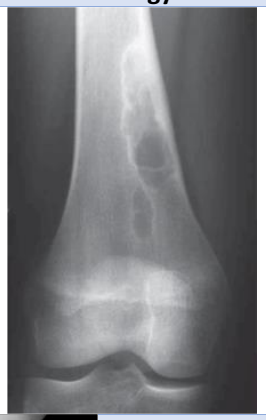
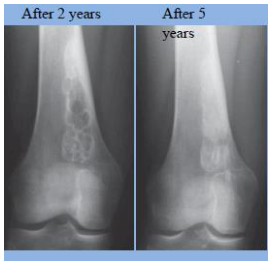
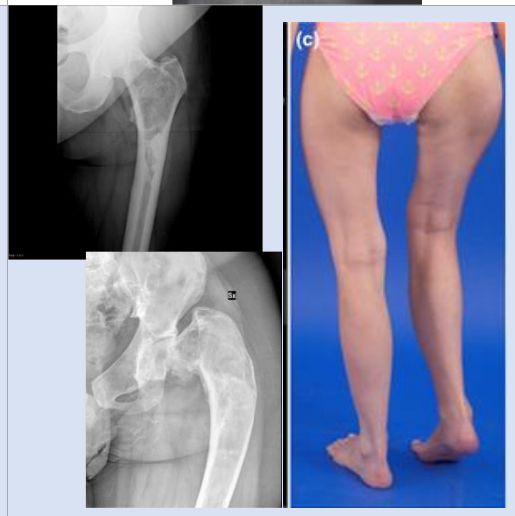
| **Histiocytic fibroma** | - m/c lesion of bone<br>- asymptomatic (incidental finding)<br>- previously named non-ossifying fibroma / fibrous cortical defect | Lesion is eccentric, metaphyseal, well defined, mixed (lytic and sclerotic)<br>- Sclerotic rim<br>- no cortical destruction / periosteal reaction |  | No need for trx as the lesion ossifies with time<br>  |
| **Fibrous dysplasia** | - if it is a solitary lesion (monostotic), it rarely transforms into malignancy. However, were it polyostotic, the risk increases.<br>- can affect any bone<br>-rarely, can be associated with McCune Albright Syndrome (multiple café au lait spots and endocrine abnormalities like precocious puberty)<br>- presents with pain | - central, well defined, lytic lesion<br>- with ground glass appearance (fine calcifications)<br><br>- proximal femoral deformity is apparent (Shepherd's crook deformity) |  | - observation (rare transformation into malignancy)<br>- bisphosphonates<br>- deformity correction |

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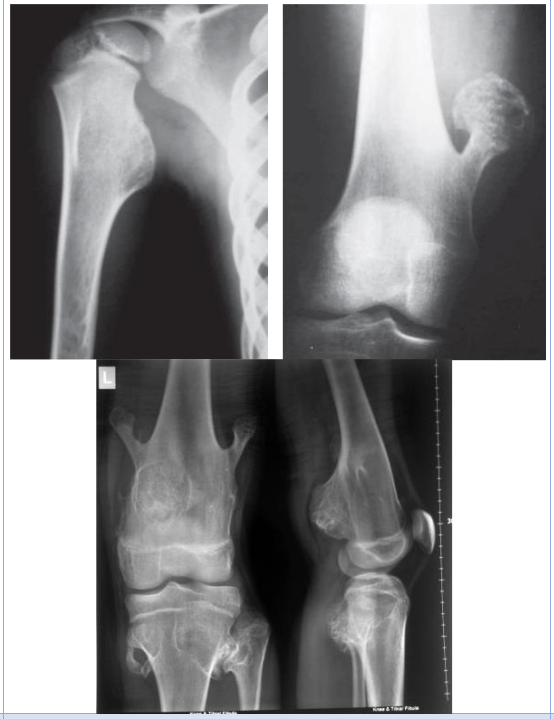
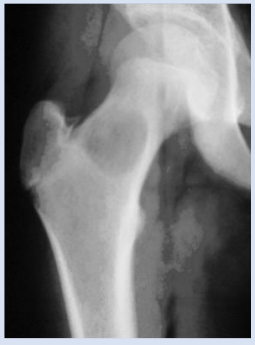
| **Osteochondroma (exostoses)** | - m/c benign lesion of bone<br>- aberrant growth of cells in the perichondrial ring (cartilage forming lesion) -> seen in children, continues to grow until the GP closes (skeletal maturity)<br>- growth beyond skeletal maturity can indicate malignant transformation (although malignancy is rare)<br>- clinically, the lesion is larger than it appears on x-ray b/c we don't see cartilage on x-ray<br>- presents with pain (tendinitis / bursitis), lump, mechanical restriction of movement | The lesion can be sessile (wide-based) or pedunculated (stalked)<br><br>Multiple Hereditary Exostoses (MHE) is an autosomal dominant condition that causes multiple deformities (disfiguring) and has a higher chance of malignant transformation. |  | Treatment depends on symptoms:<br>If asymptomatic: observation<br>If symptomatic: surgical resection |
| **Simple Bone Cyst** | - not a true cyst (fibrous lining other than epithelial). Full of fluid (MRI)<br>- not neoplastic<br>- in children. Very rare in adults.<br>- m/c locations are prox. humerus and prox. femur<br>- high susceptibility to fractures | Lesion is central, well defined, purely lytic |  | - observation of the humerus or injection with steroids<br>- curettage, grafting and instrumentation of the femur |

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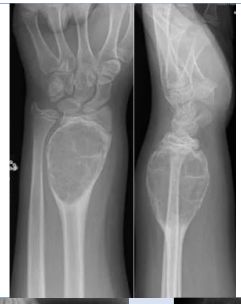
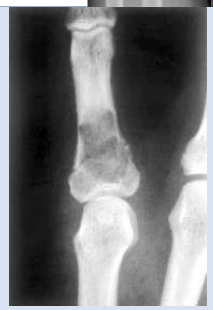
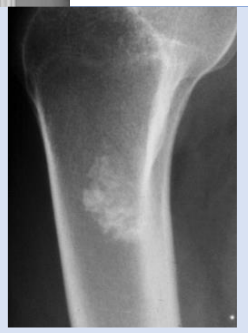
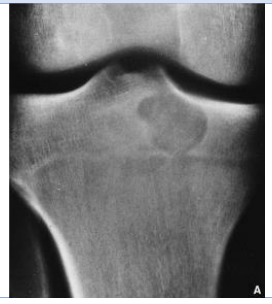
| **Aneurysmal Bone Cyst (ABC)** | - neoplastic (genetic translocation)<br>- filled with blood + fluid<br>- can be 1° or 2°<br>- growing tumour BUT no risk of malignancy | Lesion is well defined, multiloculated (notice the septa), lytic, causing significant ballooning and thinning of the cortex |  | Curettage and grafting |
| **Chondroma (Enchondroma)** | - m/c <u>benign</u> bony lesion in the <u>hand</u><br>- completely benign and asymptomatic (usually incidental) (the pt. usually comes to clinic due to fracture) -> fracture is a common presentation<br>- occurs in any bone | (on the left): lesion is well defined, lytic with coarse calcifications (stippled/popcorn appearance).<br>- thinning of the cortex<br>- notice the fracture<br>(to the right picture): florid popcorn calcifications in the distal femur and the lytic background is barely seen. |   | Depends on the location.<br>In the hand: do curettage and grafting<br>Elsewhere: just observe |
| **Chondroblastoma** | - occurs in the <u>epiphysis</u> of **immature** skeleton<br>- presents as pain, stiffness, and joint effusion | Well-defined, lytic lesion in the epiphysis of prox. tibia with some coarse calcifications |  | Curettage and grafting |

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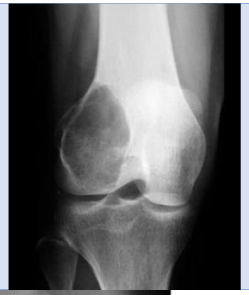
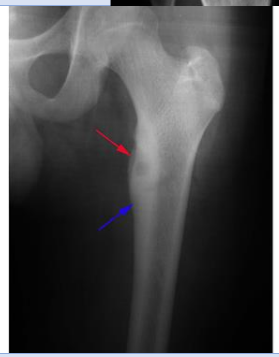
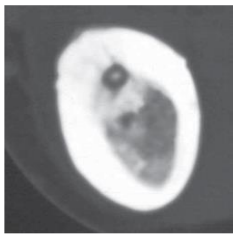
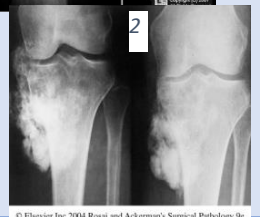
| **Giant Cell Tumour** | - benign but usually aggressive<br>- occurs in the epiphysis (now is called subchondral region because it's an adult skeleton) of **mature** skeleton ( giant is mature)<br>- if present around the knee, there is high risk of fracture | Lesion is well-defined, purely lytic, in the subchondral area of the distal femur<br>- thinning of the cortex |  | Curettage and cementing ± instrumentation |
| **Osteoid Osteoma** | - completely benign<br>- less than 1.5 cm<br>- occurs anywhere in the bone<br>- presents with pain (especially at night)<br>- responds to NSAIDs but NOT paracetamol (b/c of the release of prostaglandins from the tumour)<br>- if not seen on x-ray, perform a thin cut CT | (On the left): Lesion is intracortical, small, well-defined, lytic (nidus) surrounded by thick sclerosis<br>- the reactive thick sclerosis is explained by the inflammatory process of osteoid osteoma<br>(On the right): thin cut CT; notice how small the nidus is (<1.5 cm) |   | Classic treatment: surgical resection of the nidus.<br>Recent treatment: radiofrequency ablation of the nidus |

## Malignant lesions

| Lesion | Properties | Radiological description | Radiology | Treatment |
|---|---|---|---|---|
| **Osteosarcoma** | - m/c 1° malignant bone tumour<br>- typical in the metaphysis around the knee in adolescents<br>- classically high grade<br>- poor prognosis (mets are usually found at the time of diagnosis)<br>- survival rate increased from 50% to 70% b/c of the use of chemotherapy to treat micro mets. | 1. sunray appearance (red and green circles). Codman triangle (arrows)<br>2. sclerotic lesion with ill-defined margins (wide transition zone). Notice the solid periosteal reaction<br>3. the tumour is crossing the growth plate to the epiphysis. There's cortical destruction and extension to the soft tissue. Codman triangle at the proximal end of the tumour |       | It's a high-grade lesion, thus, it needs neoadjuvant (before surgery) as well as adjuvant chemotherapy. |

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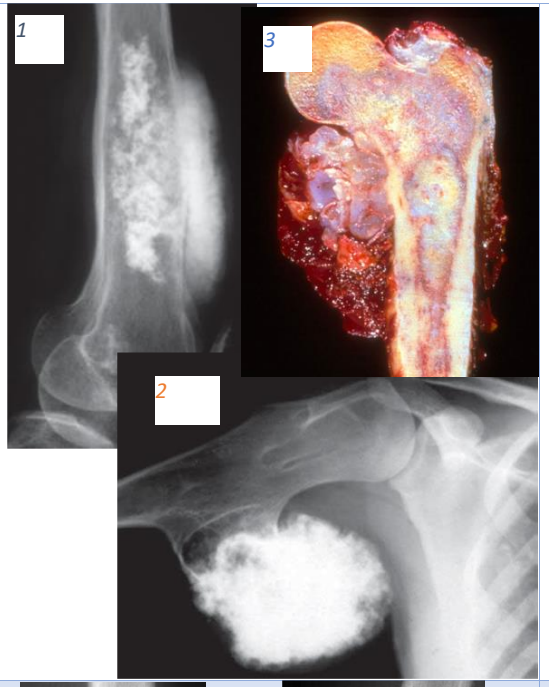
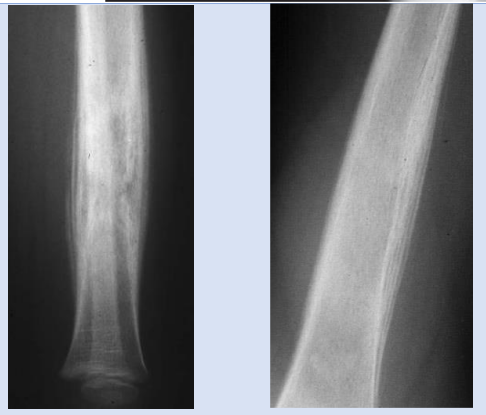
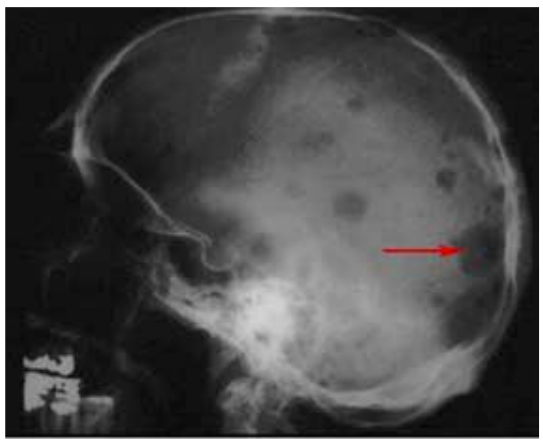
| **Chondrosarcoma** | - occurs in adults<br>- usually low grade (doesn't respond to chemo or radiotherapy<br>- 2 types: 1° (central) arising de novo in the medullary canal. 2° (peripheral) arising from a pre-existing osteochondroma | 1. 1° (central) lesion with irregular coarse calcifications with tumour extension outside the bone (periosteal reaction)<br><br>2. 2° (peripheral): large amount of calcification on top of the bony prominence<br><br>3. specimen of a femur with chondrosarcoma: gross silvery appearance of the tumour. There is involvement of the soft tissue. |  | |
| **Ewing Sarcoma** | - typically occurs in the shaft of the bone<br>- very young patients (1st and 2nd decades of life)<br>- may have constitutional symptoms (fever -low grade-, fatigue, weight loss, affected appetite, malaise and night sweats)<br>- high grade | Onion skin appearance of the lesion |  | Ewing Sarcoma is radio- and chemo-sensitive. |

# Other malignant lesions:

## *Multiple Myeloma*



- Purely lytic, punched out lesions
- X-ray is the modality of choice

(Bone scans are 30% of the time falsely negative)

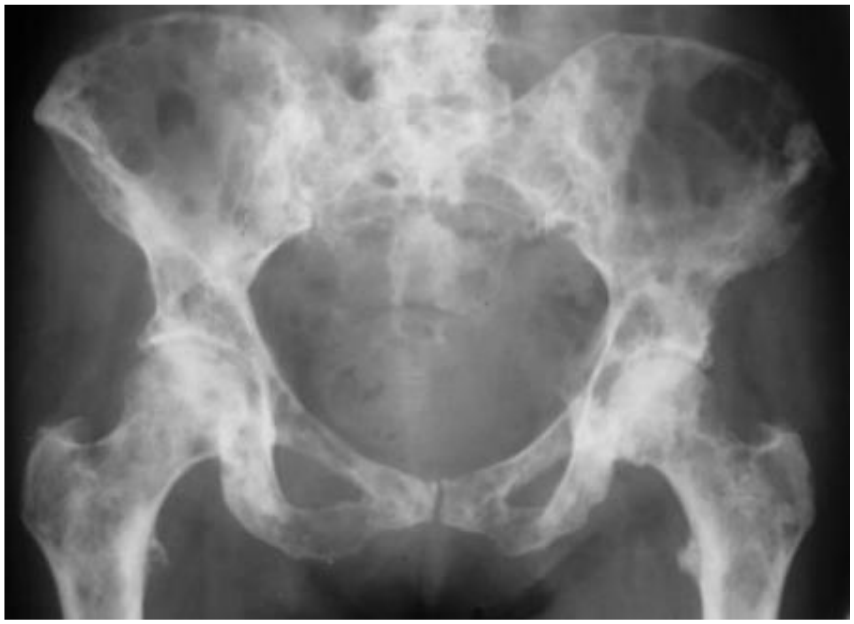
- Treatment is basically medical. Surgical treatment is implemented in the case of complications: fractures or impending fractures
- Multiple myeloma cases are usually referred to orthopaedics from oncologists after diagnosis.

## *Secondary tumours (metastasis)*

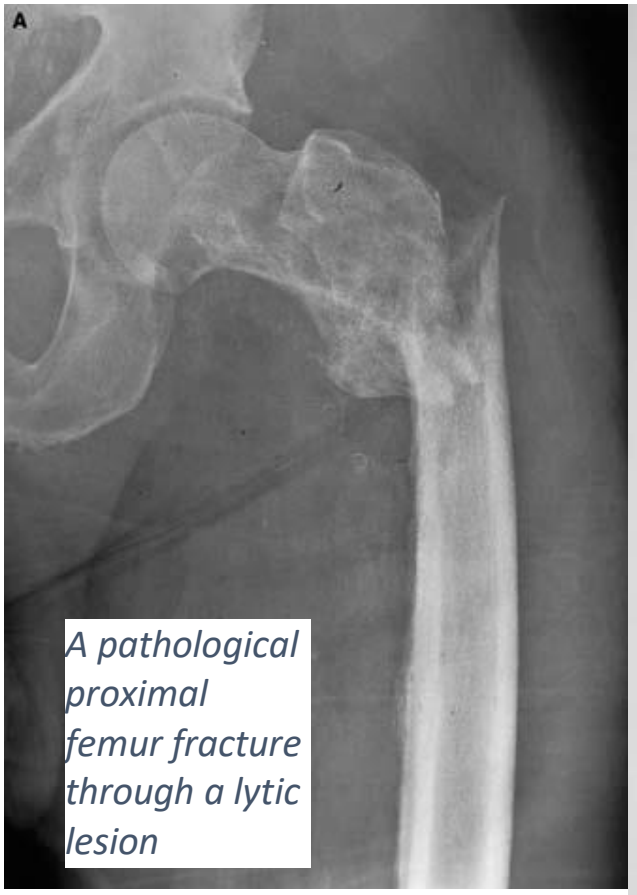
2° is more common than 1°, occurs mainly after the 5$^{th}$ decade of life. Usually in the AXIAL SKELETON.

Most common sites from which tumours metastasise to the bone:

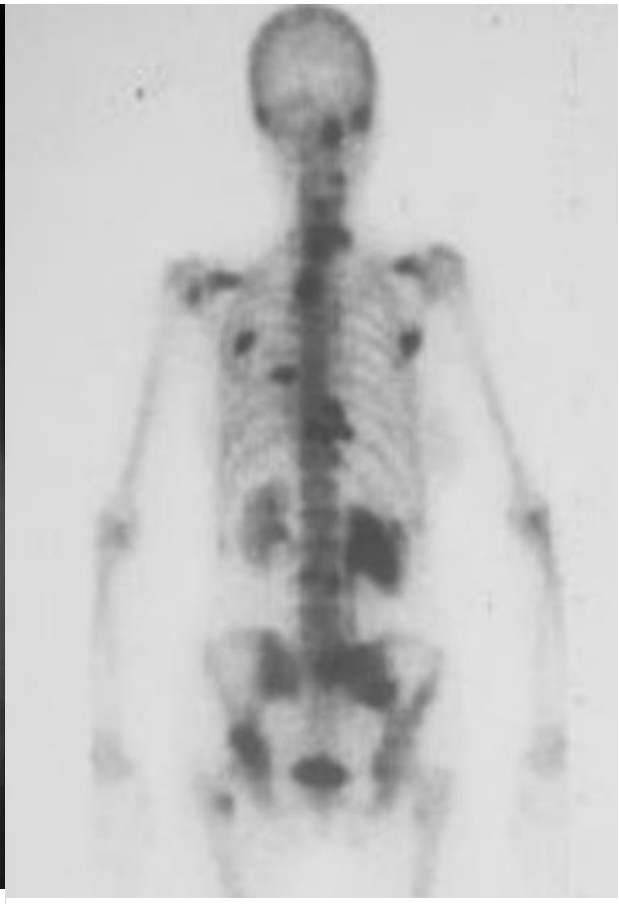
| Site | Characteristic(s) of lesions | Prognosis |
|---|---|---|
| **Lungs** | **Lytic lesions, distal to the knee or elbow** | **Poor** |
| **Kidney** | **Lytic & hypervascular lesions** | |
| **Prostate** | **Sclerotic lesions** | **Good** |
| **Breast** | **Mixed (lytic and sclerotic) lesions** | **Relatively good** |
| **Thyroid** | | **Poor** |



***Multiple lytic lesions in the pelvis and both femurs***




***Here, the proper evaluation of the lesion is prioritized over the treatment of the fracture.***



**Bone scan: multiple hot lesions throughout the axial skeleton. Each lesion should be x-rayed and evaluated for risk of fracture especially in the proximal femur**