Bone Tumours.

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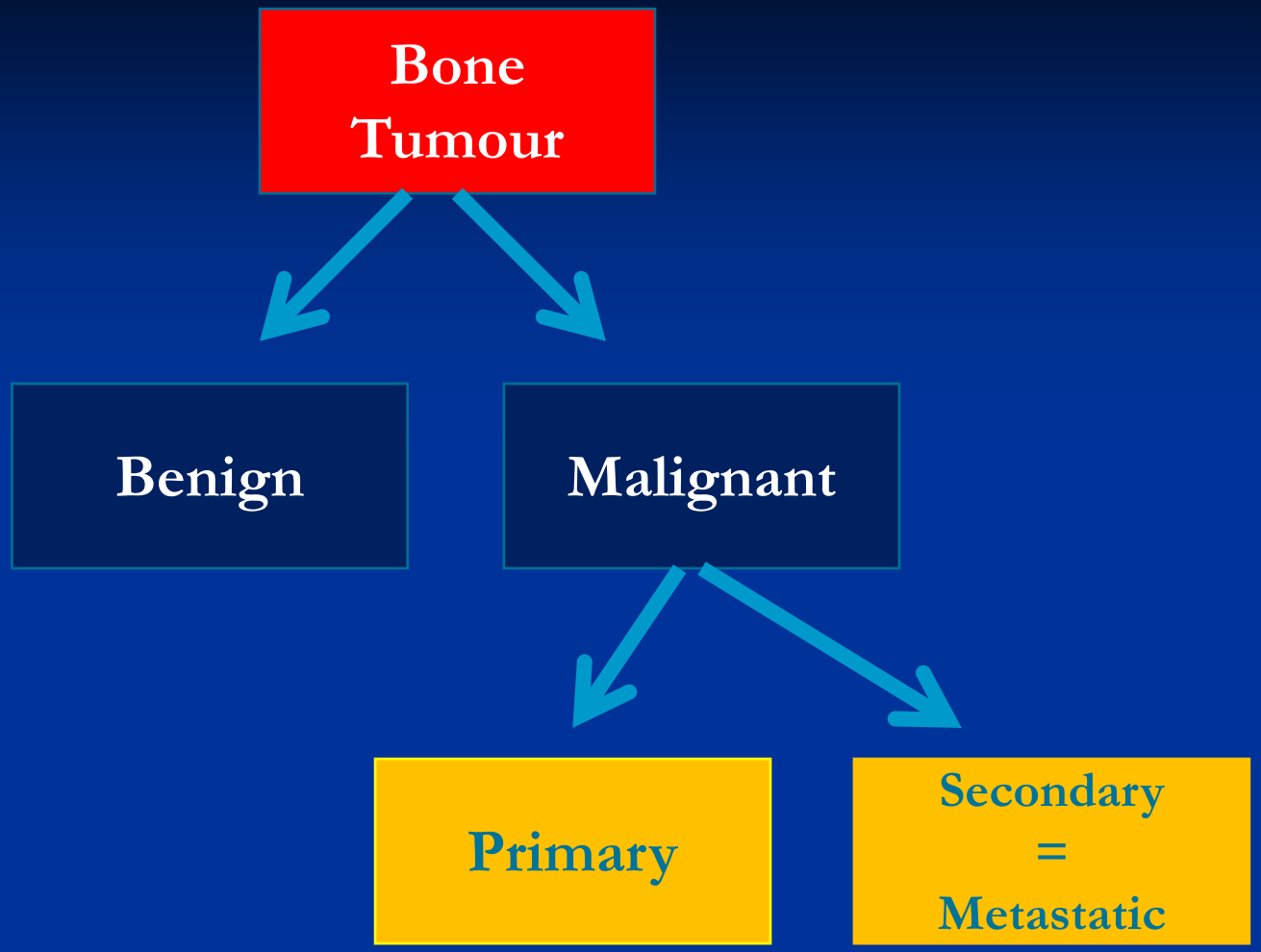
What is a sarcoma?

- Rare tumor.
- Effects bone and all soft tissues arising from mesodermal germ layer.


Bone Tumour
Benign
Malignant
Primary
Secondary = Metastatic

Bone tumors

- Bone tumors are classified into:
  - Primary bone tumors
  - Secondary bone tumors (Metastasis)
- Most are classified according to the ***normal cell of origin*** and apparent pattern of differentiation

Bone tumors

- Bone-forming tumors
- Cartilage-forming tumors
- Miscellaneous tumors
- Hematopoietic tumors
- Fibrous tumors

Primary Bone Tumors

Bone-Forming tumors

- Osteoma
- Osteoid osteoma and osteoblastoma
- Osteosarcoma

Cartilage-Forming tumors

- Chondroma (Enchondroma)
- Osteochondroma
- Chondrosarcoma

Miscellaneous tumors

- Ewing's sarcoma
- Giant cell tumor of bone

BONE TUMORS

BENIGN

- ✓ Osteochondroma
- ✓ Osteoma
- ✓ Osteoid Osteoma
- ✓ Osteoblastoma
- ✓ Chondroma
- ✓ Giant Cell Tumor

MALIGNANT

- ✓ Osteosarcoma
- ✓ Chondrosarcoma
- ✓ Ewing Sarcoma

Bone-Forming tumors;

	Tumor Type	Locations	Age	Morphology
BENIGN	Osteoma	Facial bones, skull	40-50	Exophytic growths attached to bone surface; histologically resemble normal bon
	Osteoid osteoma	Metaphysis of femur and tibia	10-20	Cortical tumors, characterized by pain; histologically interlacing trabeculae of woven bone
	Osteoblastoma	Vertebral column	10-20	vertebral processes; histologically similar to osteoid osteoma
MALIGNANT	Primary osteosarcoma	Metaphysis of distal femur, proximal tibia, and humerus	10-20	Grow outward, lifting periosteum, and inward to the medullary cavity; microscopically malignant cells form osteoid.
	Secondary osteosarcoma	Femur, humerus, pelvis	>40	Complications of polyostotic Paget disease; histologically similar to primary osteosarcoma

Cartilage-forming Tumors;

	Tumor Type	Locations	Age	Morphology
BENIGN	**Osteochondroma**	Metaphysis of long tubular bones	10-30	Bony excrescences with a cartilaginous cap; may be solitary or multiple and hereditary
	Chondroma	Small bones of hands and feet	30-50	Well-circumscribed single tumors resembling normal cartilage; arise with medullary cavity of bone; uncommonly multiple and hereditary
MALIGNANT	**Chondrosarcoma**	Bones of shoulder, pelvis, proximal femur, and ribs	40-60	Arise within medullary cavity and erode cortex; microscopically well differentiated cartilage-like or anaplastic

Malignant bone tumours.

Osteosarcoma 22%

Chondrosarcoma 10%

Lymphoma 8%

Ewing's 8%

Giant Cell Tumour

Clear Cell Sarcoma

Malignant Fibrous Histocytoma

Mesenchymal chondrosarcoma

Leiomyosarcoma

Angiosarcoma

Chordoma

Fibrosarcoma

Adamantinoma

Hemangiopericytoma

METASTATIC BONE TUMORS

- *Metastatic tumors are the most common malignant tumor of bone.*

- How Might Cancer Present to an Orthopaedic Surgeon?
- What are the salient features in history taking for orthopaedic malignancy?
- What treatment options are available for bone and soft tissue sarcoma?

Red Flag Signs.

Red Flags: Spine.

- Age - new back pain with patient over 50 years, or age under 20 years.
- Previous history of cancer (e.g. possible metastases)
- Systemic (constitutional) symptoms, e.g. fever, chills, unexplained weight loss.
- Pain that worsens when supine; severe night-time pain; thoracic pain.

Samanta J, Kendall J, Samanta A. 10-minute consultation: chronic low back pain. BMJ. 2003 Mar 8;326(7388):535.

Red Flags: Children.

- Joint swelling.
- Bone tenderness to palpation.
- Muscle Weakness.
- Fall in height or weight growth curve.

Red Flags: Limbs.

- History of cancer.
- Unexplained deformity.
- Functional or pain at rest.
- Mass or swelling.

Red Flags: Soft Tissue Lumps.

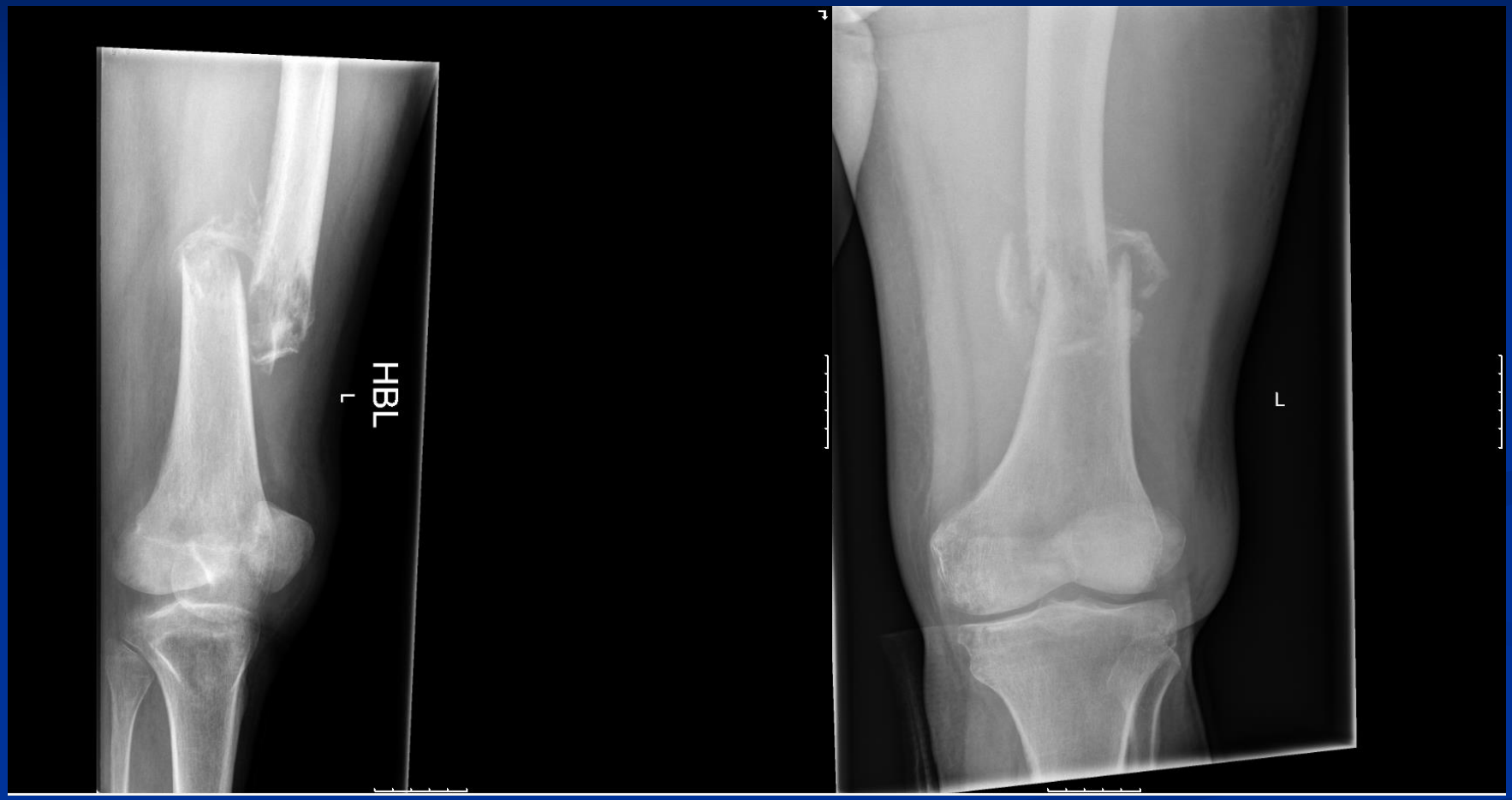
- >5cm.
- Deep to deep fascia.
- Painful.
- Enlarging.

Presentation.

- Mass 80%
- Discomfort/pain 40%
- Fracture 5-10%
- Metastases 4%
  - Lung symptoms 2%
  - Bone pain 2%
- Systemic symptoms 40%

Jaffe N, Spears R, Eftekhari F, Robertson R, Cangir A, Takaue Y, Carrasco H, Wallace S, Ayala A, Raymond K, et al. Pathologic fracture in osteosarcoma. Impact of chemotherapy on primary tumor and survival. Cancer. 1987; 59: 701-09.

Pathological fracture.



Bone lesion above 40 years

- Remmember!!!!!!!

1. Metastasis
2. Myeloma
3. Infection

Bone Tumours.

Radiological Investigations:

- X-ray - whole bone.
- Bone scan.
- CT.
- MRI.

Bone Tumours

- Investigations
  - Local staging.

  (Cross sectional imaging of the whole limb, Skip mets)
  - Systemic staging.

  (CT scan chest, abdomen, pelvis. Isotope bone scan)
  - Bloods – PSA, LDH.
  - Urine – BJP, Immunoelectrophoresis.

Bone Tumours

- Biopsy:
  - Open
  - Percutaneous

Role of the orthopaedic surgeon in metastatic bone disease.

- Diagnosis – biopsy.
- Relieve pain.
- Restore function.
- Prophylactic fixation - risk of fracture.
- Stabilisation or reconstruction after pathological fracture.
- Spinal decompression and stabilisation.
- Fixation must last the lifetime of the patient!!!!!

Management.

- Imaging (Local & systemic staging).
- Biopsy.
- Neoadjuvant Therapy - Chemotherapy.
- Re stage.
- Surgery - Aim for limb salvage surgery.
- Adjuvant Therapy - Chemotherapy and/or Radiotherapy.

Margins?

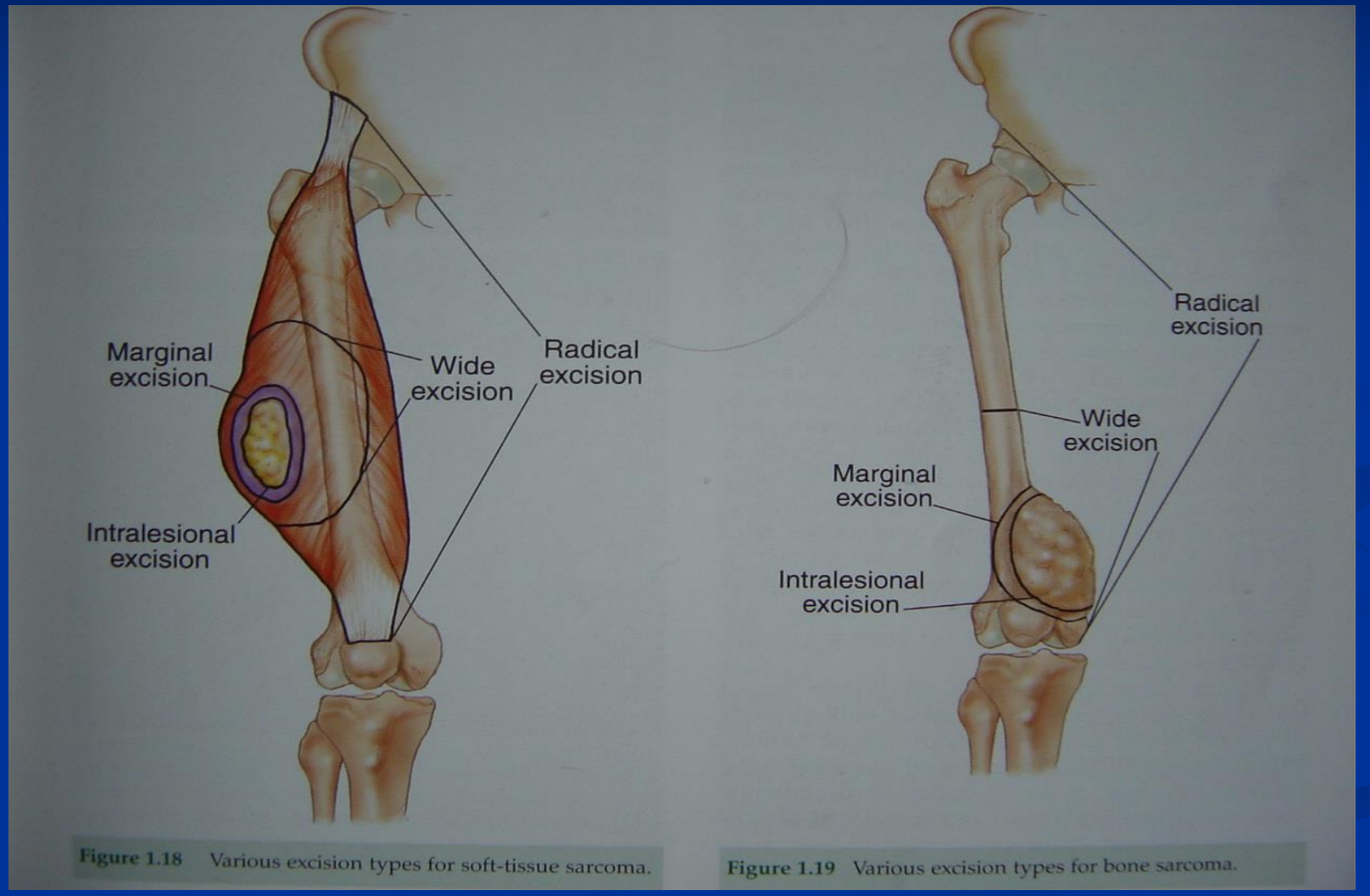


Figure 1.18 Various excision types for soft-tissue sarcoma.

Figure 1.19 Various excision types for bone sarcoma.

Safe margin?

- An intact fascial layer
- 5 cm of muscle longitudinally
- 1cm of muscle radially

RECOMMENDATIONS . . .

- Sarcomas should be treated with aim of obtaining clear margins.
- Experienced surgeons are more successful at achieving this.
- All patients with sarcomas should be treated at specialist centres (N.I.C.E Guidelines).


HORIZONTAL BEAM


Se:5
Im:10
[H]
R.SADIE
Study Date:28/08/14
Study Time:16:41:35
MRN:
[RP]
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[F]
C606
W1213


Se:2
Im:20
[H]
R.SADIE
Study Date:28/08/14
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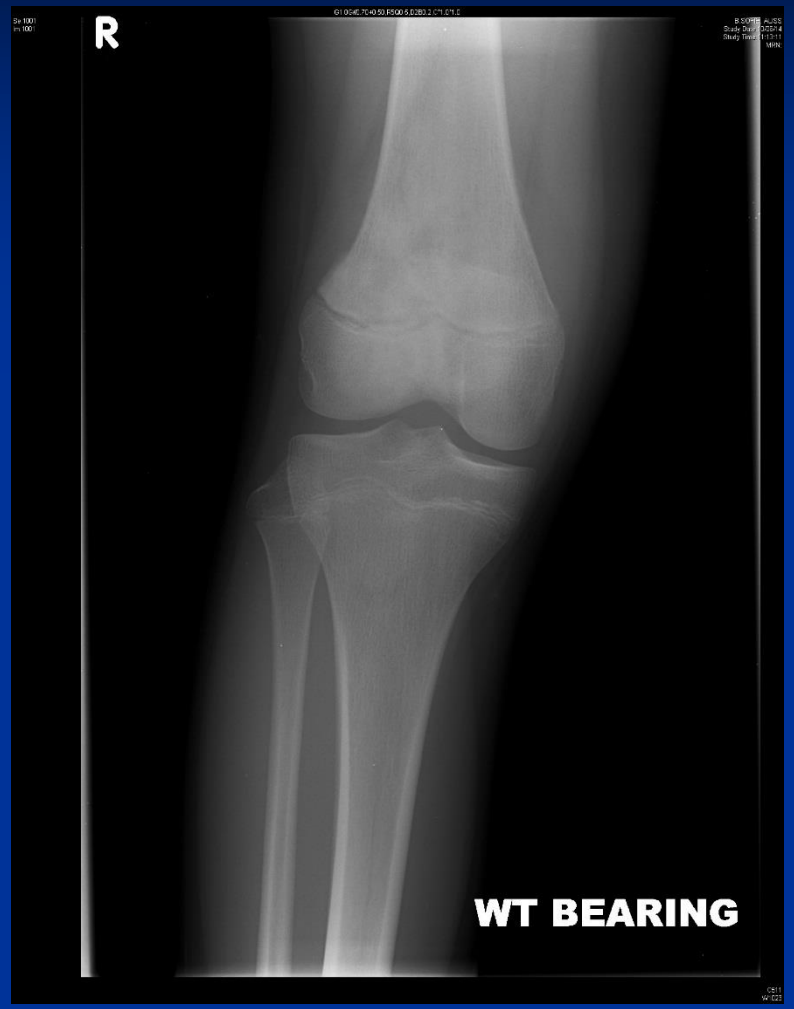
R
WT BEARING


R
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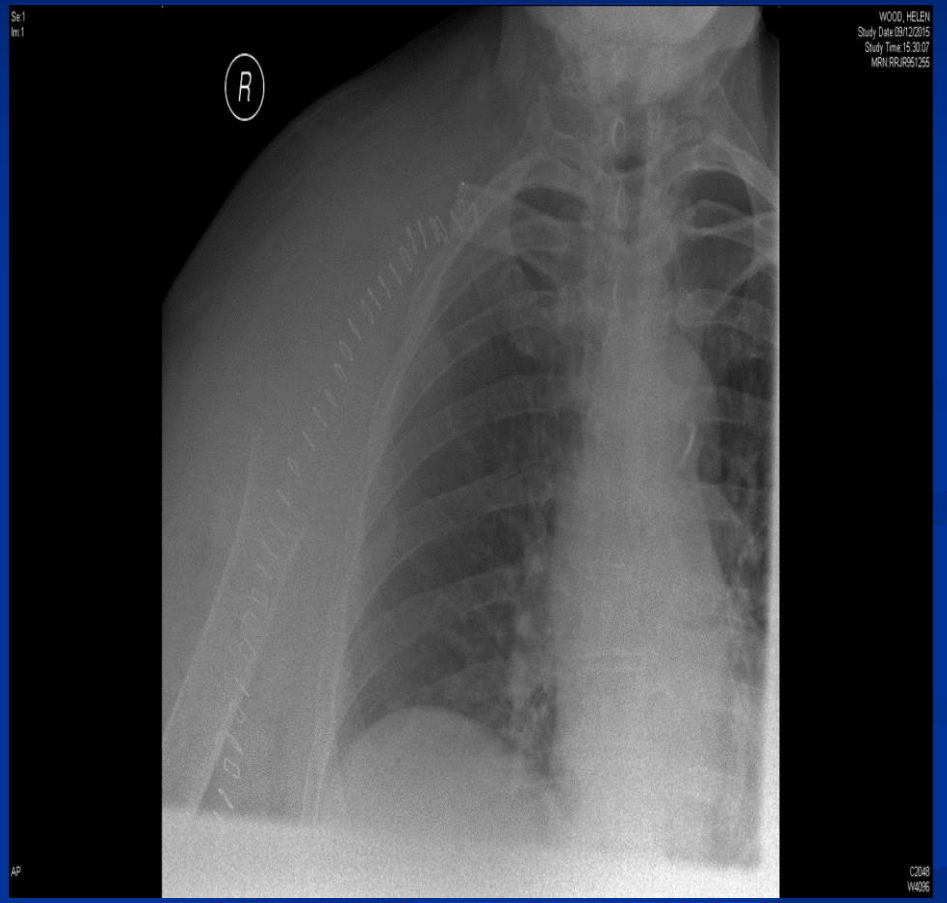
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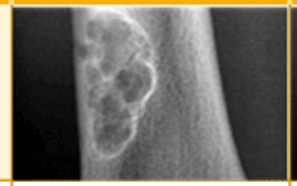
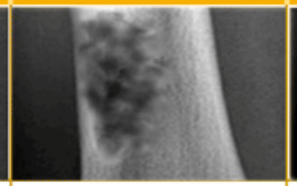
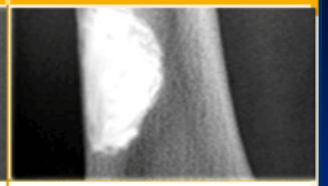
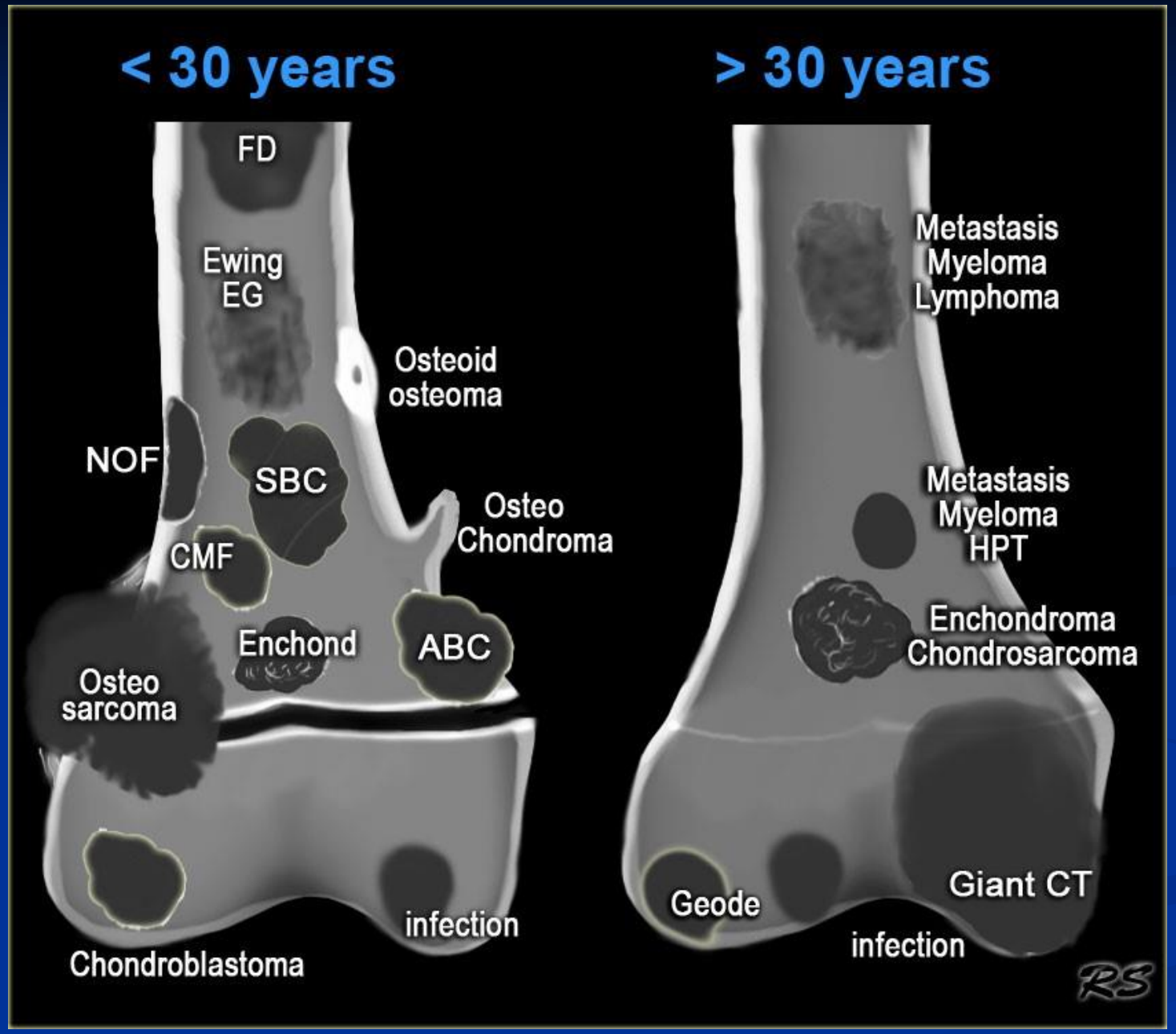
Im:1
WOOD, HELEN
Study Date:09/12/2015
Study Time:15:30:07
MRN:RR9951255
R
AP
C2048
W4096

Summary.

- History >>>> Red flags.
- Plain radiograph.
- Local and systemic staging.
- Biopsy.
- Never assume!!! Phone a friend.
- Aim for cure in primary disease and pain relief and function in metastasis.
- Metastasis , Myeloma and infection!!!!!

Age	Well-defined	ill-defined	Sclerotic
			
0-10	EG SBC	EG -Ewing Osteosarcoma Leukemia	Osteosarcoma
10-20	NOF Osteoblastoma Fibrous dysplasia EG SBC ABC Chondroblasoma CMF	Ewing Eosinphilic Gran Osteosarcoma	Osteosarcoma Fibrous dysplasia Eosinphilic Gran Osteoid osteoma Osteoblastoma
20-40	Giant CT Enchondroma Chondrosarcoma (low grade) HPT - Brown tumor Osteoblastoma	Giant CT	Enchondroma Osteoma Bone island Parosteal Osteosarc Healed lesions: • NOF, EG • SBC, ABC • Chondroblastoma
40	Metastases Myeloma Geode	Metastases Myeloma Chondrosarcoma (high grade)	Metastases Bone island
All ages	Infection	Infection	Infection


< 30 years
> 30 years
FD
Ewing
EG
Osteoid
osteoma
NOF
SBC
Osteo
Chondroma
CMF
Enchond
ABC
Osteo
sarcoma
infection
Chondroblastoma
Metastasis
Myeloma
Lymphoma
Metastasis
Myeloma
HPT
Enchondroma
Chondrosarcoma
Geode
Giant CT
infection
RS

Thank you