

# Evaluation of Bone Lesions

*Bruce Rougraff, M.D.*

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# **Infants**

**Hemangioma**

**Osteomyelitis**

**Infantile Fibrosarcoma**

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# **Open Growth Plates**

## **Epiphyseal**

**Chondroblastoma**

**Osteomyelitis/EG**

## **Metaphyseal**

**Non-Ossifying Fibroma**

**Osteochondroma**

**Aneurysmal Bone cyst**

**Unicameral Cyst**

**Osteosarcoma/Ewing's**

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**Young adult**

**Osteosarcoma**

**Giant Cell tumor**

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**Over 40 years of age**

**Metastatic carcinoma**

**Multiple Myeloma**

**Chondrosarcoma**

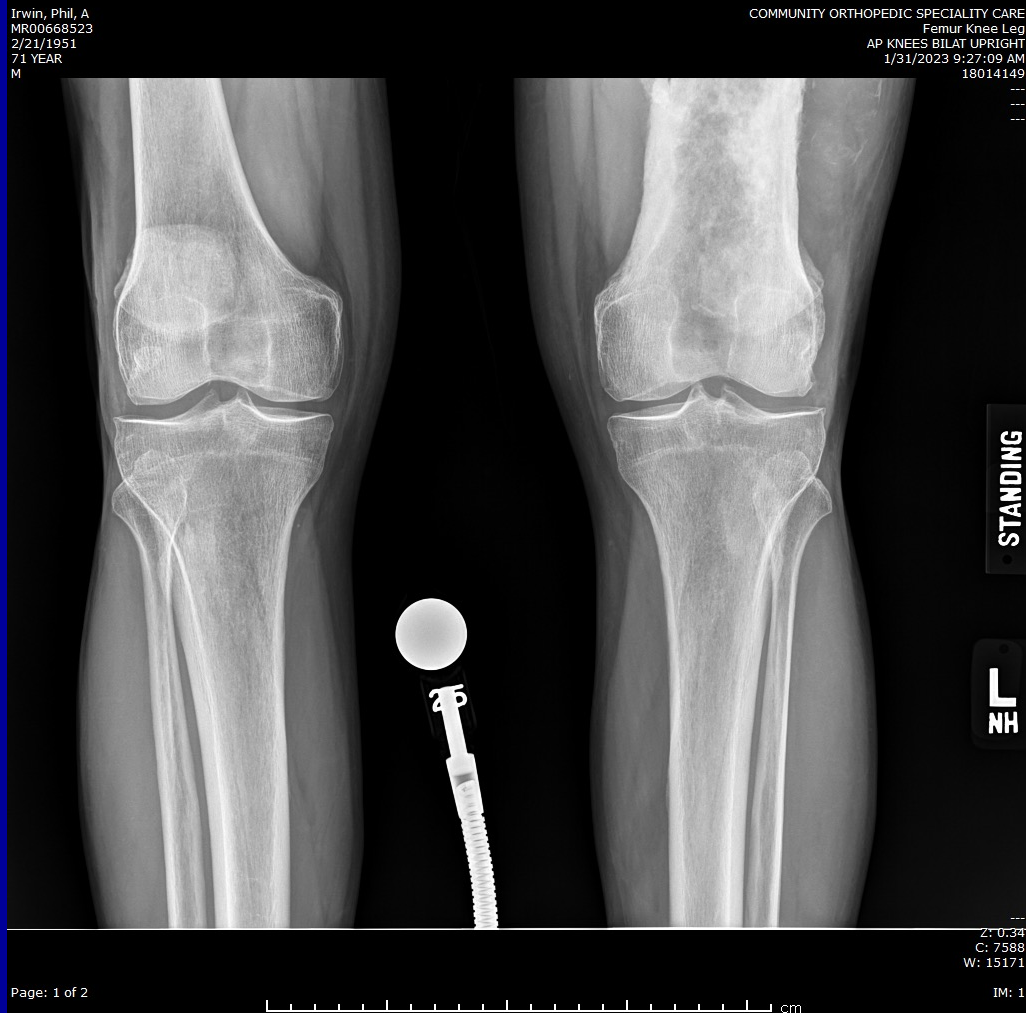
# Looking at the W-ray: What's Bad?

- **Cortical erosion**
- **Periosteal reaction**
- **Pathologic Fracture**
- **Mineralization in the bone**
- **Mineralization of soft tissue/  
extension of tumor**

# Looking at the W-ray: What's Good?

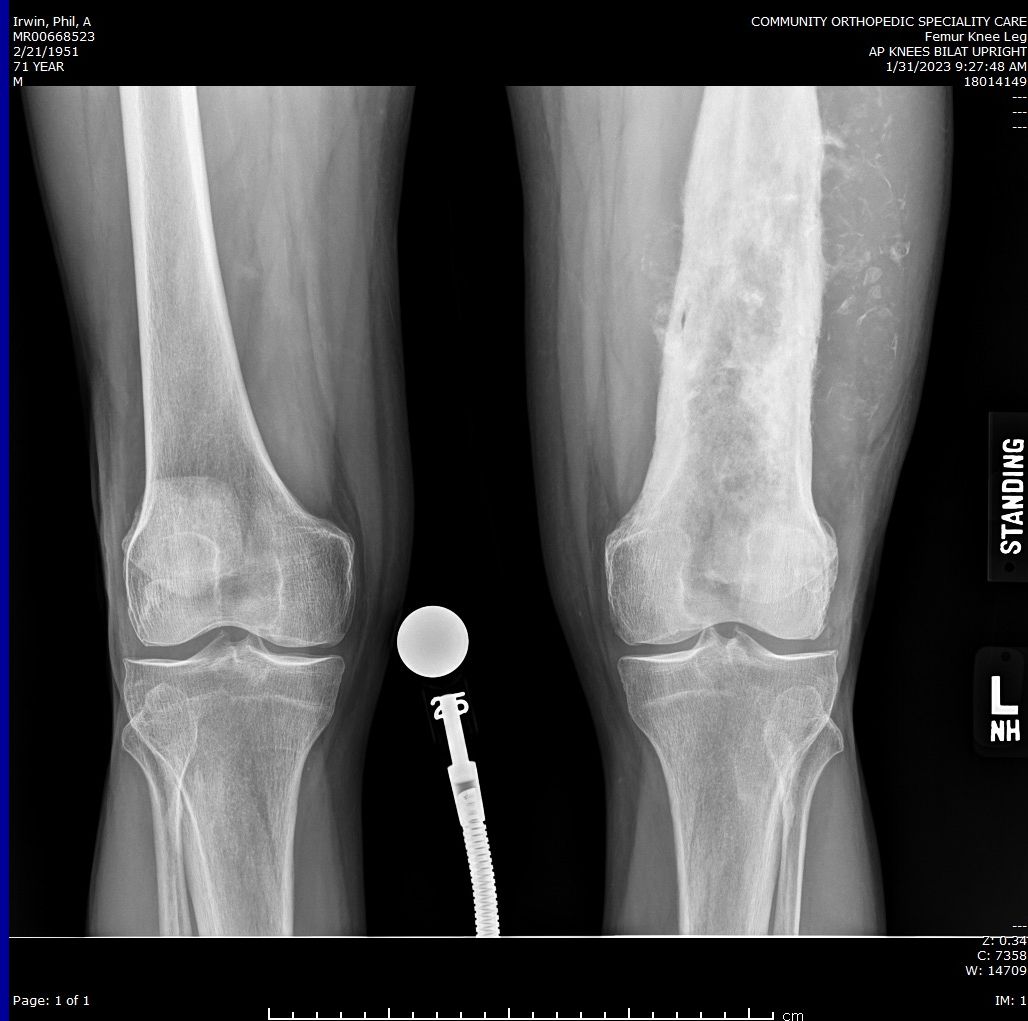
- **Well defined borders**
- **No cortical changes**
- **Normal Marrow directly next to lesion on MRI**

# 71 YOWM, left knee pain





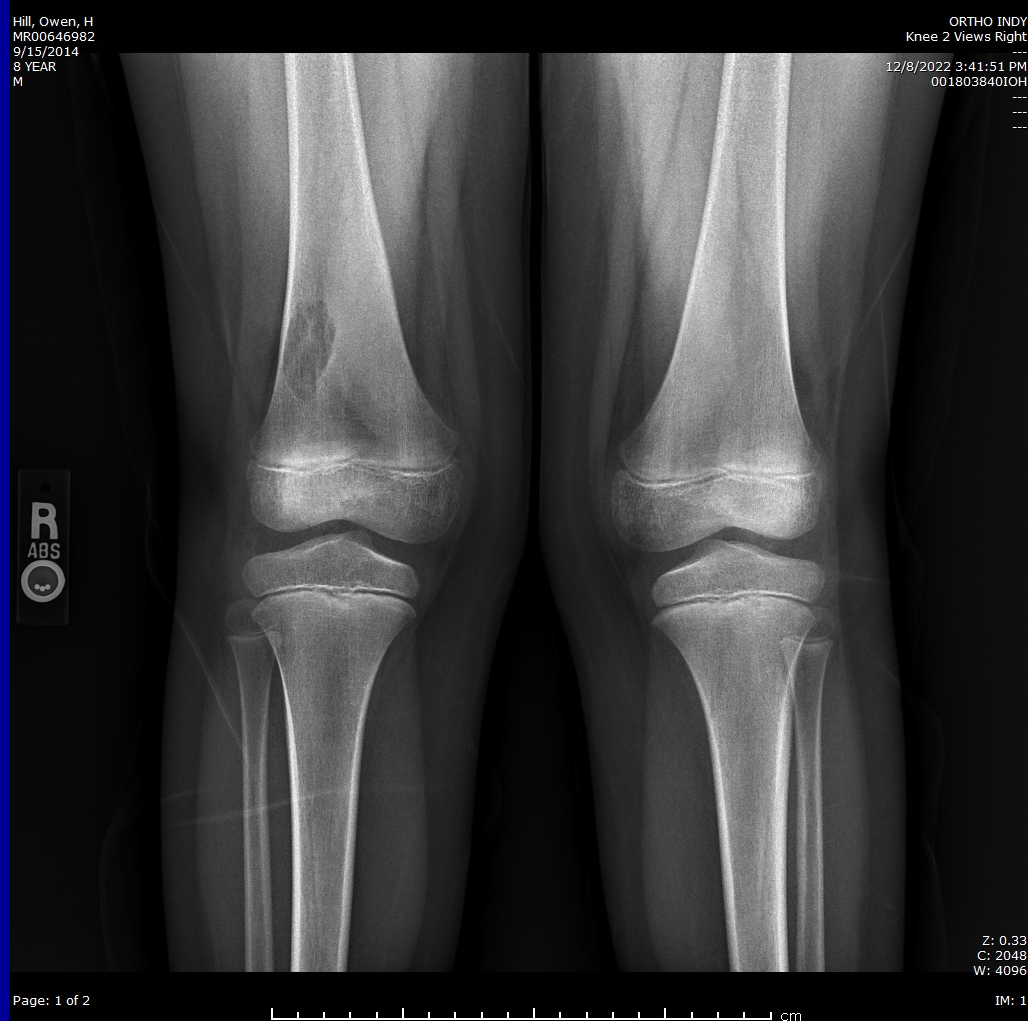
# Left knee pain: Look at entire x-ray!



# Periosteal and Cortical changes



# 8 YOWM, Well defined borders of lesion

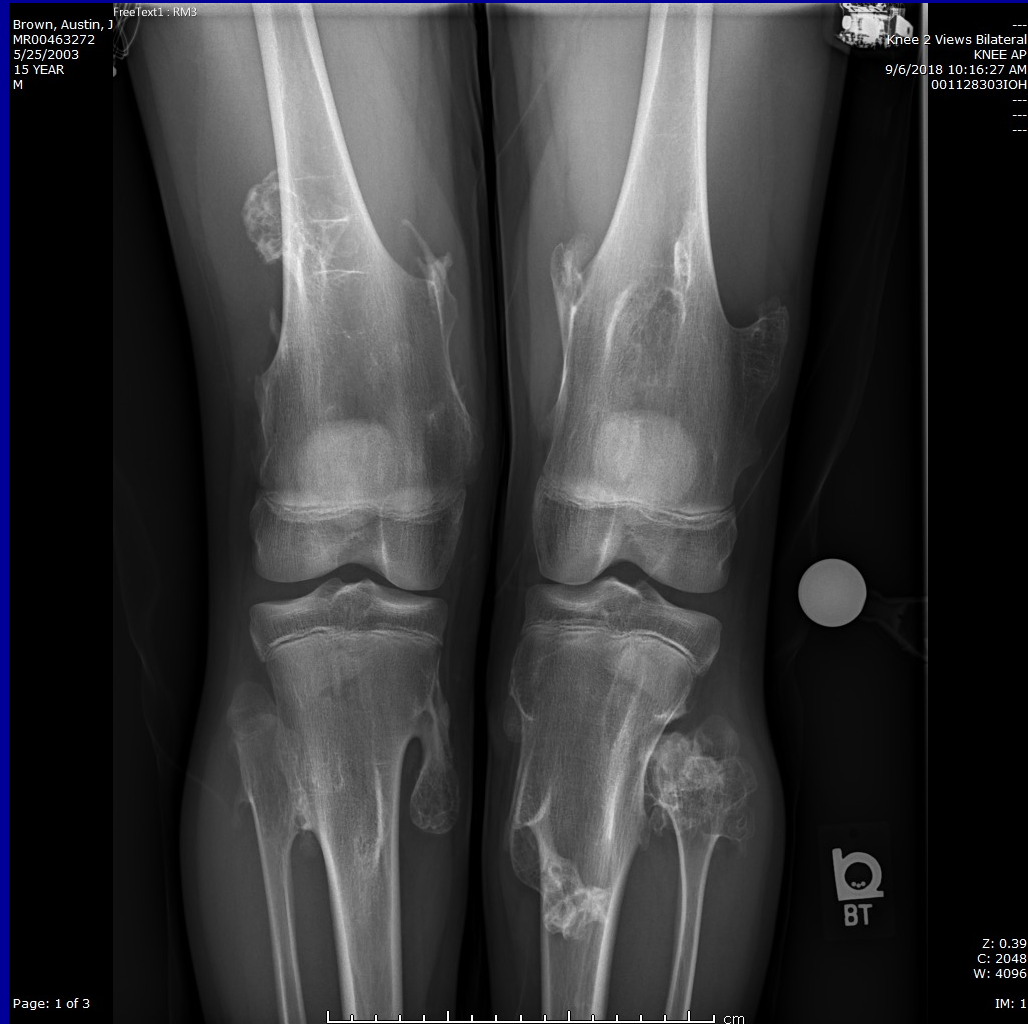


# 17 YOWM, osteochondroma Cortex flows into the lesion

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# 12 YOWM, Multiple exostoses



# 75 YOWM, enchondroma



# 9 YOWF, right shoulder pain

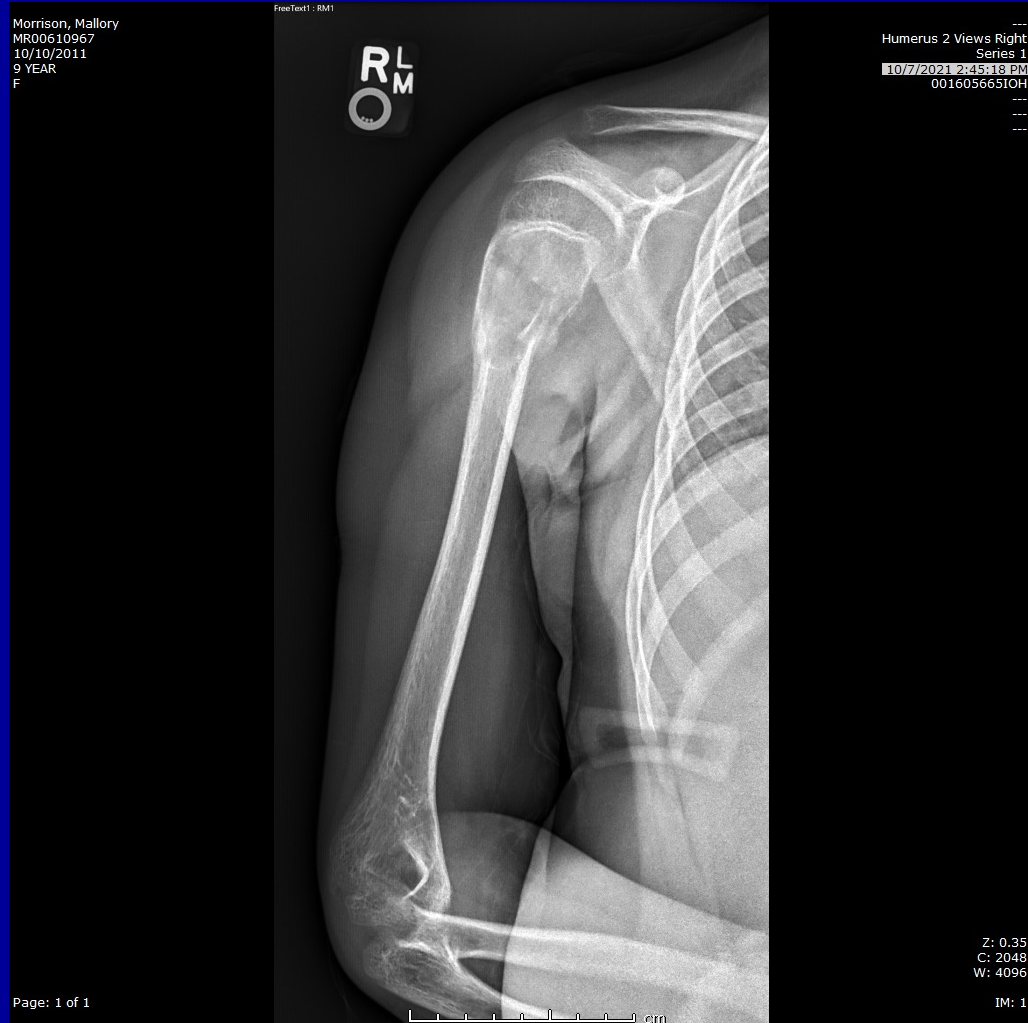
Morrison, Mallory  
MR00610967  
10/10/2011  
9 YEAR  
F

Cameron Memorial Community Hospital  
XRAY HUMERUS MINIMUM 2 VIEWS RIGHT  
Humerus  
9/6/2021 11:32:36 AM  
110010522

R



# 9 YOWF, right humeral UBC





# 7 YOWM, Cortical destruction

## Aneurysmal bone cyst

Wiseman, Lane, T  
MR00497125  
11/28/2011  
6 YEAR  
M



St Vincent Health 2ORTH011  
LEG LOWER TIB-FIB 2 VIE  
7/18/2018 3:14:28

Wiseman, Lane, T  
MR00497125  
11/28/2011  
6 YEAR  
M

A

St Vincent Health 2ORTH011  
MRI LOWER EXTREMIT  
RT s

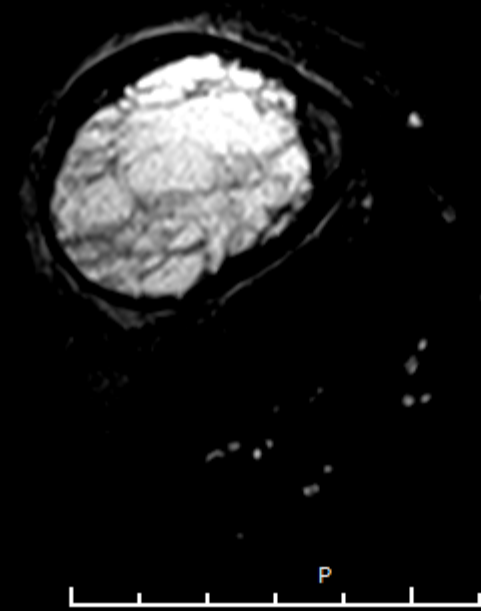
7/25/2018 3:2

LOC  
THK: 3 S

R

---  
NEX:1  
EC: 1  
SE\IR  
FA: 150  
TR: 4980  
TE: 30  
AQM: 256\213

Z: 0  
C: 2i  
W: 4i  
Page: 22 of 40



DFOV:1

IM: 2

# 20 YOWF, right knee pain Poorly marginated (GCT)



Ferguson, Halle, Rae  
MR00266069  
1/27/2001  
20 YEAR  
F  
ORTH  
Knee :  
9/15/202  
00

L



R  
K  
D



# 71 YOWM with left arm pain:

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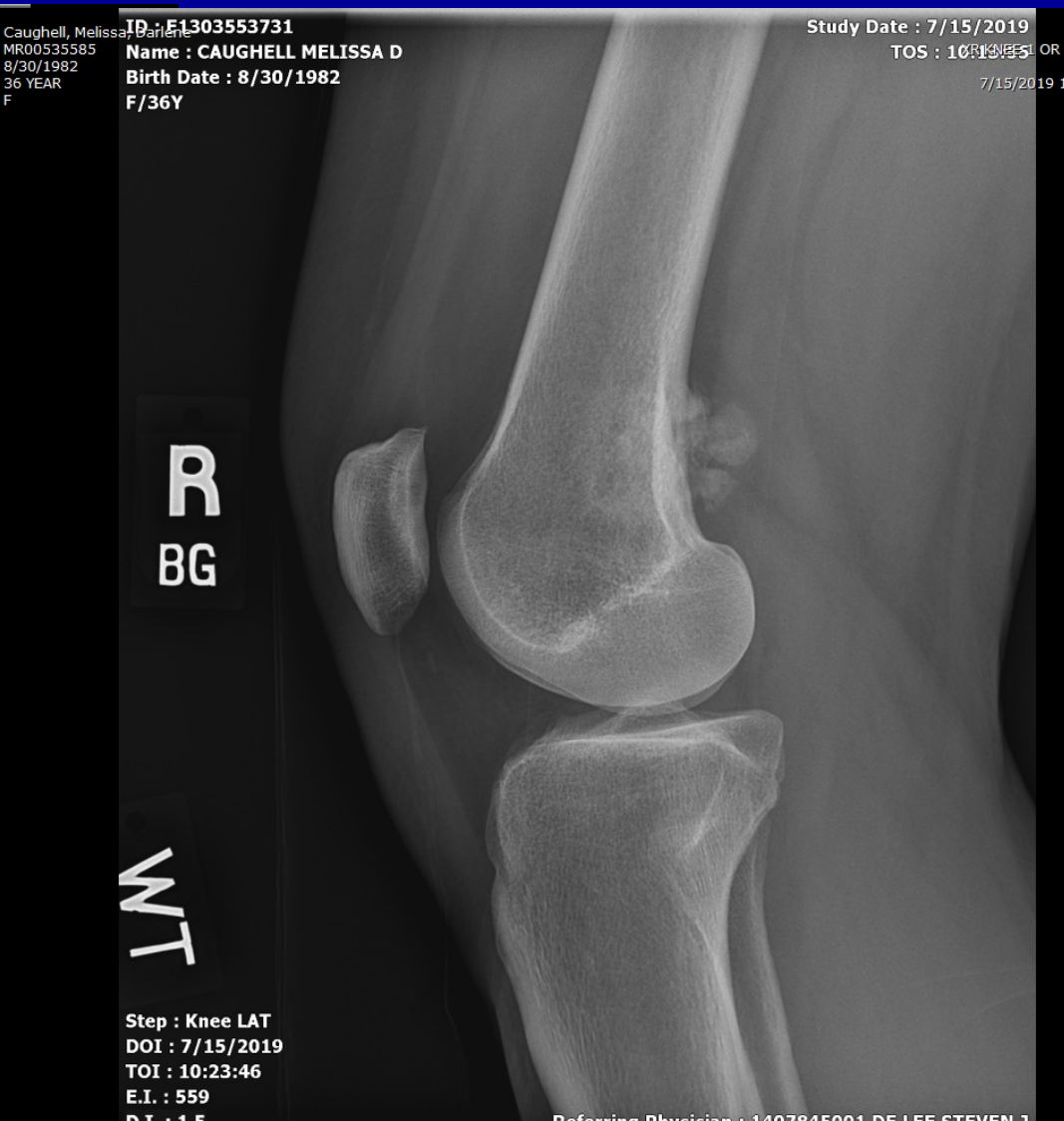
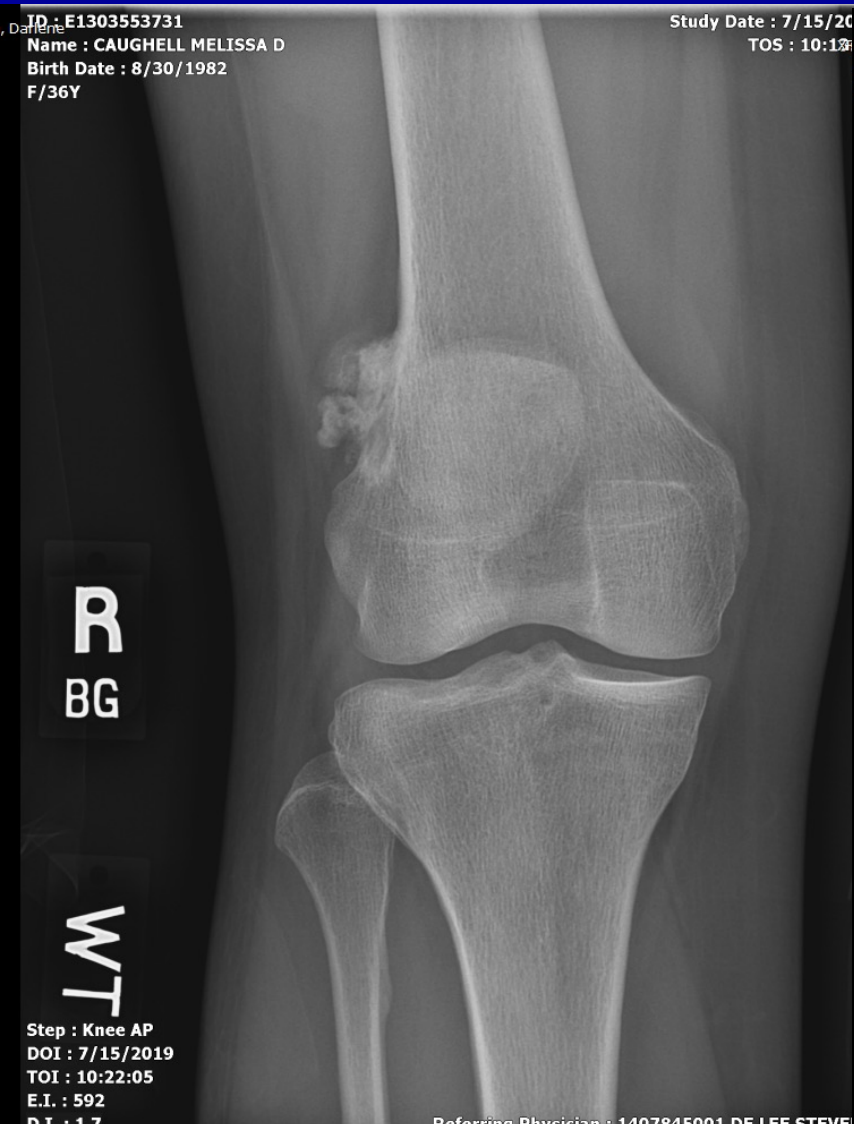
## Cortical destruction= BAD

Bane, Donald  
MR00499503  
8/3/1947  
71 YEAR  
M



INDY ORTHO  
Humerus 2 Views Left  
---  
8/13/2018 1:42:29 PM  
001117530IOH  
---  
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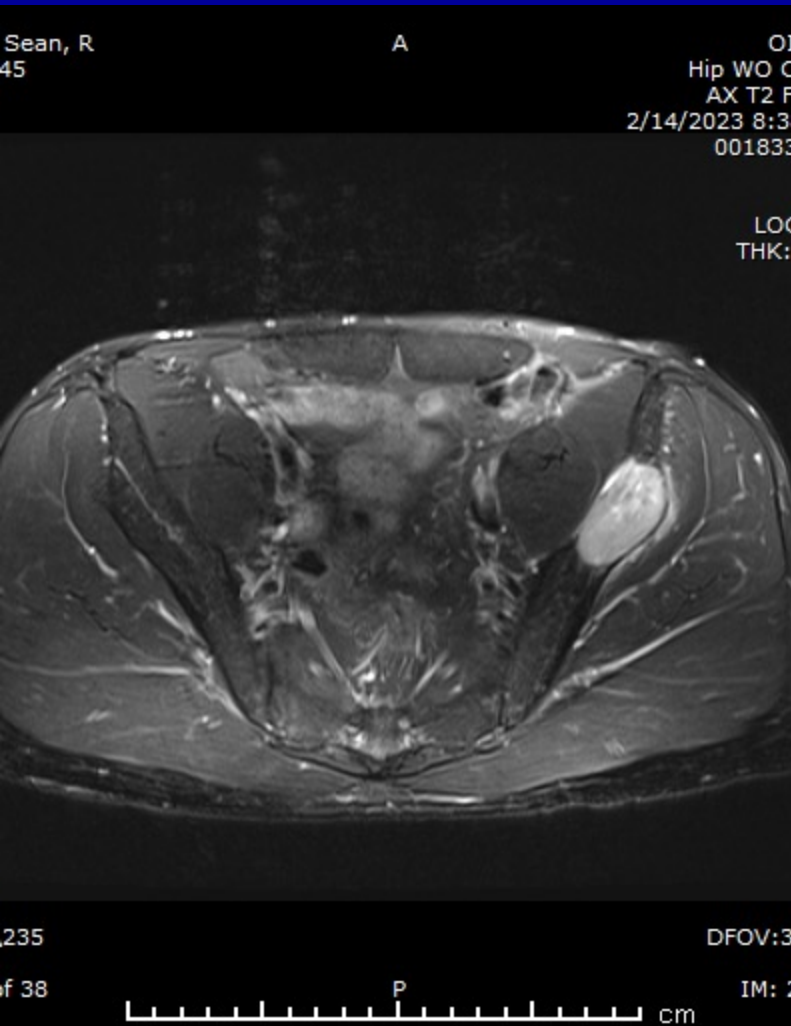
# 36 YOWF, knee pain Soft tissue ossification Osteosarcoma



# 40 YOWM, Left hip and back pain: Poorly marginated bone lesion



# 40 YOWM, Left pelvis Myeloma



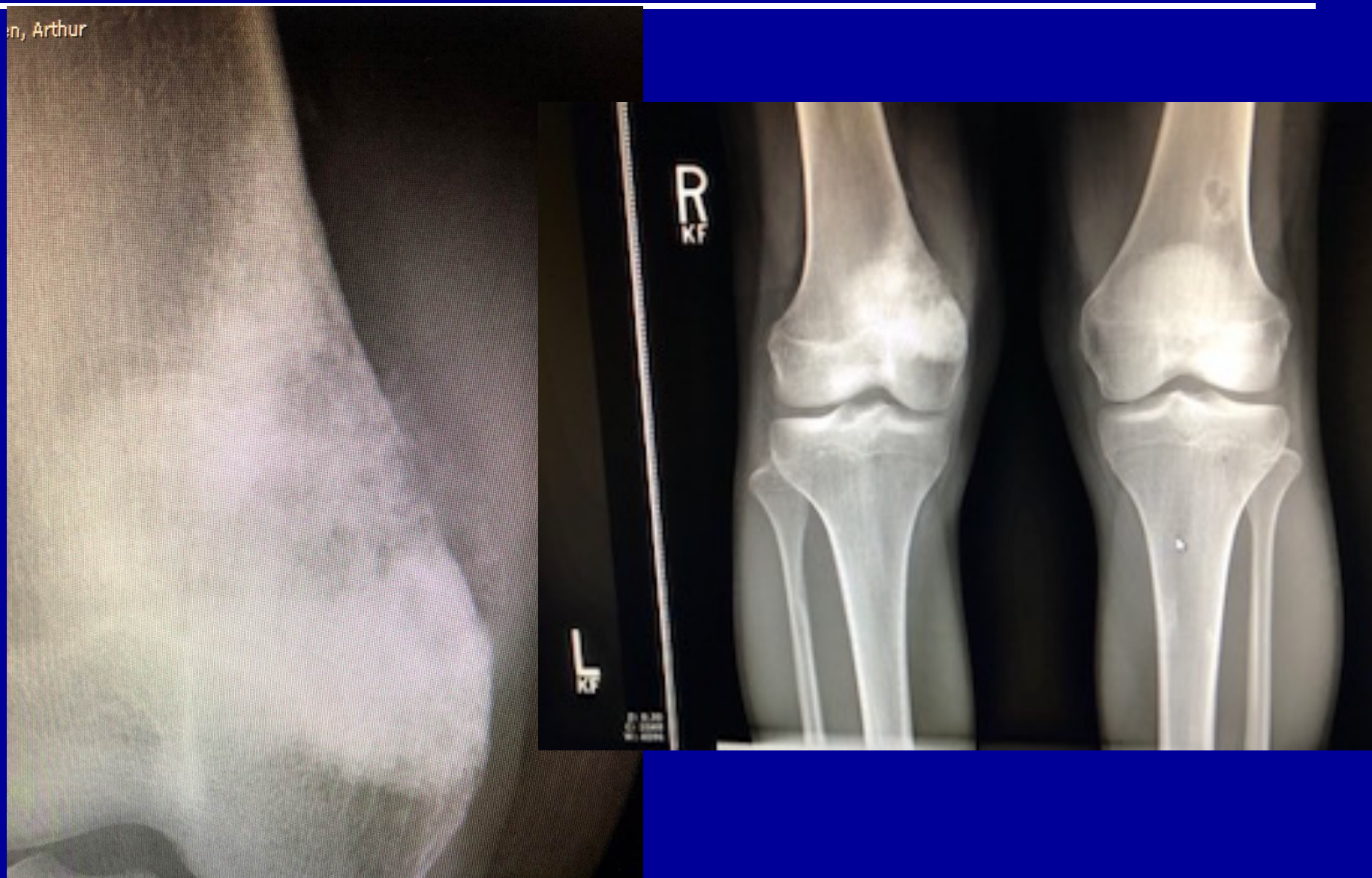
OI  
Hip WO C Middleton, Sean, R  
AX T2 F MR00310145  
2/14/2023 8:31 7/23/1982  
001833 40 YEAR  
M

LOC  
THK:



# 19 YOM Distal Femur lesions

in, Arthur



# Poorly marginated, ossifying lesion

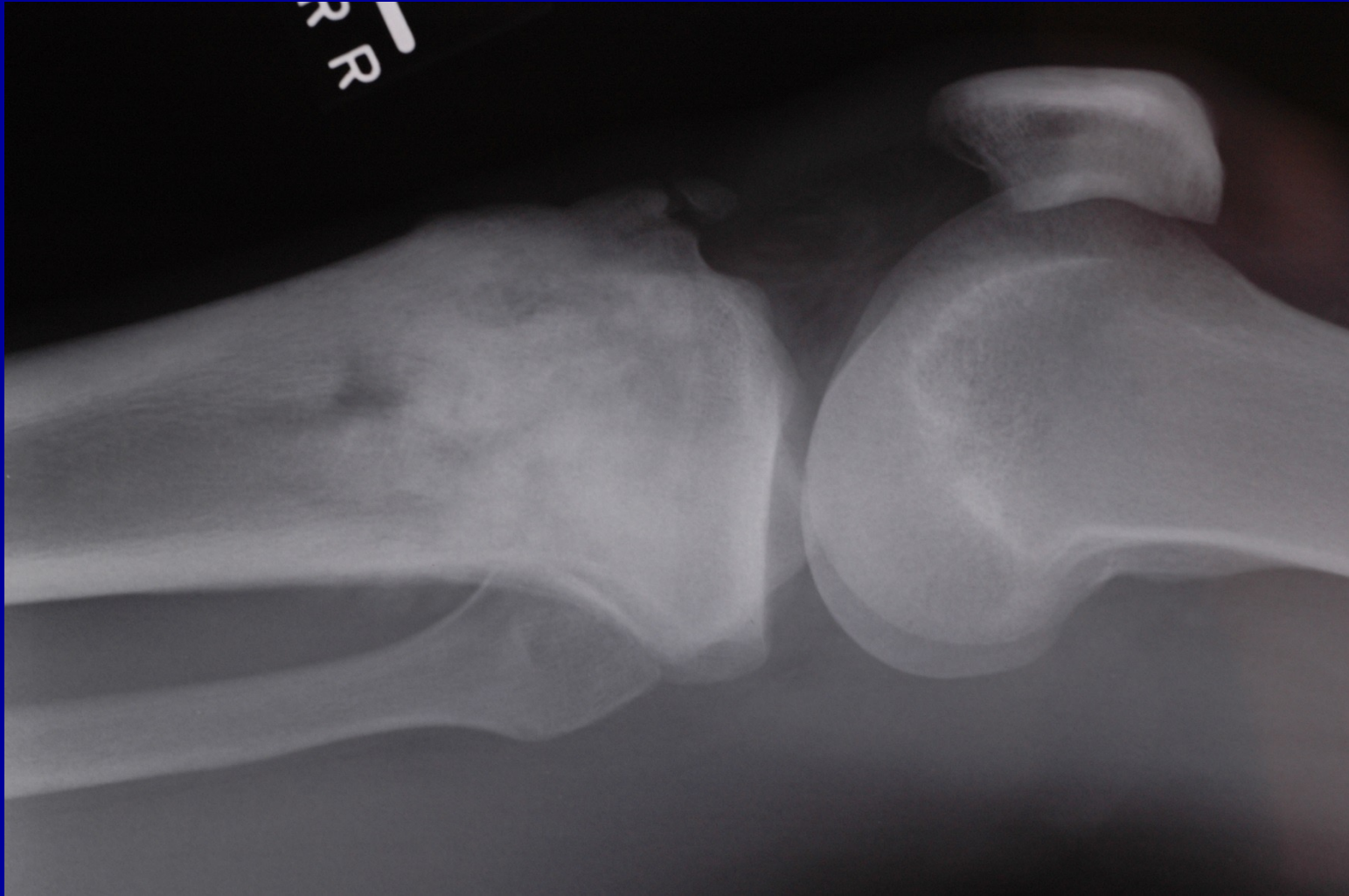
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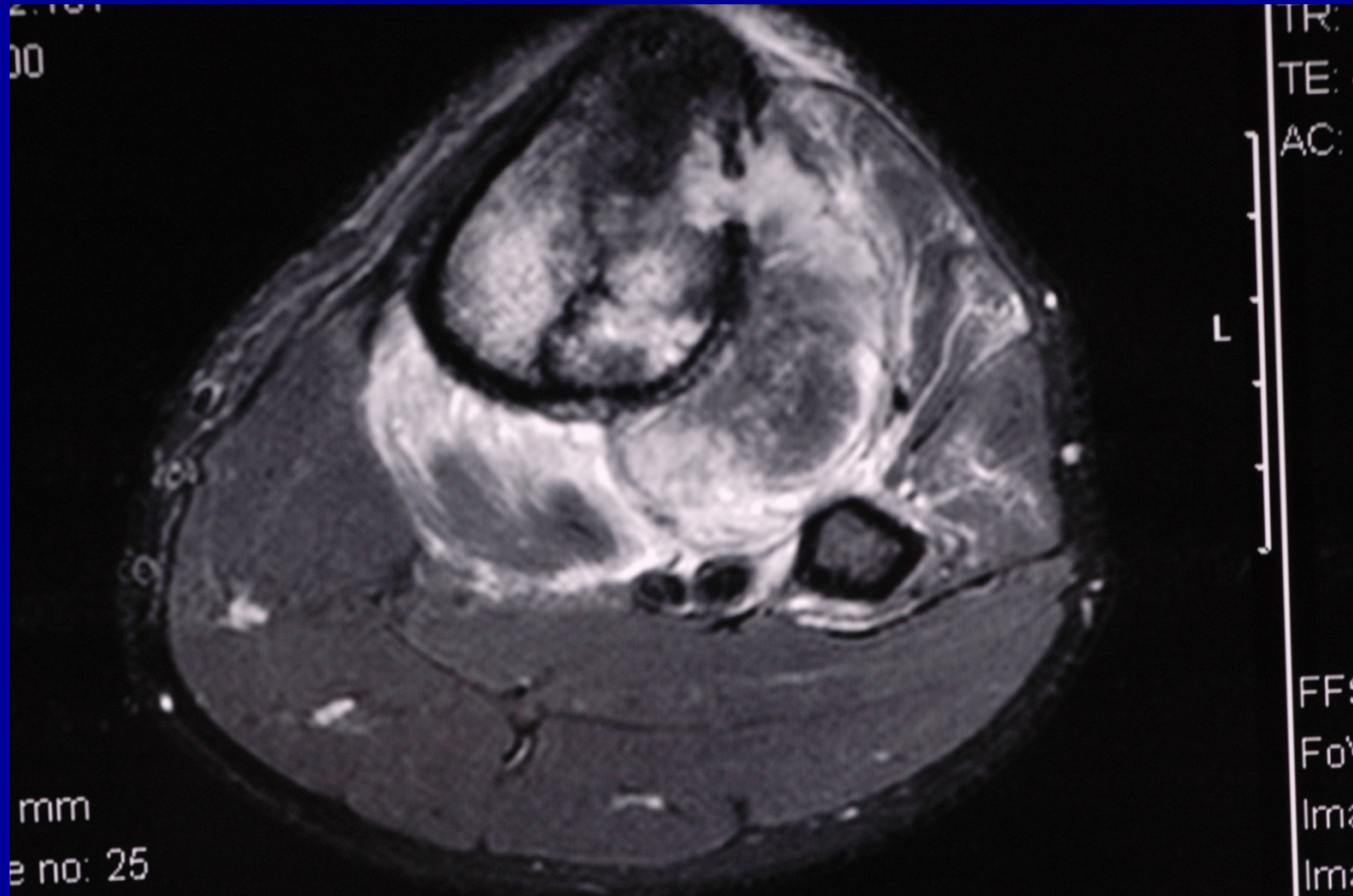
# Osteosarcoma

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# Osteosarcoma: Soft tissue extension

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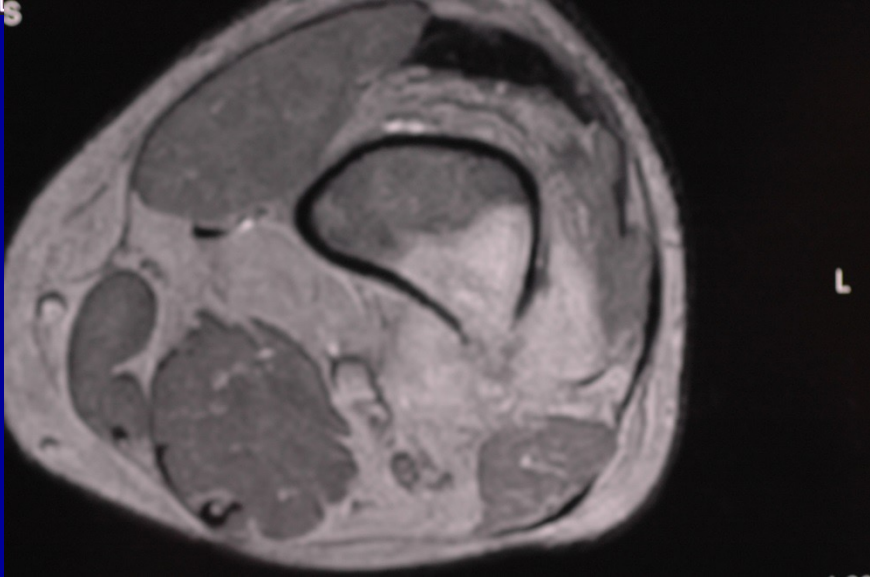
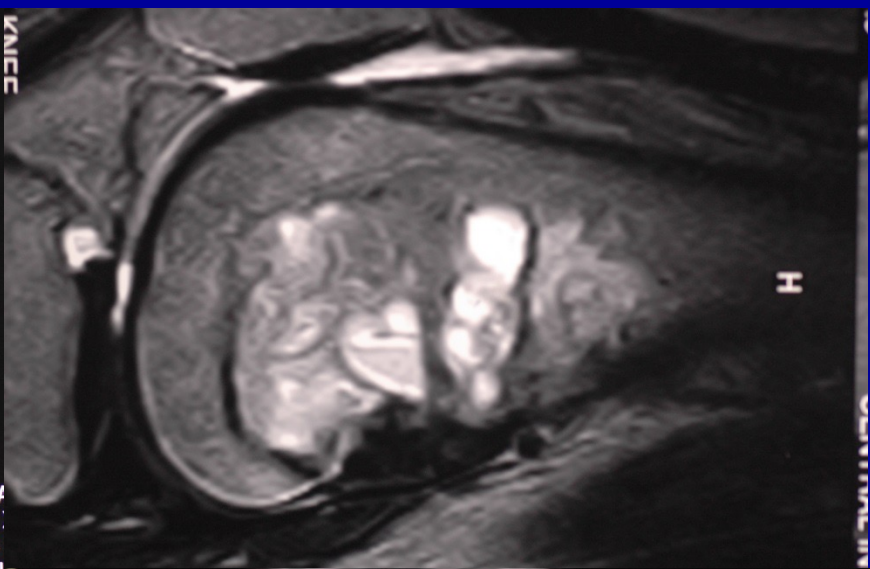
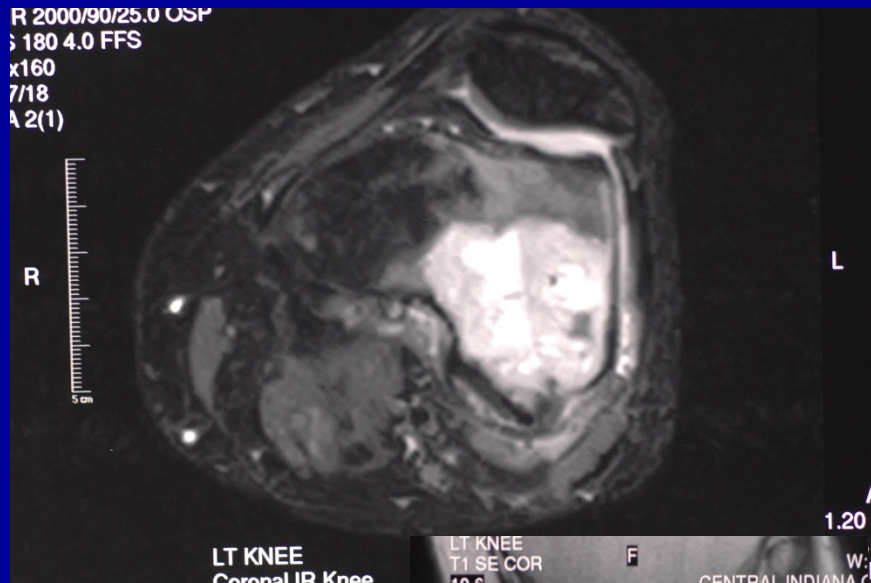
# Telangiectatic Osteosarcoma 22 YOWM

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# Telangiectatic Osteosarcoma MRI

R 2000/90/25.0 OSP  
180 4.0 FFS  
x160  
7/18  
A 2(1)

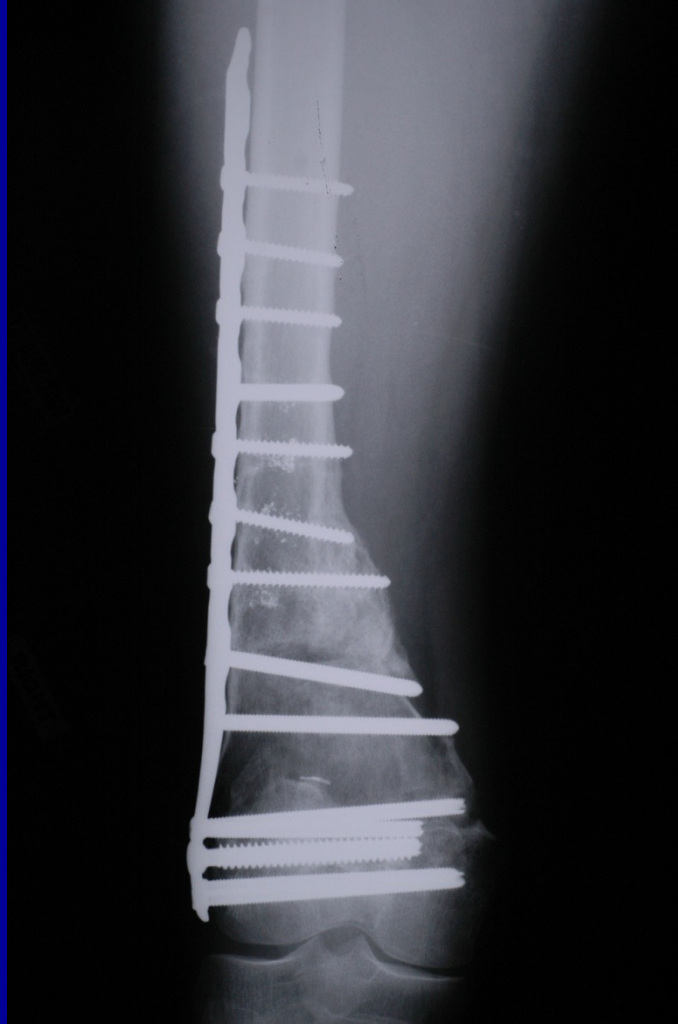


# 13 YOM with a mass Distal Femur

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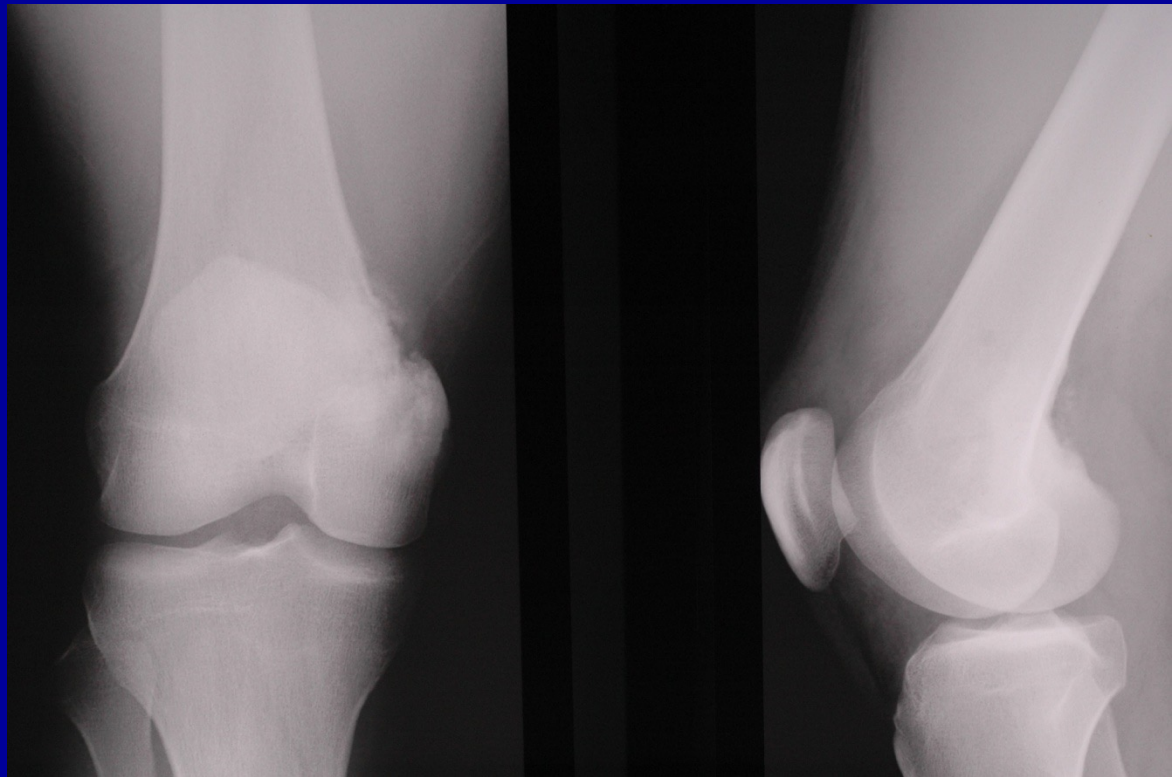
# Healed Allograft, no pain after bone graft



# Good prognosis for Osteosarcoma

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- Normal CCT
- <8 cm
- Resectible
  - site



- Chemotherapy response > 90%
- Distal site

# **Poor prognosis for Osteosarcoma**

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- **Positive CCT**
- **>8 cm**
- **Skip marrow lesions**
- **Chemotherapy response < 90%**
- **Pathologic fracture**



# **Cure rate for Osteosarcoma**

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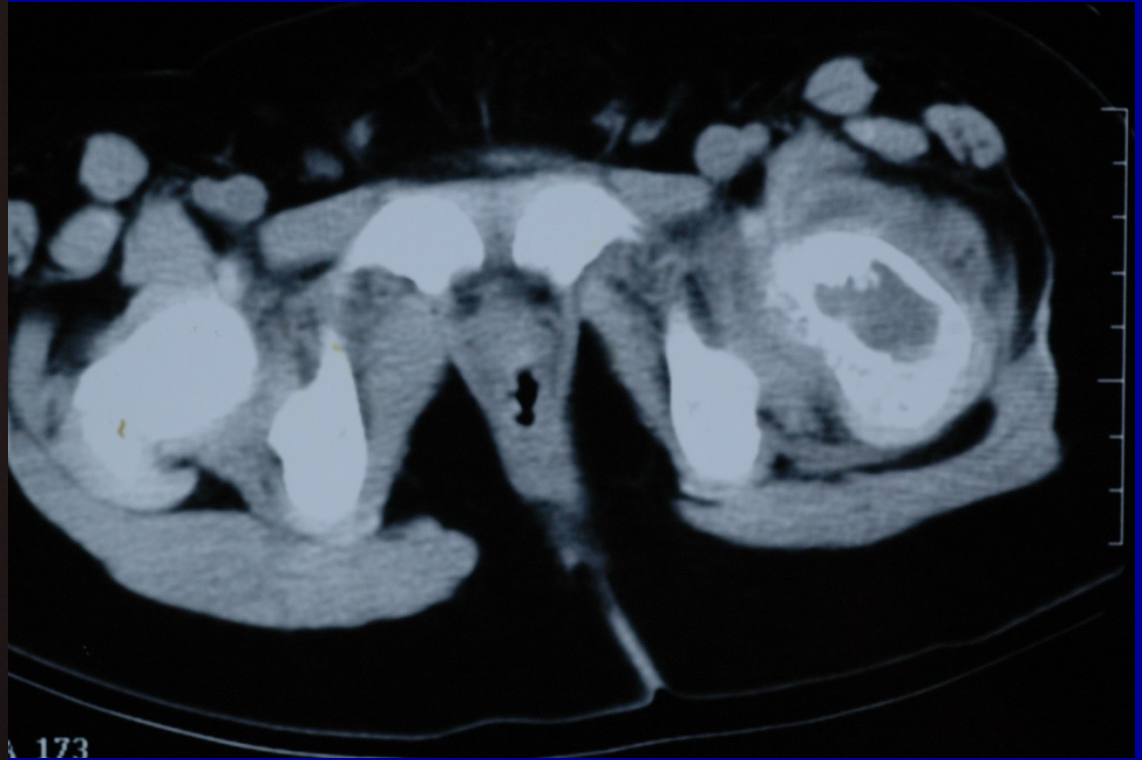
- **65% if negative CCT**
- **20% 5 year survival if + CCT**
- **Metastases are best treated with resection if feasible which will increase time of survival**

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# Ewing's sarcoma of bone

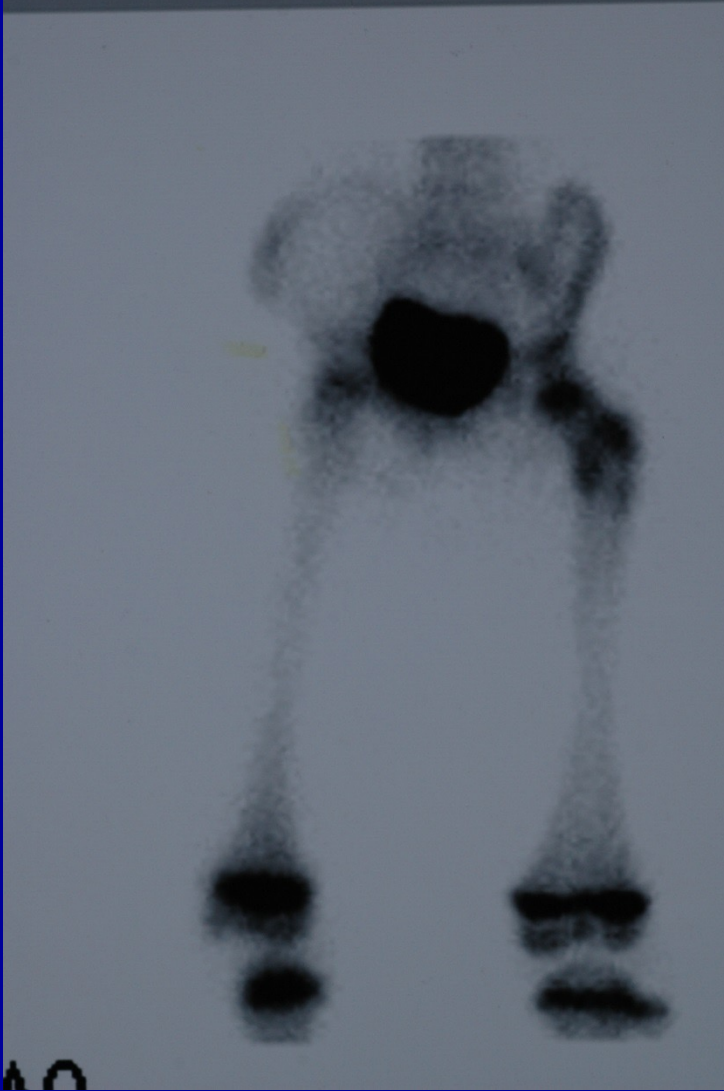
# 3 year boy with left hip pain

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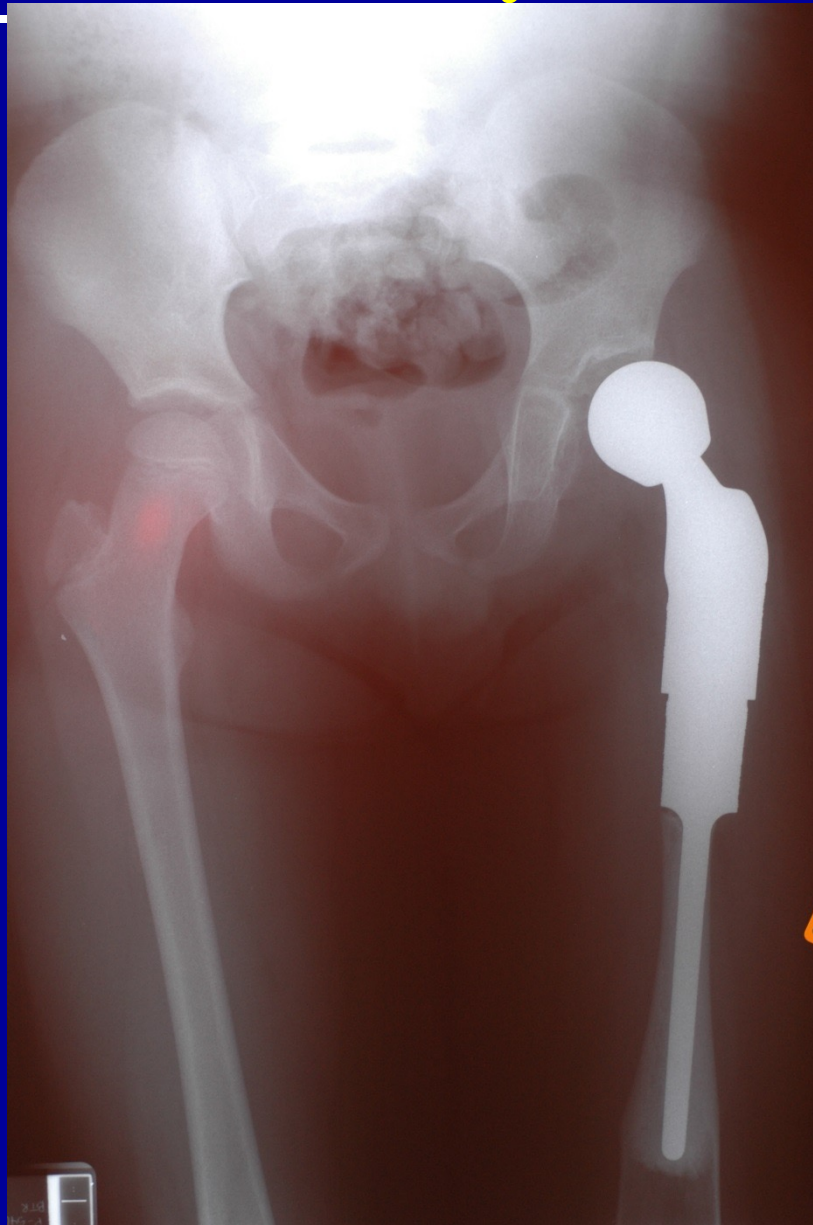


# 3 year boy with left hip pain

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# 8 YOWM, 5 years/ 21 YOWM, 18Years

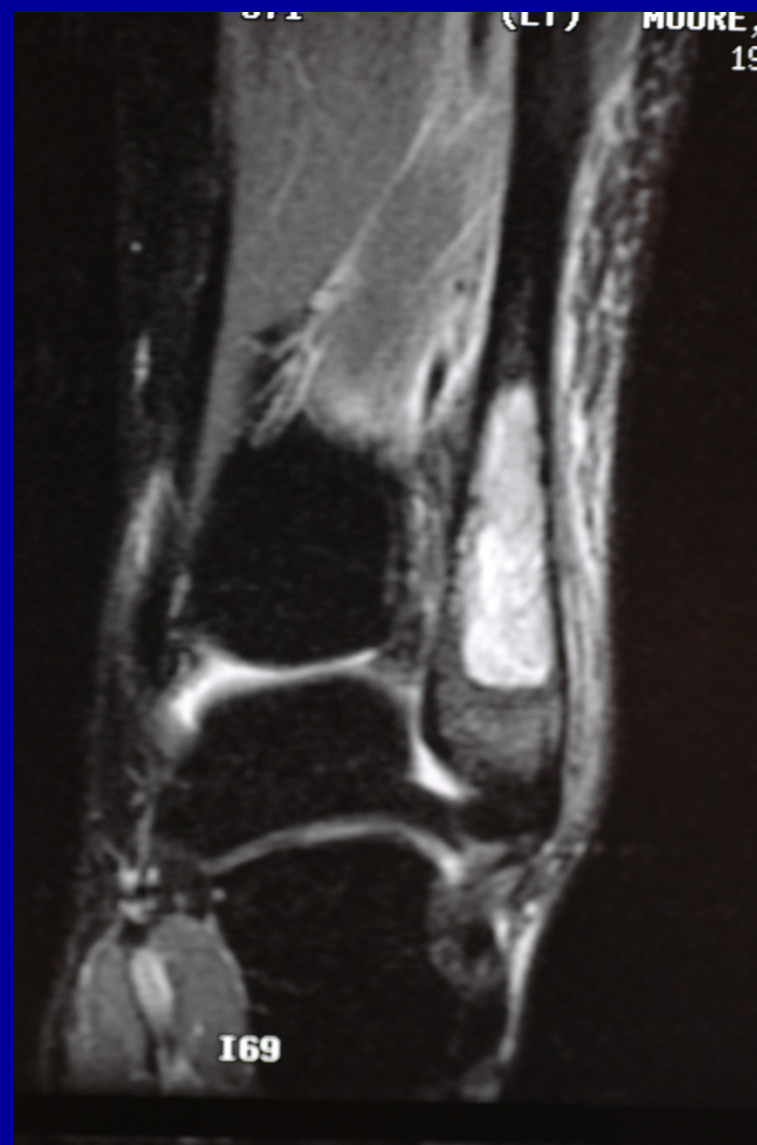


Strange, Ryan, A  
MR00069354  
5/28/1997  
21 YEAR  
M



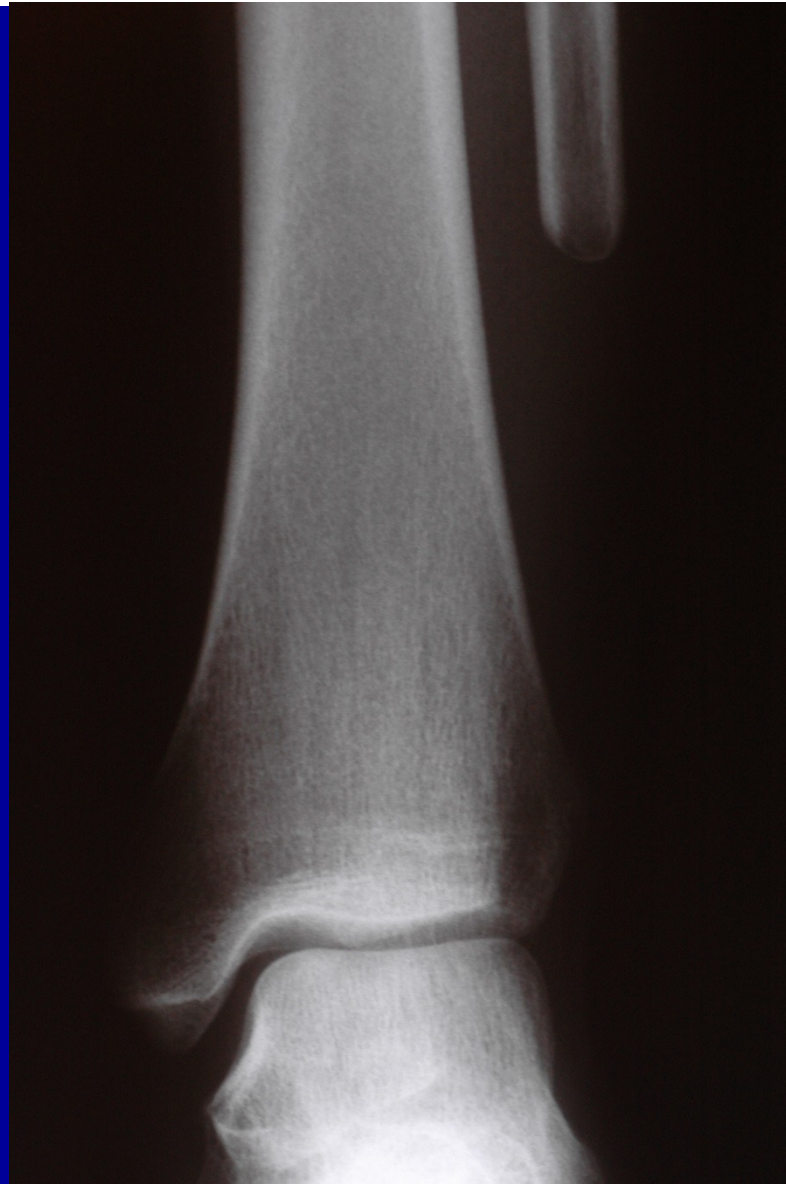
Femur 2 V  
F  
7/5/2018 9:  
00110

# 19 YOF with 4 months of pain left ankle



# **5 years after resection and chemotherapy**

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# **Ewing's sarcoma Good Prognosis**

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- **Negative CCT**
- **Age  $\leq$  14 years**
- **100% chemotherapy response**
- **EWS-FLI1**
- **Peripheral site of disease**
- **Less than 8 cm/ <200 cc**



# **Ewing's sarcoma Poor Prognosis**

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- **Fevers, weight loss, anemia**
- **Positive CCT**
- **High LDH**
- **Non-EWS-FLI1**
- **Pelvis site of disease**
- **Larger than 8 cm**

# **Ewing's Local Control**

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- **Wide resection**
- **Wide resection with  
Radiation**
- **Radiation alone**

# Ewing's Survival

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- **Localized Disease, 60% cure**
- **Metastatic Disease, 25% 5 yr**
- **Accelerated Chemo Program**
  - **Q 2 weeks**
  - **70% 5 yr vs 63% 5 yr**

**8 YOF hip pain with Onion skinning of periosteum: BAD sign**

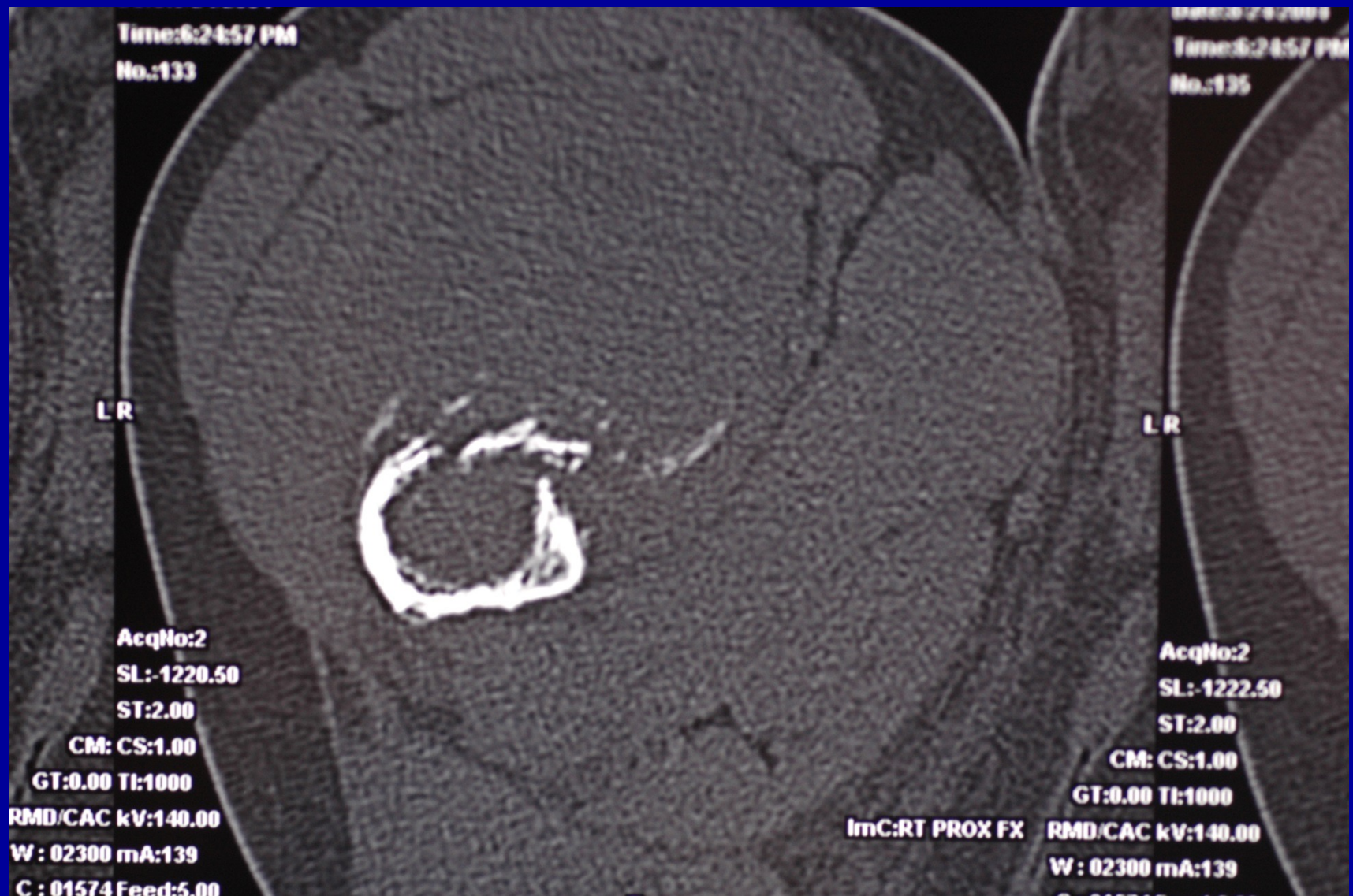
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# **27 YOWM fell on the ice: Path FX= BAD**



# 27 YOWM CT, Huge mass, Ewings



## Over 40 years of age

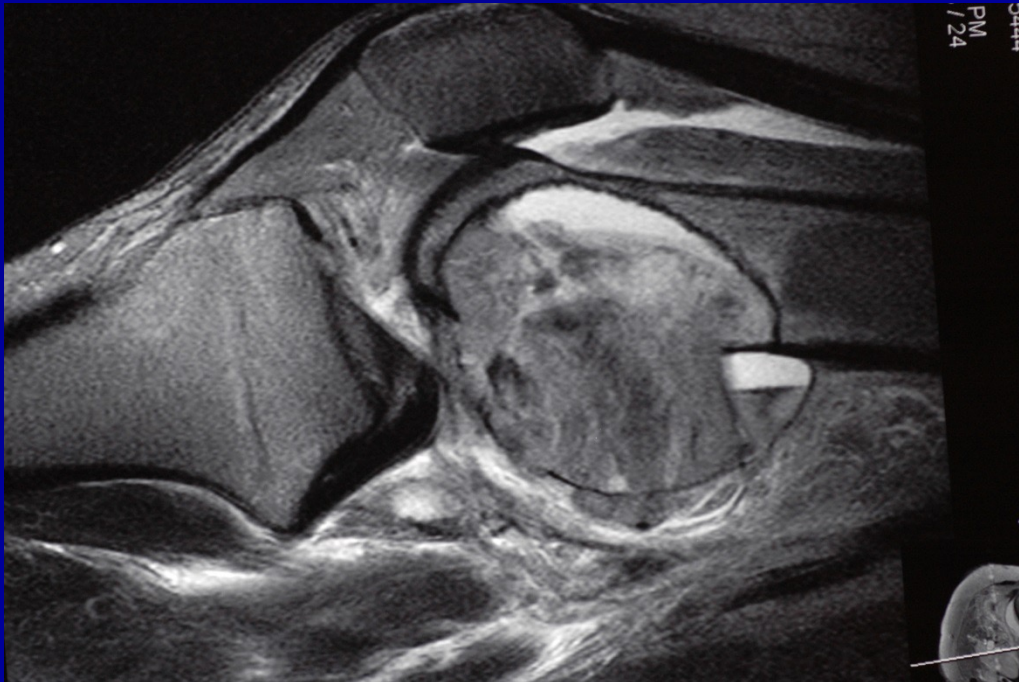
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- **Multiple Myeloma**
- **Metastatic Carcinoma to bone**
- **Chondrosarcoma**

# Metastatic Carcinoma of Unknown Origin

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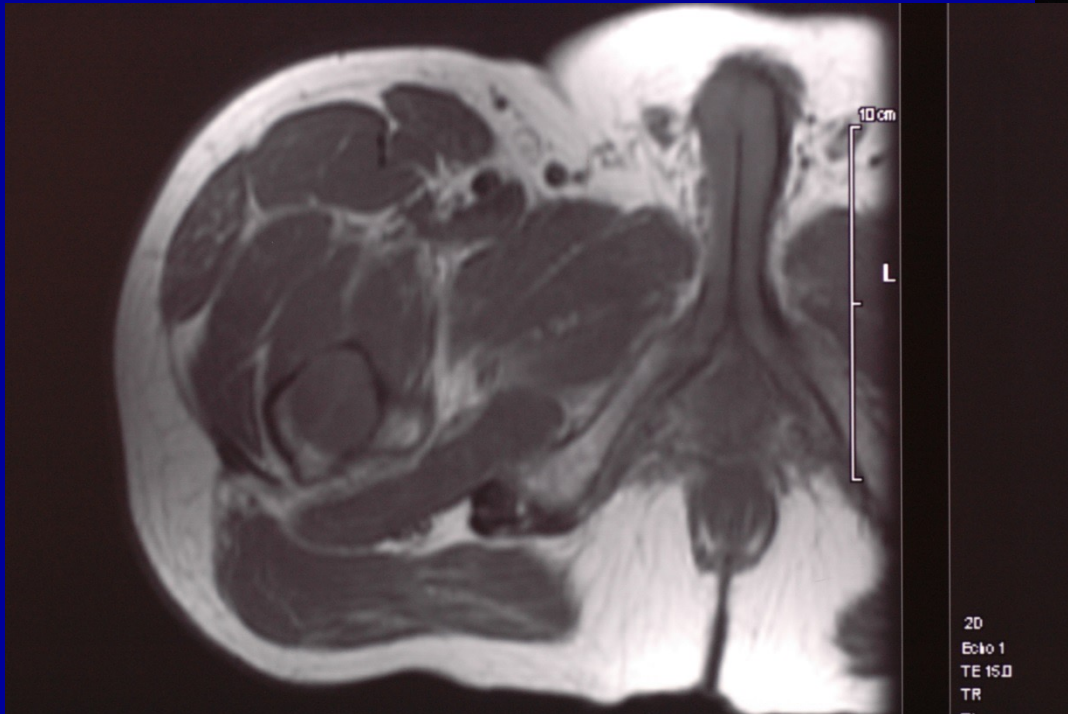
- Typically >40 years old
- More common than Primary sarcoma
- 3% of all metastases have unknown primary site





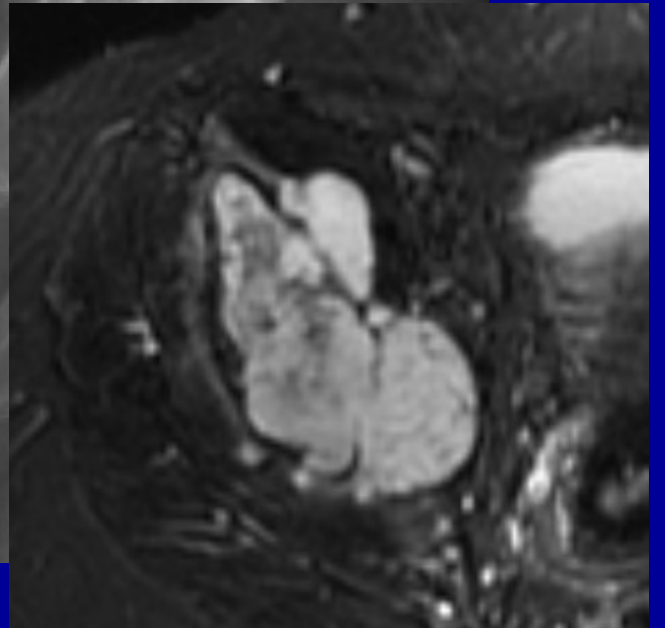
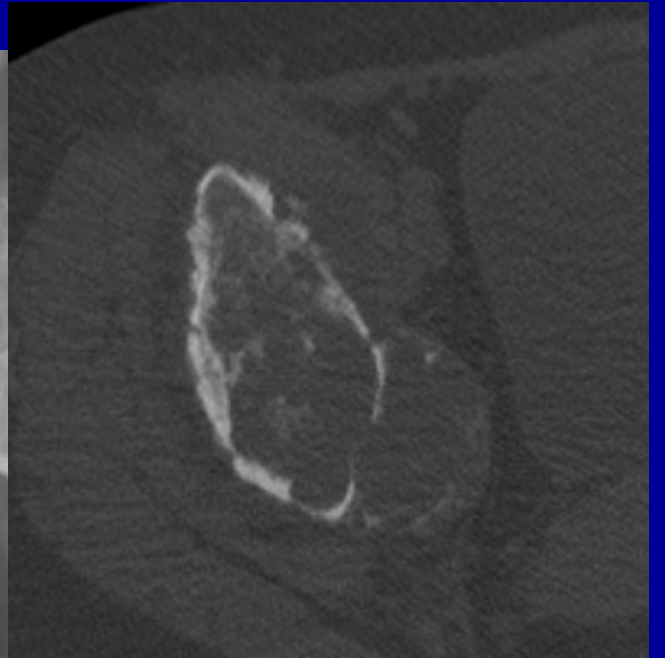
# Protocol: 57 YOWM Left Hip pain

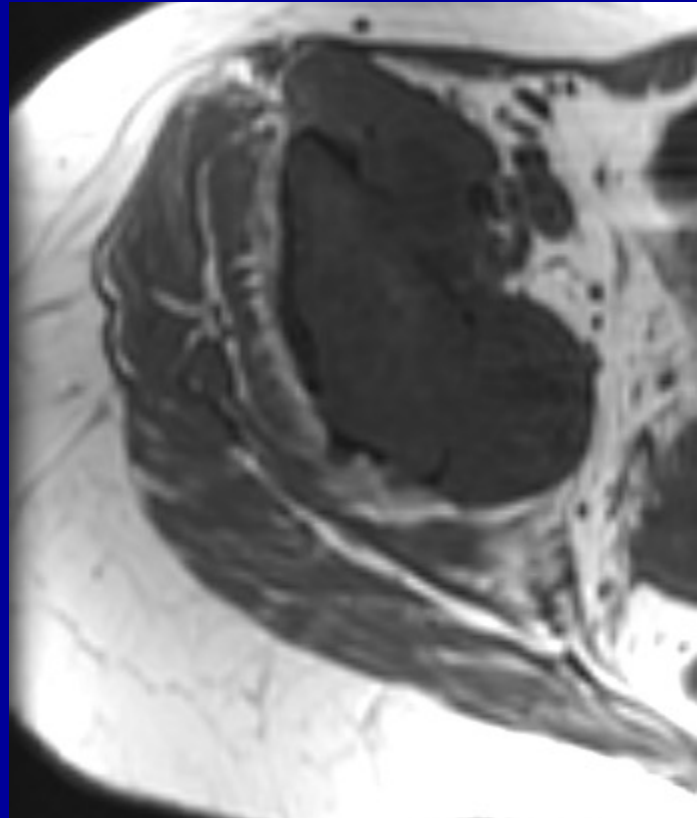
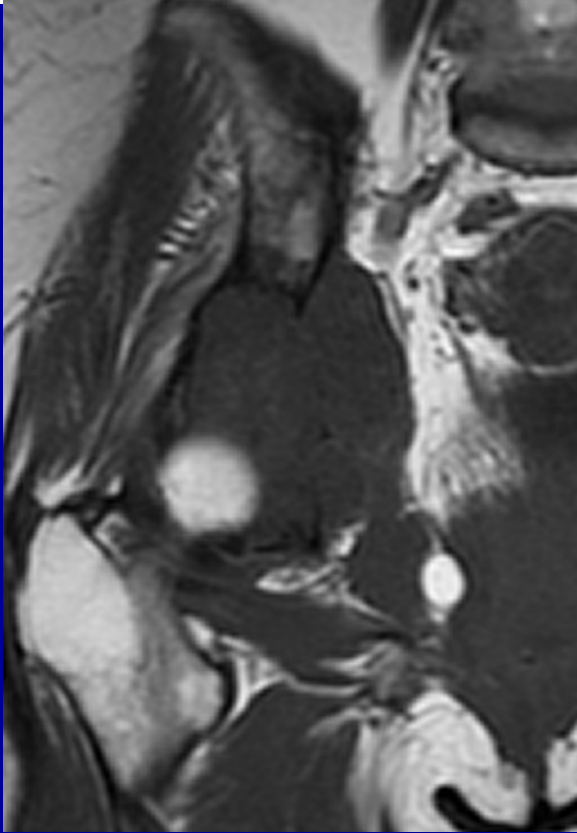
- SPEP
- Whole Body Bone Scan
- Chest, Abdomen, Pelvis CT

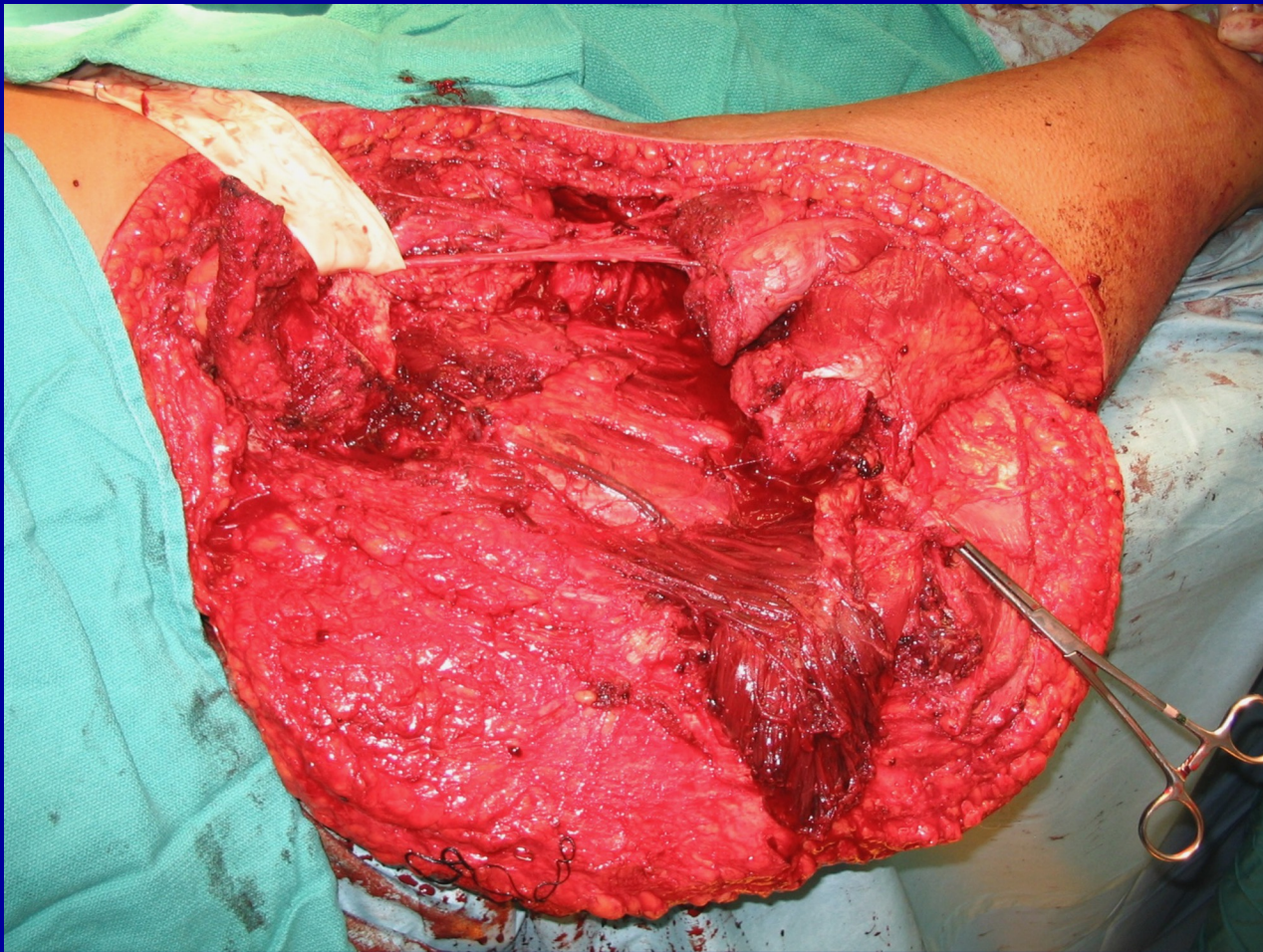


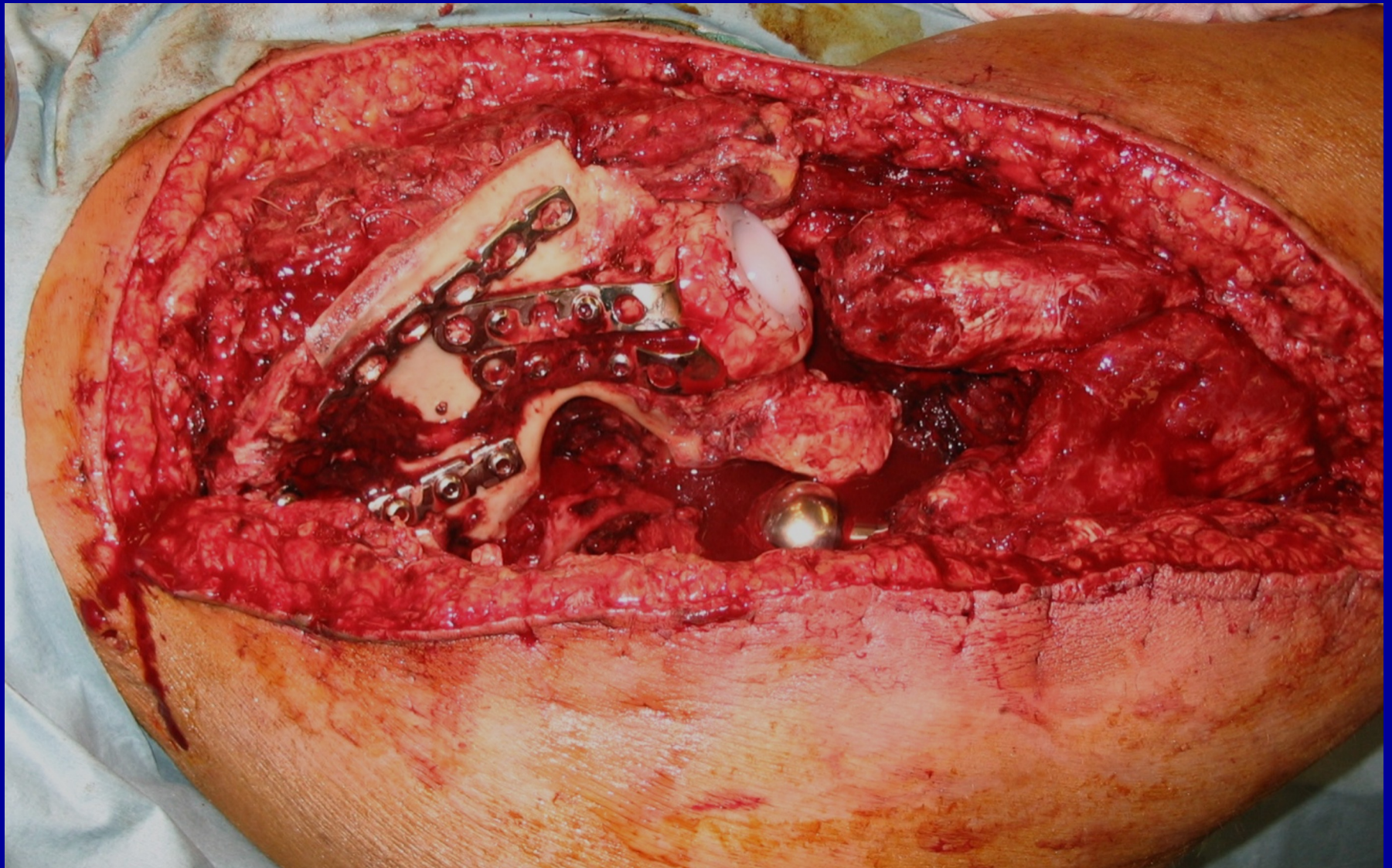
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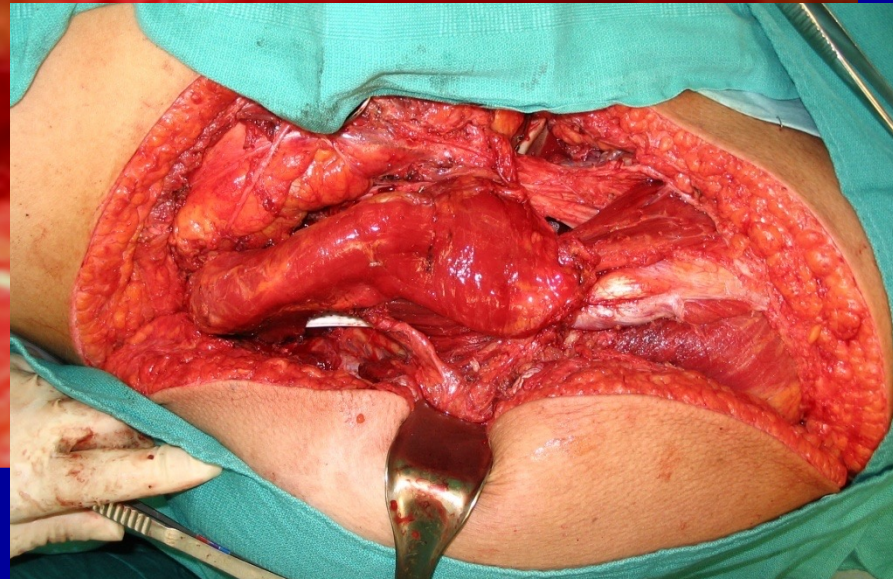
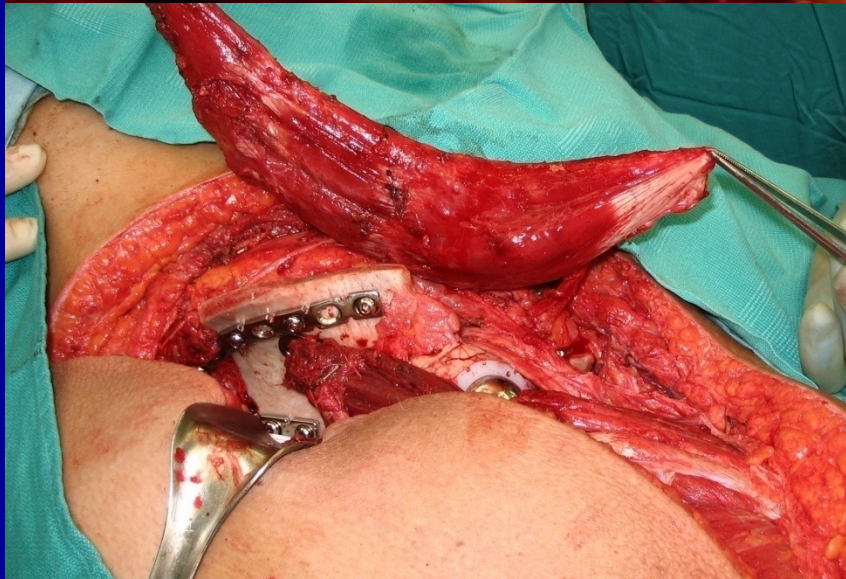
# Chondrosarcoma

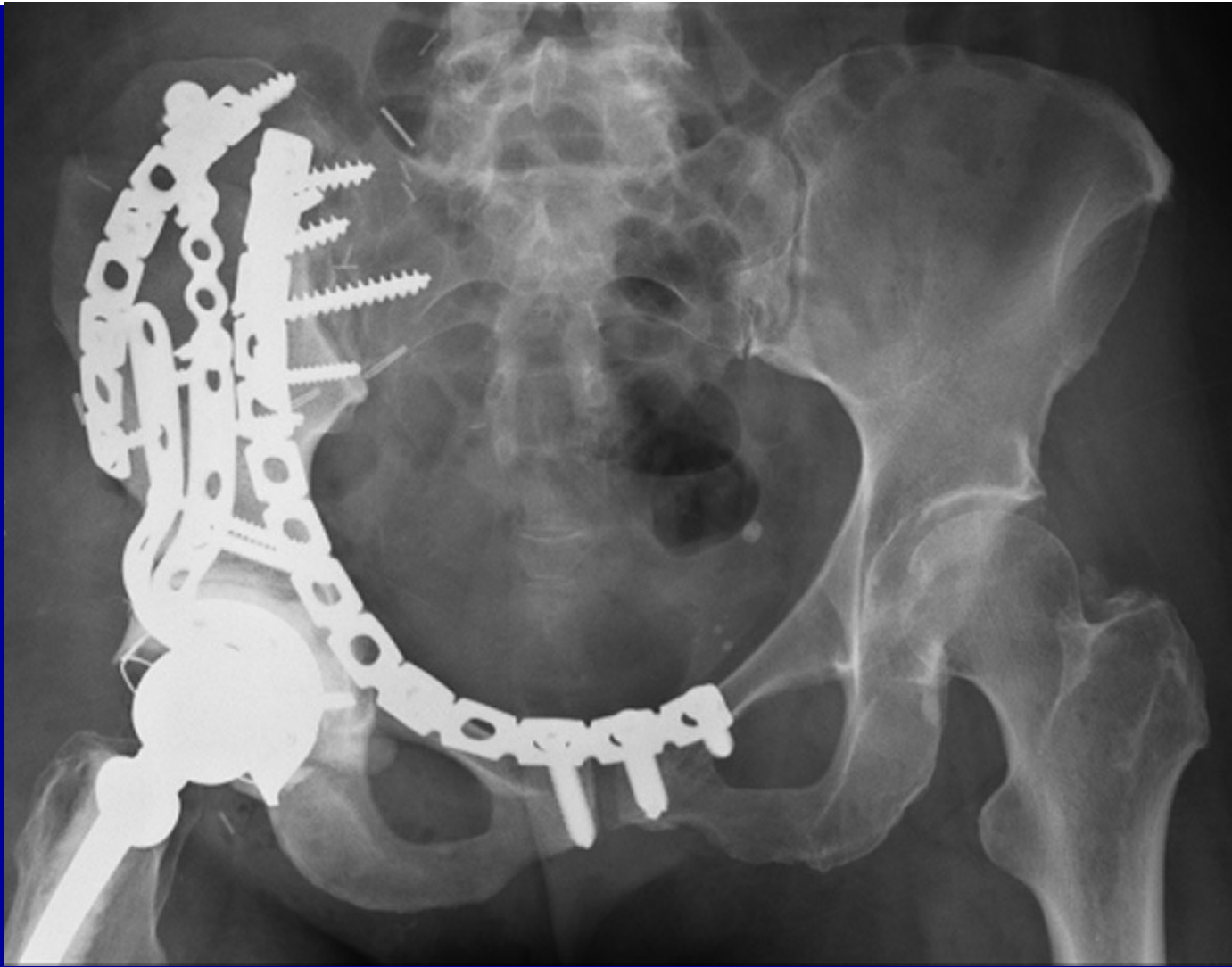














# Chondrosarcoma Good prognosis

- **Low Grade**
- **Negative CCT**
- **Resectible site**

# Chondrosarcoma Poor prognosis

- High Grade
- Positive CCT
- Pelvis or spine site
- Dedifferentiated
- Mesenchymal (Chemotherapy)

# **Chondrosarcoma**

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- **Wide resection for grade 2 and 3**
  - **<10% local recurrence**
  - **Less than wide has >33% LR**
- **Curettage for grade 1 is controversial**

# **Chondrosarcoma**

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- **Grade 1: 95%**
- **Grade 2: 75%**
- **Grade 3: 50%**
- **Dedifferentiated (15% survival)**
- **Mesenchymal (25% survival)**

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**Thank You!**