

Imaging the Musculoskeletal System

(Part Three)

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Lordofrays



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OBJECTIVE

The main focus and objective of this lecture is to help student to be competent in looking at MSK images and interpreting findings, by learning:

- ✓ Normal radiological anatomic landmarks
- ✓ System of analyzing findings

“Where to look & What to look for”

- ✓ Recognize features of certain disease entity

IMPORTANT SITES

BONE DENSITY & TEXTURE
BONE MARROW
ARTICULAR CORTICES
SOFT TISSUE

OUTLINES

- ✓ Introduce Imaging approach to skeletal infections and Identify important findings including sequelae and complications
- ✓ Introduce Imaging approach to skeletal neoplastic disorders and Identify important findings including sequelae and complications

IMAGING OF MUSCULOSKELETAL SYSTEM PATHOLOGY

CONGENITAL

TRAUMA

ARTHRITIS INFECTIOUS

METABOLIC

HEMATOLOGICAL

NEOPLASTIC

NEOPLASTIC

TYPES

✓ OSSEOUS

Osteoma -- Osteosarcoma

✓ CHONDRAL

Enchondroma -- Chondrosarcoma

✓ FIBROUS

Osseous Fibroma -- Fibrosarcoma

✓ SOFT TISSUE

Lipoma -- Liposarcoma

IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

KEY FEATURES

Morphology

Behavior of lesion

Age of patient

Site (Location)

Osteolytic

Osteosclerotic

Mixed

Soft tissue

IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

KEY FEATURES

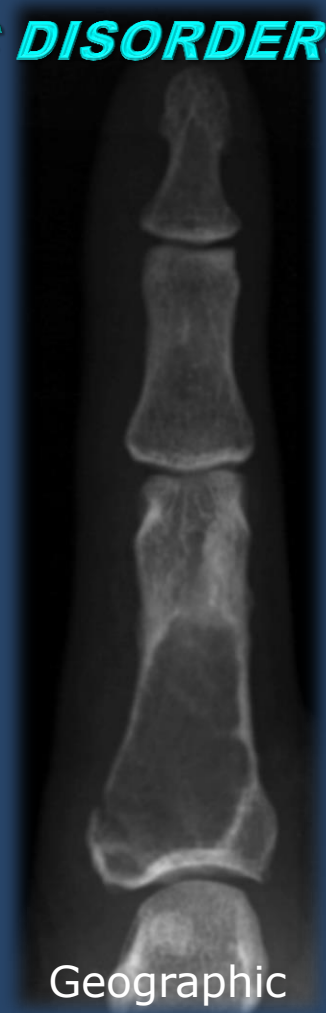
Morphology

- Pattern of bone destruction
- Size, Shape & Margin of lesion
- Texture of lesion Matrix
- Cortex & Periosteal reaction

Behavior of lesion

- Slow grow
- Rapid grow (Aggressive)

#geographic_lesion



IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

KEY FEATURES

Morphology

Pattern of bone destruction
Size, Shape & Margin of lesion
Texture of lesion Matrix
Cortex & Periosteal reaction

Behavior of lesion

Slow grow
Rapid grow (Aggressive)



#moth_eaten
#Permeative_lesion

IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

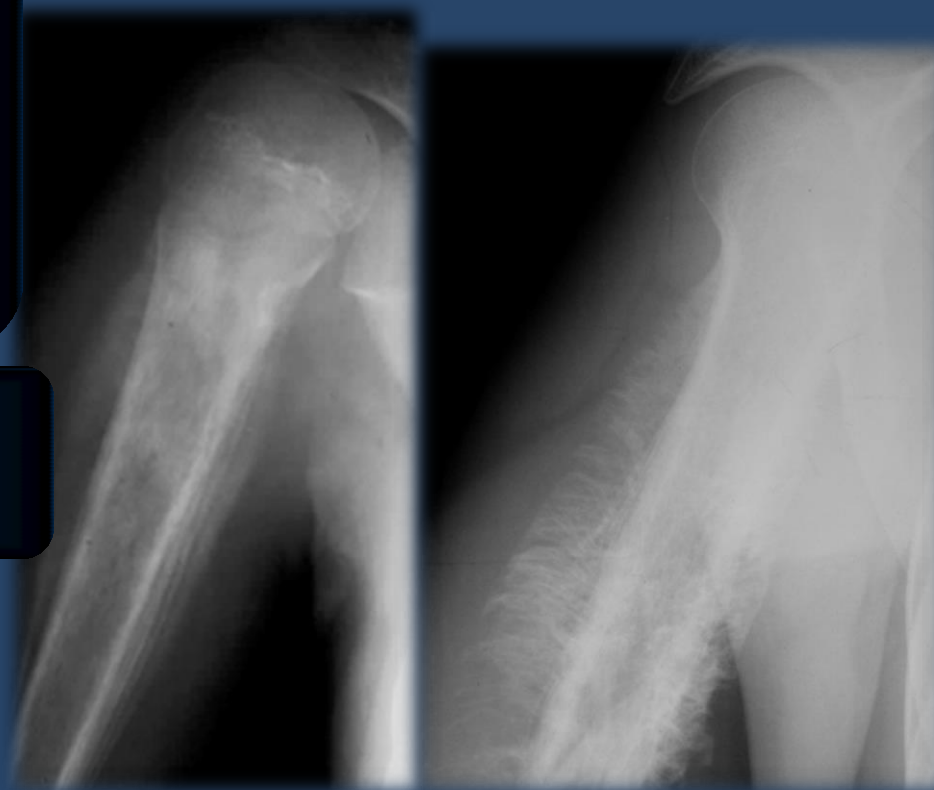
KEY FEATURES

Morphology

Pattern of bone destruction
Size, Shape & Margin of lesion
Texture of lesion Matrix
Cortex & Periosteal reaction

Behavior of lesion

Slow grow
Rapid grow (Aggressive)



IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

KEY FEATURES

Age of patient

Pediatric, Adult, Elderly

Site (Location)

Diaphyseal, metaphyseal or epiphyseal
Cortical vs. Medullary (eccentric vs. concentric)



IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

✓ Osteolytic / Benign / Pediatric

13 year-old boy patient presented with knee pain and swelling
X-ray of knee requested

CASE NO. 1

FINDINGS

- Expansile lytic lesion
- Metaphyseal
- Homogeneous, no calcification
- No cortical destruction and no periosteal reaction
- No soft tissue swelling



#Aneurysmal_Bone_Cyst

IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

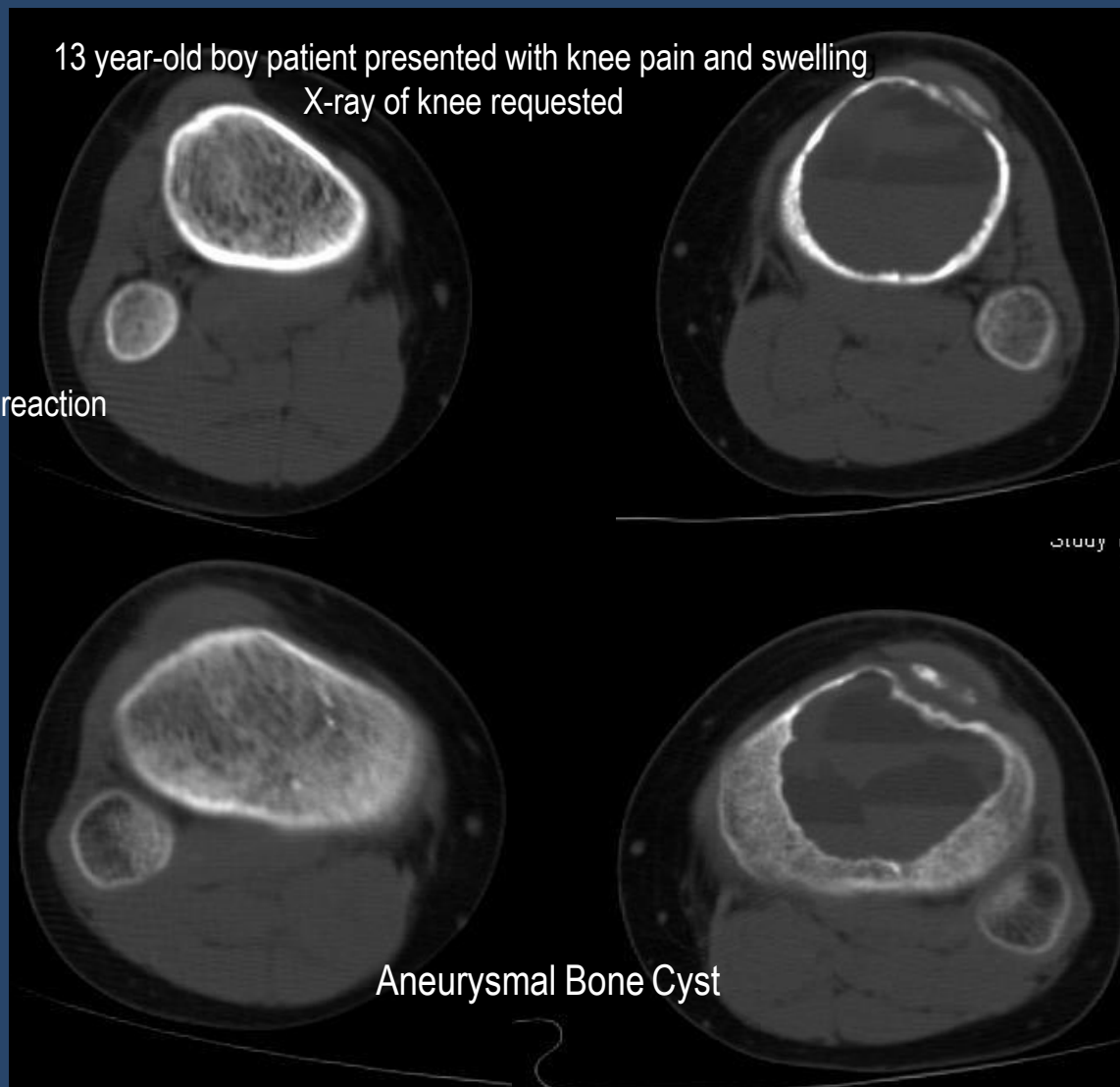
✓ Osteolytic / Benign / Pediatric

CASE NO. 1

FINDINGS

- Expansile lytic lesion
- Metaphyseal
- Homogeneous, no calcification
- No cortical destruction and no periosteal reaction
- No soft tissue swelling

13 year-old boy patient presented with knee pain and swelling
X-ray of knee requested



Aneurysmal Bone Cyst

IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

✓ Osteolytic / Benign / Adult

CASE NO. 2

FINDINGS

- Expansile lytic lesion
- Metaphyseal / Subarticular
- Homogeneous, no calcification
- Cortical destruction and periosteal reaction
- Soft tissue swelling

Adult man with knee pain and swelling



Giant Cell Tumor

#Giant_cell_Tumor

IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

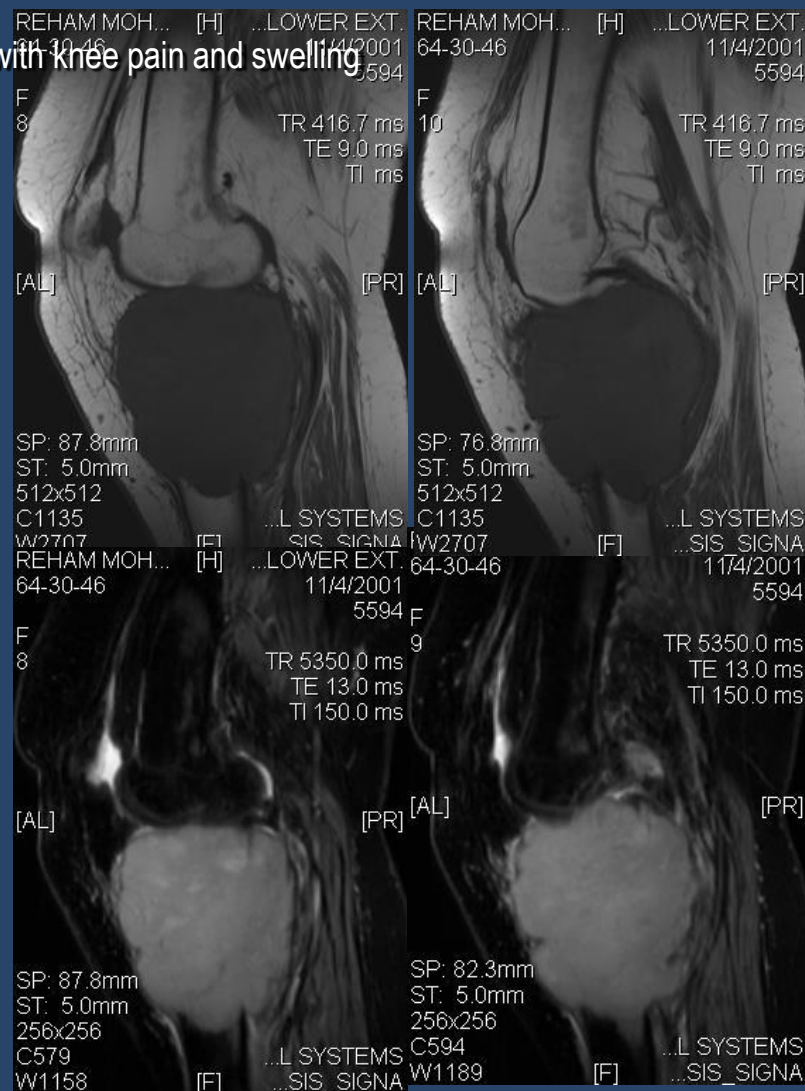
✓ Osteolytic / Benign / Adult

CASE NO. 2

FINDINGS

- Expansile lytic lesion
- Metaphyseal / Subarticular
- Homogeneous, no calcification
- Cortical destruction and periosteal reaction
- Soft tissue swelling

Adult man with knee pain and swelling



Giant Cell Tumor

IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

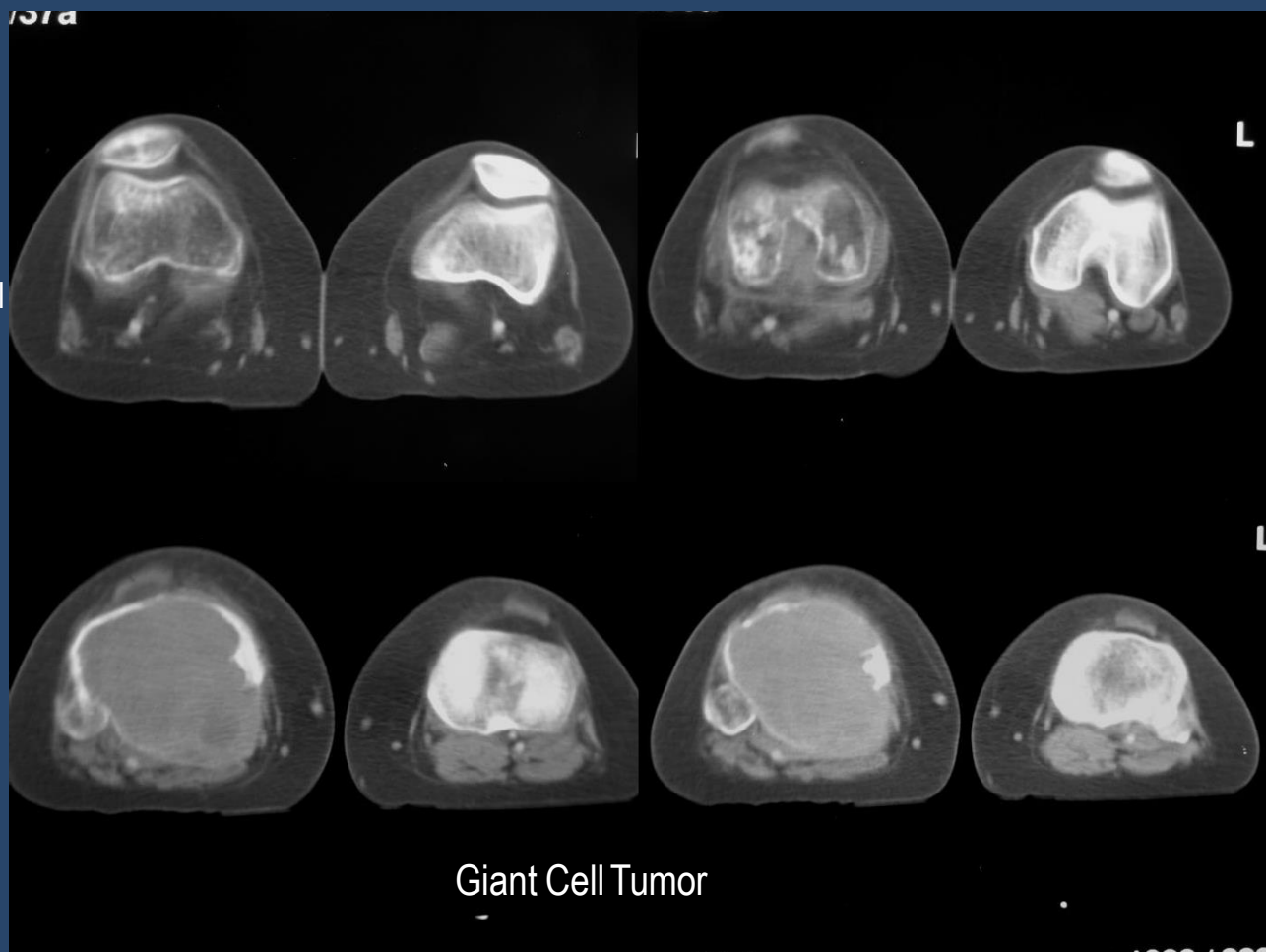
✓ Osteolytic / Benign / Adult

Adult man with knee pain and swelling

CASE NO. 2

FINDINGS

- Expansile lytic lesion
- Metaphyseal / Subarticular
- Homogeneous, no calcification
- Cortical destruction and periosteal
- Soft tissue swelling



IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

✓ Osteolytic / Aggressive / Adult

Adult man with knee pain

CASE NO. 3

FINDINGS

- Eccentric osteolytic lesion
- Metaphyseal / Subarticular
- Heterogeneous texture
- Cortical destruction and periosteal reaction
- Localized soft tissue extension



#Osteosarcoma

#Bone_Lymphoma

IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

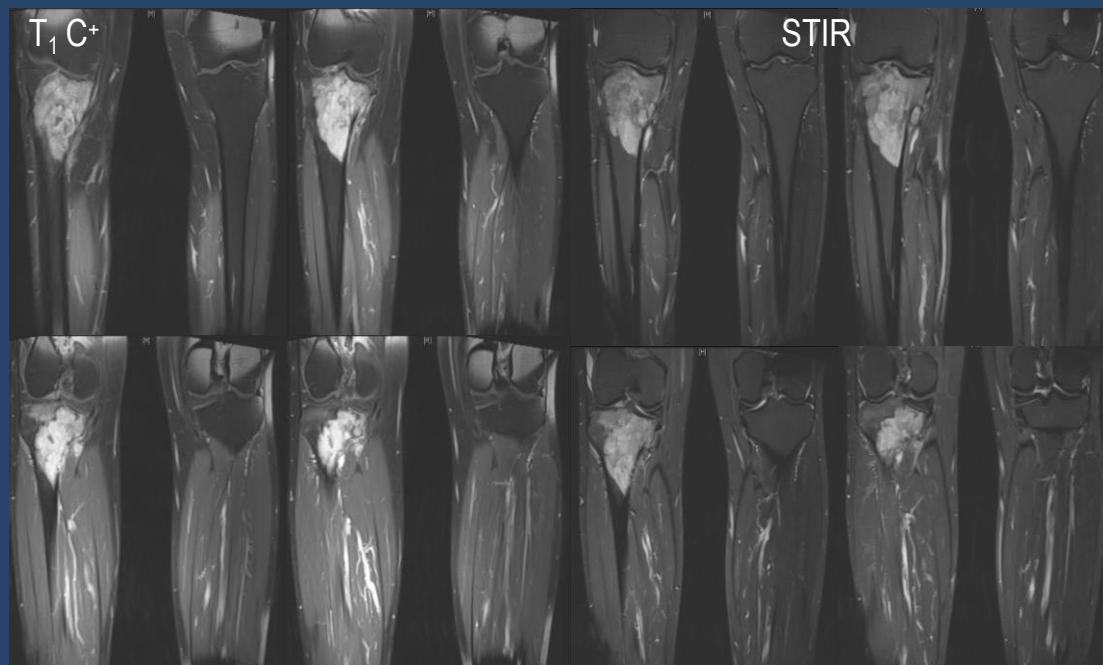
✓ Osteolytic / Aggressive / Adult

Adult man with knee pain

CASE NO. 3

FINDINGS

- Eccentric osteolytic lesion
- Metaphyseal / Subarticular
- Heterogeneous texture
- Cortical destruction and periosteal reaction
- Localized soft tissue extension



Permeative Pattern

Osteosarcoma / Lymphoma

IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

✓ Sclerotic Osseous Lesion

57 years old female patient presented with bone ache.
Had history of breast carcinoma

CASE NO. 4

FINDINGS

- Preserved bone density in general
- Sclerotic foci of variable sizes (islands)
- No destructive lesion



IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

✓ Soft tissue Mass

CASE NO. 5

Adult female patient presented with hand swelling
X-ray of hand requested

FINDINGS

- Soft tissue swelling (relatively lucent)
- No calcification
- No osseous involvement



IMAGING OF MUSCULOSKELETAL NEOPLASTIC DISORDERS

✓ Soft tissue Mass

CASE NO. 5

Adult female patient presented with hand swelling
X-ray of hand requested

FINDINGS *mri*

- High signal on T₁WI and low in T₂FS → Fat saturated
- No enhancement



#Lipoma

IMAGING OF MSK INFECTIONS

Causes & Types:

- Pyogenic
osteomyelitis
- Fungal
Osteomyelitis.
- Skeletal Syphilis.
- TB

IMAGING OF MSK INFECTIONS

Pyogenic:

- *Staphylococcus aureus*: 80-90% of all infections
- *Escherichia coli*: intravenous drug users (IVDU) and genitourinary tract infection
- *Pseudomonas spp.*: IVDU and genitourinary tract infection
- *Klebsiella spp.*: IVDU and genitourinary tract infection
- *Salmonella spp.*: sickle cell disease
- *Haemophilus influenzae*: neonates
- group B streptococci: neonates

IMAGING OF MSK INFECTIONS

Location

Frequency by location, in descending order :

- lower limb (most common)
- vertebrae: lumbar > thoracic > cervical
- sacroiliac joint-----SEPTIC ARTHRITIS

IMAGING OF MSK INFECTIONS

The location of osteomyelitis within a bone:

- Neonates: metaphysis and/or epiphysis
- Children: metaphysis
- Adults: epiphyses and subchondral regions

IMAGING OF MSK INFECTIONS

Radiographic features:

In some instances, radiographic features are specific to a region or a particular type of infection, for example:

subperiosteal abscess

Brodie abscess

Pott puffy tumor

IMAGING OF MSK INFECTIONS

IMAGING FEATURES

regional osteopenia

periosteal reaction/thickening (periostitis): variable; may appear aggressive, including the formation of a Codman's triangle ⁶

focal bony lysis or cortical loss

endosteal scalloping ⁸

loss of trabecular bone architecture

new bone apposition

eventual peripheral sclerosis

In chronic or untreated cases, eventual formation of a sequestrum, involucrum, and/or cloaca may be seen.



9 YEAR OLD
MALE WITH
HAND PAIN
POST
TRAUMA. He
haad
pneumonia 1
week ago

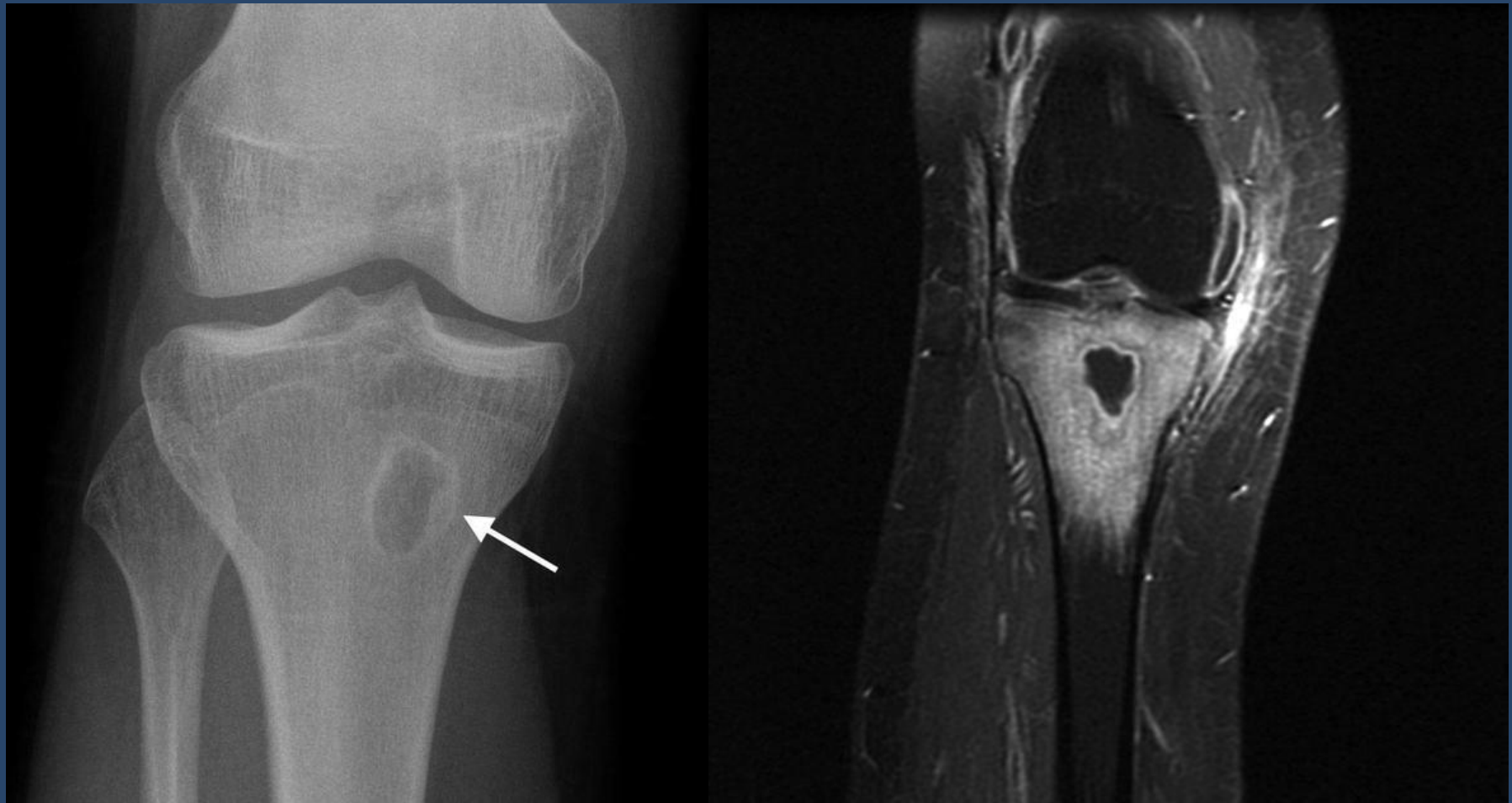
#osteomyelitis

TB spine discitis -osteomyelitis



#Potts_disease

30 year old leg pain for long time



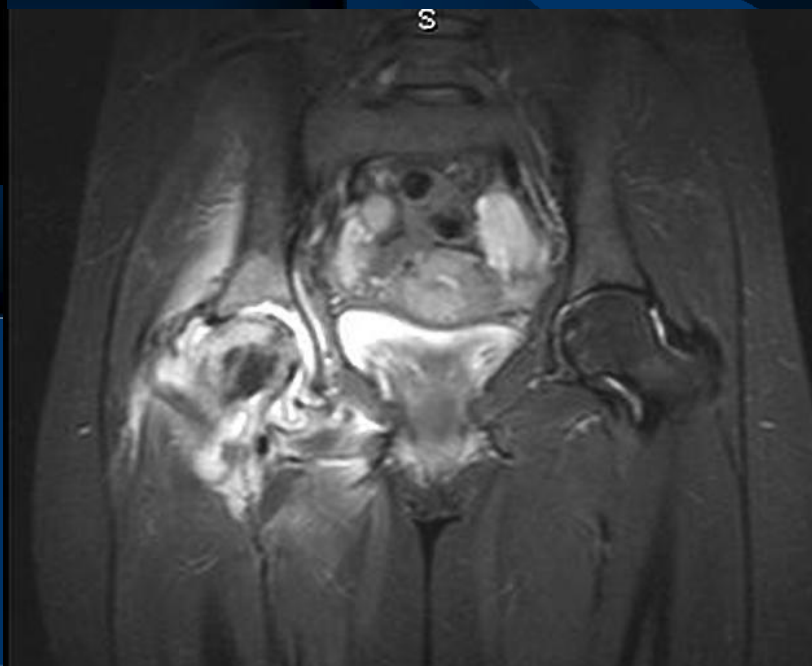
#osteomyelitis

IMAGING OF MSK INFECTIONS

Pyogenic:

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IMAGING OF MSK INFECTIONS



#Septic_Arthritis