2025

KARNATAKA RADIOLOGY EDUCATION PROGRAM

Case 2

- Right knee pain x 6 months
- Right knee stiffness x 6 months
- Had an episode of fever for a week x 5 months back.
- No history of trauma.

General examination: Conscious , alert and oriented to time , place and person.

Systemic examination: Within normal limits.

Local examination

- Antalgic gait.
- Swelling over right knee.
- Fixed flexion deformity 10-15 degrees.
- Joint line tenderness.
- Increased warmth of right knee.

Investigation

- Complete blood count – Increased white blood count and increased ESR.
- Renal function test.
- Liver function test.
- Right knee radiograph- AP and Lateral
- Plan CT/MRI.

DEPARTMENT OF LABORATORY MEDICINE

Final Report

Patient Name : Mr Ukil Chandro Roy MRN : 10020001656708 Gender/Age : MALE , 42y (01/02/1981)

Collected On : 26/06/2023 03:11 PM Received On : 26/06/2023 04:00 PM Reported On : 26/06/2023 05:37 PM

Barcode : 042306260129 Specimen : Pus Consultant : Dr.Purushotham Lal R(ORTHOPAEDICS & JOINT REPLACEMENT)

Sample adequacy : Satisfactory Visit No : IP-001 Patient Mobile No : 7047767199

MICROBIOLOGY

PUS FOR GRAM STAIN

Pus For Gram Stain	Many pus cells no organisms seen.

PUS FOR Z-N STAIN (AFB STAIN)

Pus For For AFB ZN Stain	No acid fast bacilli seen.

--End of Report-

Dr. Mallika Reddy K
MD, Microbiology
Consultant

DEPARTMENT OF LABORATORY MEDICINE

Final Report

Patient Name : Mr Ukil Chandro Roy MRN : 10020001656708 Gender/Age : MALE , 42y (01/02/1981)

Collected On : 26/06/2023 03:11 PM Received On : 26/06/2023 03:59 PM Reported On : 28/06/2023 03:51 PM

Barcode : 042306260130 Specimen : Pus Consultant : Dr.Purushotham Lal R(ORTHOPAEDICS & JOINT REPLACEMENT)

Sample adequacy : Satisfactory Visit No : IP-001 Patient Mobile No : 7047767199

MICROBIOLOGY

PUS FOR CULTURE & SENSITIVITY

- Report Status : Final
- Method Name : Conventional/ Automated Reflectance/Automated MIC
- Specimen Type : Pus
- Colony Count : Scanty
- Incubation Period : 48 Hours of Incubation

CULTURE

Pathogen(s) Isolated

- **Staphylococcus aureus**

Organism	Staphylococcus aureus		Level
Antibiotics	**Sensitivity**	**MIC**	
Benzylpenicillin	Resistant	>=0.5	-
Cefoxitin Screen	-	Neg	-
Ciprofloxacin	Resistant	>=8.0	L1
Clindamycin	Resistant	0.25	L1
Daptomycin	Susceptible	0.5	L3
Erythromycin	Resistant	>=8.0	L1
Gentamicin	Susceptible	<=0.5	-

Osteomyelitis

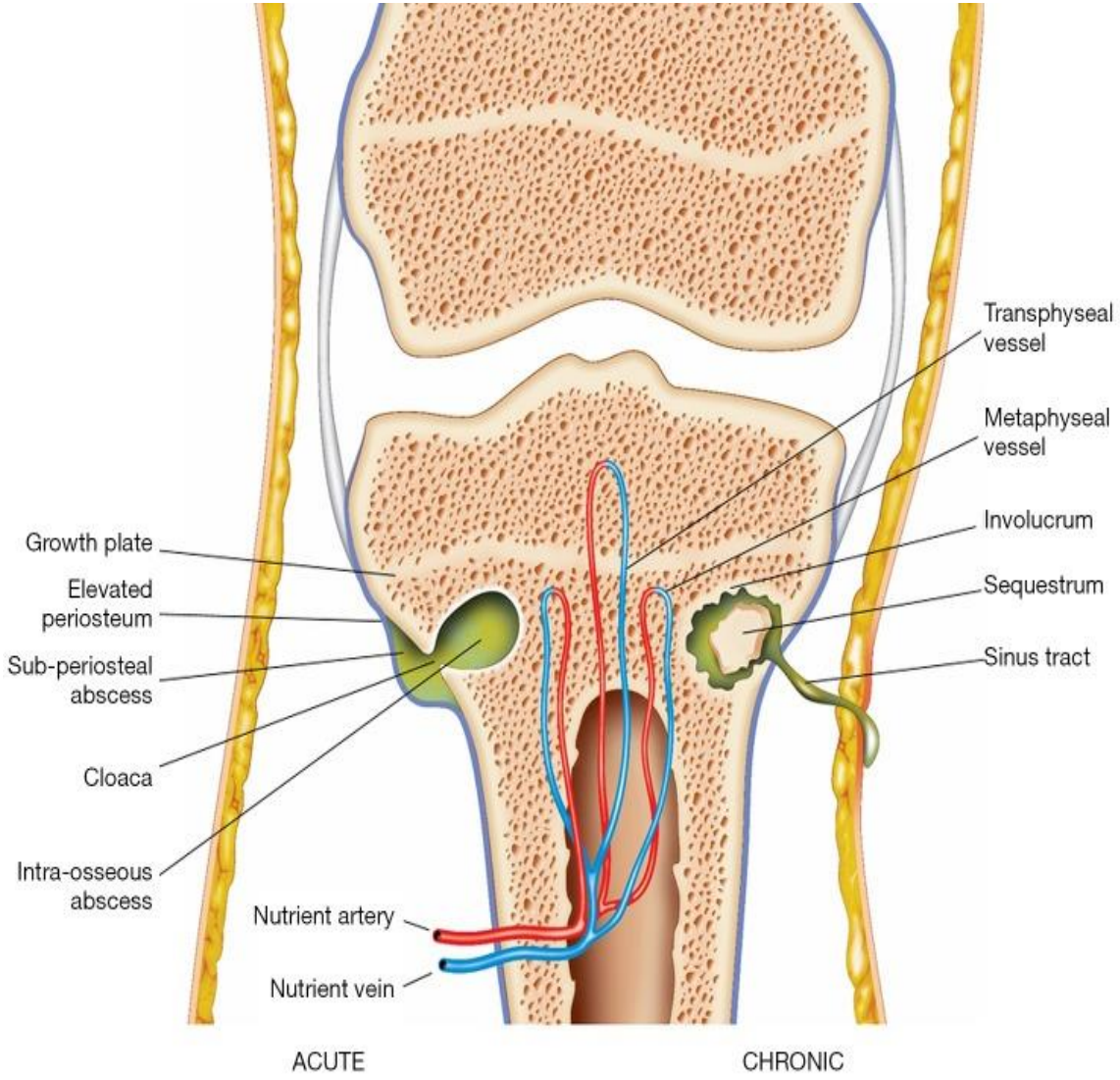
- Inflammation of the bone marrow secondary to infection, which can progress to osteonecrosis, bone destruction and septic arthritis.
- Bimodal age distribution with peak incidences in children under 5 and adults over 50 years of age.
- Typical clinical presentation of osteomyelitis with pain, erythema and oedema of the affected part.

Pathogenesis

- *Staphylococcus aureus* is the causative organism in up to 80% of cases of osteomyelitis.
- *Salmonella* species in sickle-cell patients.
- *Pseudomonas* or *Klebsiella* in intravenous drug users.
- Fungal osteomyelitis most commonly occurs in immunocompromised patients

Pathogenesis

Metaphyseal vessels contain slow-flowing blood, predisposing to bacterial proliferation. Hence, the metaphysis is a common site for haematogenous osteomyelitis. The growth plate forms a barrier between the metaphyseal and epiphyseal vessels in children over 18 months of age. However, in infants under 18 months and in adults, transphyseal vessels are present which provide a route for infection to communicate between the metaphysis and epiphysis. In acute osteomyelitis, a collection of pus becomes surrounded by granulation tissue and reactive bone, forming an intraosseous abscess. Raised intramedullary pressure secondary to accumulation of pus leads to rupture of the cortex, creating a defect known as a cloaca, which drains pus from the bone to the surrounding tissues. This can cause a subperiosteal abscess with elevation of the periosteum, as well as soft tissue abscesses. In chronic osteomyelitis, disruption of the intraosseous and periosteal blood supply leads to formation of a necrotic bone fragment, known as a sequestrum, which is surrounded by pus and granulation tissue. A reactive shell of new bone forms around the sequestrum and is known as an involucrum. A sinus tract, which drains pus from bone to the skin surface, may be present in both acute and chronic osteomyelitis.



RADIOGRAPH

- Well-circumscribed bony lucency representing an intraosseous abscess.
- Periosteal reaction secondary to elevation of the periosteum.
- Soft tissue swelling.
- Drawback -Bone marrow oedema, which is the earliest pathological feature, is not visible on plain films.

RADIOGRAPH

A sclerotic bony fragment surrounded by lucent rim (sequestrum) is seen in the distal femoral diaphysis with posterior cortical defect (cloaca) and marked thickening of adjacent cortex (involucrum).

Magnetic resonance imaging

- Modality of choice.
- T1W- Low signal intensity of edema and abscess.
- T2W- High signal intensity of edema and abscess.
- T1(Contrast)- Heterogenous/peripheral enhancement.

Key term	Pathological process	MRI signal		
		T1	T2	T1 + C
Bone marrow oedema	Accumulation of pus within the medullary cavity, leading to vascular congestion	Low	High	High
Intraosseous abscess	Formation of reactive bone and granulation tissue around intramedullary pus	Low	High	Peripheral enhancement
Subperiosteal abscess	Accumulation of pus beneath elevated periosteum	Low	High	Peripheral enhancement
Cloaca	A cortical defect that allows pus to drain between bone and soft tissue	Low	High	Low
Sinus tract	A channel, lined with granulation tissue, that allows pus to drain between bone and the skin surface	Low	High	Peripheral enhancement
Sequestrum	A separated fragment of necrotic bone that is surrounded by pus, granulation tissue and an involucrum	Low	Low	Peripheral enhancement

Computed Tomography

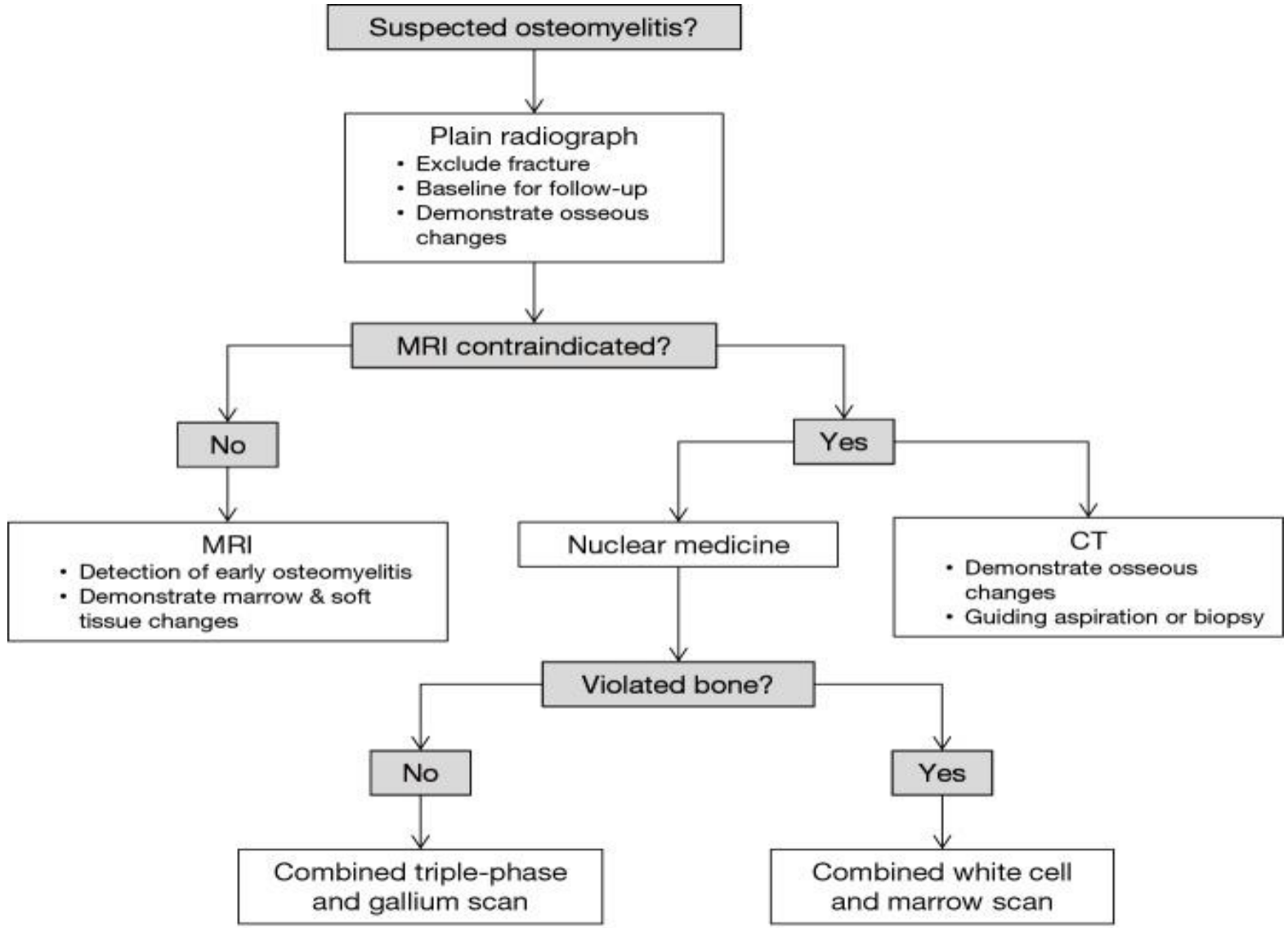
- Better at demonstrating osseous changes such as cortical destruction, periosteal reactions and sequestrum formation.
- Sequestrum on CT appears as a sclerotic lesion with a lucent rim.
- Intramedullary gas best seen on CT.

Nuclear medicine

- Triple-phase bone scan, technetium-99m-labelled MDP (Tc^{99m}-MDP) is injected intravenously followed by image acquisition in three phases: the angiographic, tissue and osseous phases.
- In osteomyelitis, there is high tracer uptake in all three phases.

Ultrasound

- Subcutaneous edema.
- Subperiosteal abscesses are seen on ultrasound as periosteal elevation with an underlying fluid collection.


Suspected osteomyelitis?
Plain radiograph
• Exclude fracture
• Baseline for follow-up
• Demonstrate osseous changes
MRI contraindicated?
No
Yes
MRI
• Detection of early osteomyelitis
• Demonstrate marrow & soft tissue changes
Nuclear medicine
CT
• Demonstrate osseous changes
• Guiding aspiration or biopsy
Violated bone?
No
Yes
Combined triple-phase and gallium scan
Combined white cell and marrow scan

Treatment

- Intravenous antibiotics.
- Drainage and/or surgical debridement.
- Amputation is performed after failure of medical therapy or when the infection is life-threatening.