

FUNGAL PSEUDARTHROSIS OF THE TIBIA IN AN IMMUNOCOMPETENT PATIENT

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1. INTRODUCTION & BACKGROUND

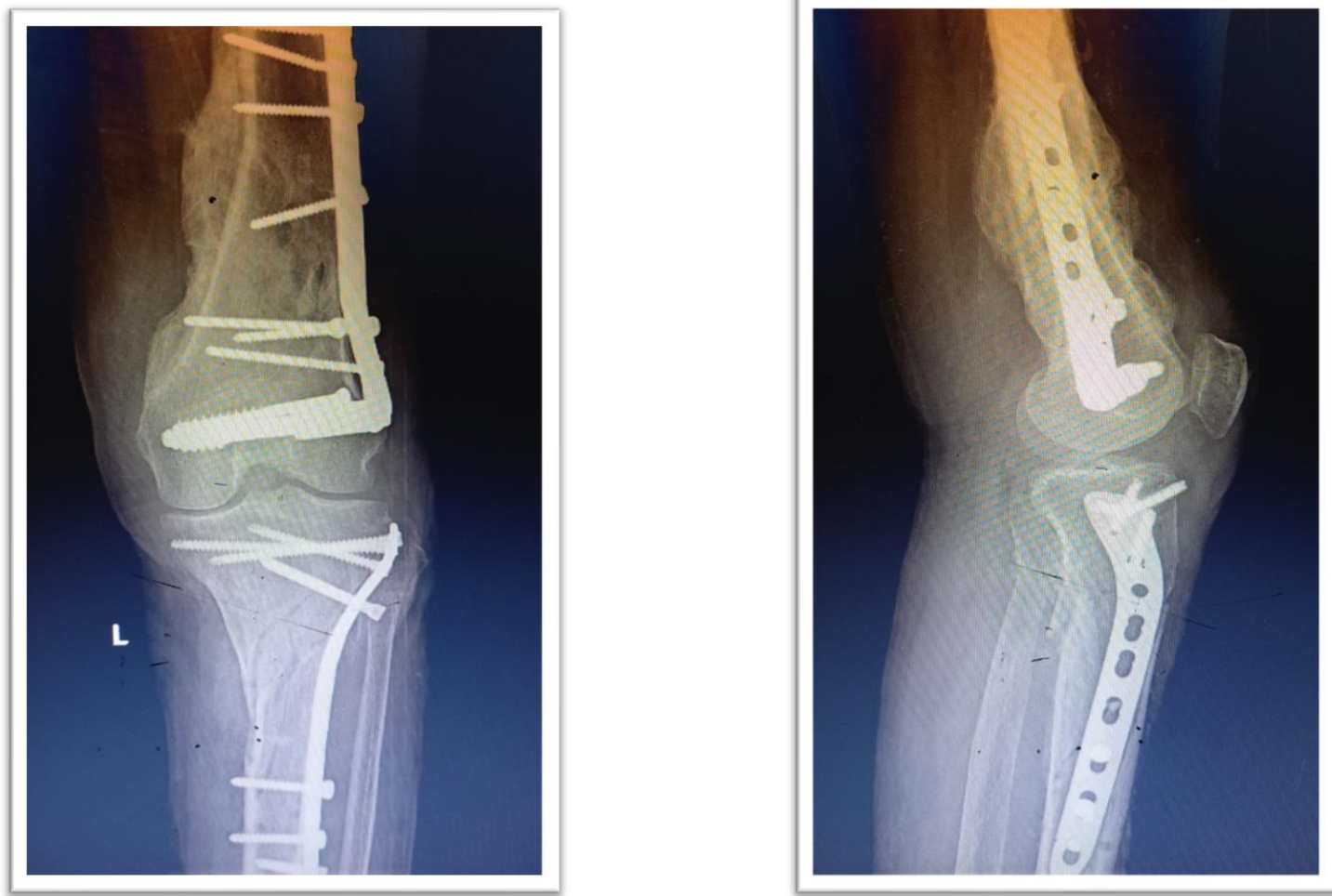
- Septic pseudarthrosis (nonunion) of the tibia is a classical, late-stage complication of fractures that have been open or treated surgically. While bacterial infections are far more common, fungal nonunion is an exceptionally rare clinical entity.
- Fungal pseudarthrosis typically occurs in severely immunocompromised individuals. Its occurrence in active, healthy immunocompetent patients is extremely rare, with only isolated cases reported in global medical literature.
- Due to the non-specific nature of radioclinical and biological signs, diagnosis of fungal nonunion is often delayed, leading to prolonged patient morbidity and diagnostic challenges.
- Aim: To report an exceptional case of post-traumatic tibial pseudarthrosis due to *Candida albicans* in an immunocompetent patient, successfully reconstructed using the Two-Stage Induced Membrane (Masquelet) Technique.

2. CASE OBSERVATION: Initial Trauma

- Patient Profile: A 54-year-old active female, with a medical history of hypertension, who had previously undergone a successful right distal femur plate fixation with excellent clinical results.
- The Trauma: She sustained a closed, sub-tuberosity proximal tibia fracture of the same knee joint following a subsequent fall.
- Anatomical Context: The fracture occurred immediately distal to the previously consolidated distal femur hardware, leaving a complex biomechanical stress environment.

3. SURGICAL FIXATION & SEPSIS

- Primary Stabilization: She underwent surgical reduction and stable osteosynthesis using a double-approach plate fixation (medial and lateral locking plates).
- Sepsis Complication: The surgical intervention was complicated by early-onset postoperative surgical site infection with severe local inflammatory signs and purulent wound drainage.
- Sepsis Management: Multiple surgical debridements, deep tissue washouts, and joint drainages were performed. Intra-operative cultures isolated *Pseudomonas aeruginosa*.



4. PERSISTENT INFECTION

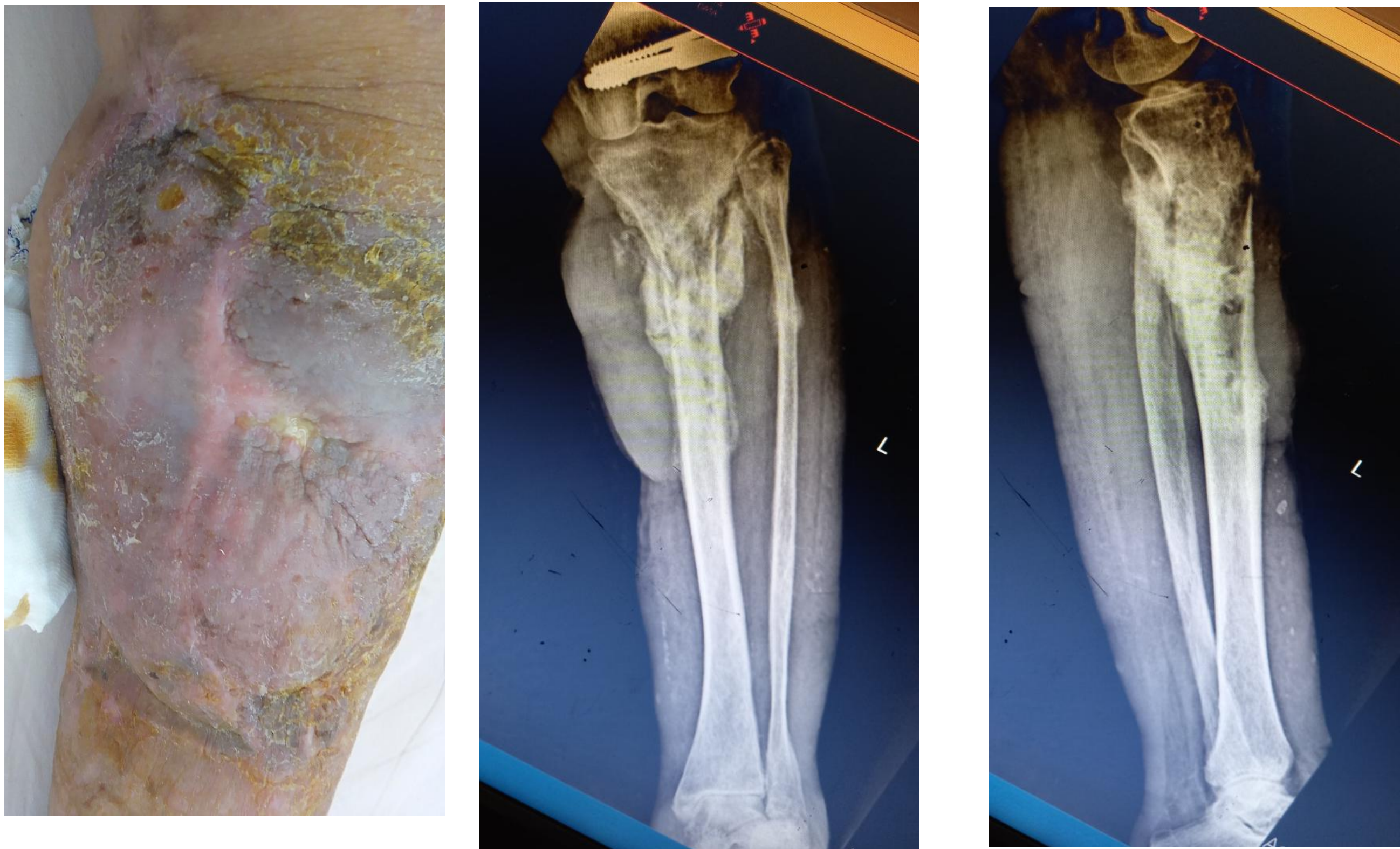
- Evolution: Unfavorable clinical progression despite prolonged and adapted targeted intravenous antibacterial therapy.
- Hardware Exposure: Chronic discharge and persistent plate exposure necessitated complete surgical ablation of the tibial osteosynthesis hardware.
- Resulting Defect: Plate removal left a large structural bone deficit, persistent nonunion, and ongoing local sepsis.

5. ISOLATION OF CANDIDA ALBICANS

- Microbiological Shift: During hardware removal, extensive mycological culture and tissue biopsies were performed.
- Pathogen Isolation: Mycological examinations isolated *Candida albicans*, confirming a fungal superinfection.
- Pathological Diagnosis: Established the clinical diagnosis of fungal pseudarthrosis (nonunion) of the tibia.
- Antifungal Therapy: Systemic antifungal treatment was initiated, achieving good initial local septic control and drying of the wound.

6. COMPLIANCE FAILURE & RECURRENCE

- Treatment Disturbance: The patient abruptly and prematurely ceased antifungal therapy after only three months of treatment without medical clearance.
- Local Recurrence: She presented back to our clinic with an active anteromedial fistulous tract of the right leg with continuous seropurulent discharge.
- Radiological Findings: X-ray evaluation demonstrated active nonunion, severe bone osteolysis, and extensive bone resorption around the proximal tibia.

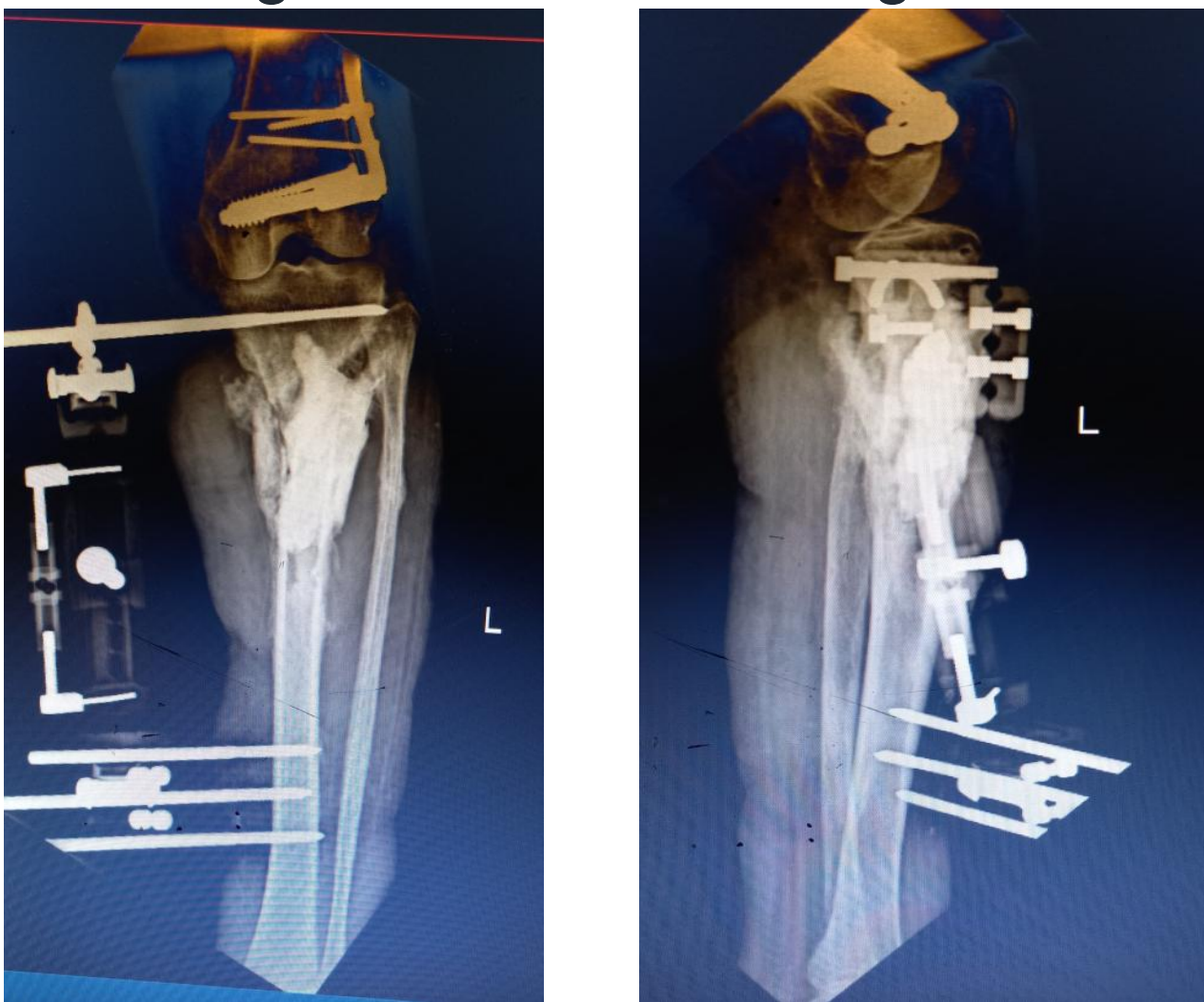


6. TWO-STAGE RECONSTRUCTION PLAN

- Clinical Decision: Radical reconstructive salvage was initiated using the Two-Stage Induced Membrane (Masquelet) Technique.
- Multidisciplinary Strategy: Planned targeted re-introduction of systemic antifungal treatment combined with sequential surgical stages.
- Membrane Induction (Stage 1): Debridement, cement spacer insertion, and rigid joint-spanning stabilization to induce a bioactive membrane.
- Biological Bone Grafting (Stage 2): Spacer removal and packing of the structural bone deficit with autologous bone graft inside the induced membrane.

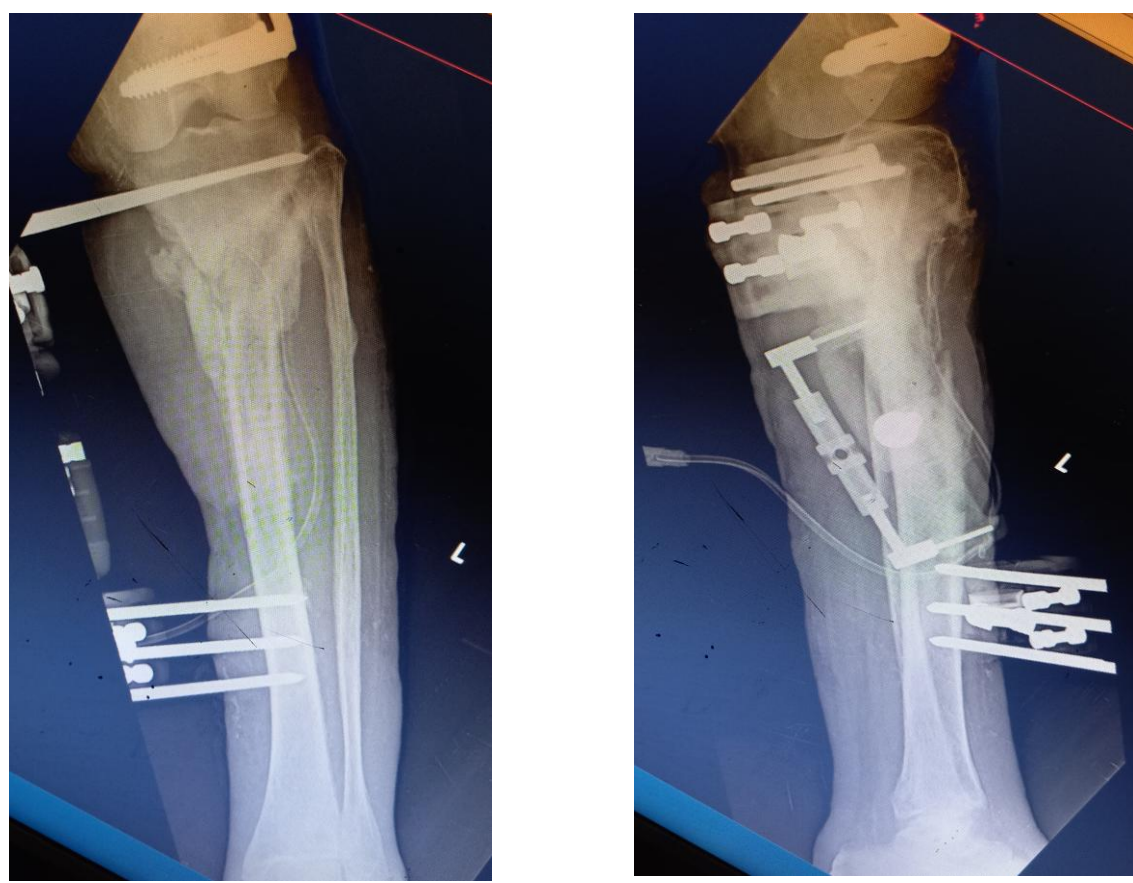
STAGE 1: SPACER & EXTERNAL FIXATION

- Surgical Execution: Radical surgical debridement of all infected and necrotic soft tissues and bone was performed.
- Spacer Insertion: A PMMA cement spacer was formed and inserted to fill the massive proximal tibia bone gap, maintaining anatomical limb length.
- Rigid Stabilization: An external fixator was placed across the knee joint to provide rigid biomechanical stability, facilitating local tissue healing.



STAGE 2: MEMBRANE GRAFTING

- Timeline: Performed 6 to 8 weeks after Stage 1, following complete clinical drying and biological normalization of septic markers.
- Membrane Preservation: The induced membrane was carefully incised longitudinally, preserving its rich vascularity and osteoinductive properties.
- Bone Grafting: The PMMA spacer was carefully removed, and the structural proximal tibial defect was packed with autologous cancellous bone graft.



7. KEY CLINICAL TAKEAWAYS

- Fungal pseudarthrosis is a rare but highly destructive complication. Suspicion should be raised in persistent, culture-negative, or worsening septic nonunions, especially after extensive broad-spectrum antibacterial use.
- Thorough and aggressive surgical debridement must be paired with targeted, long-term antifungal therapy to eliminate recalcitrant fungal pathogens.
- Patient compliance and strict therapeutic adherence are non-negotiable; premature antifungal cessation led directly to severe osteolysis and recurrence in this case.
- The Two-Stage Induced Membrane (Masquelet) Technique remains a highly reliable and extremely effective salvage option for structural tibial defects secondary to fungal infections.