

Limb Salvage in Multidrug-Resistant Infected Distal Tibial Nonunion

Staged Debridement and Ilizarov Bone Transport

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Introduction

Infected distal tibial nonunion, complicated by bone loss, limb length discrepancy and multiplanar deformity, presents a major orthopaedic reconstructive challenge. Current evidence advocates an aggressive, multidisciplinary approach to avoid amputation. Successful treatment relies on a **crucial triad**: infection eradication, mechanical stabilisation and bone reconstruction. This case demonstrates a successful staged salvage using distraction osteogenesis with the *Ilizarov* technique and targeted antimicrobial therapy.

Case Report

- Id.:** 28-year-old male, from Guinea-Bissau.
- History:** open tibial fracture (2019) with multiple unsuccessful previous surgical interventions (plate and screws, K wires), complicated with chronic osteomyelitis.
- At admission** (2023): chronic draining sinus + limb shortening + complex deformity (combined *recurvatum* and *varus* deformity and compensatory ankle *equinus*).

Multidisciplinary Infectious Management

Initial Flora
S. epidermidis & *S. caprae*
Initial antibiotherapy:
Vancomycin +
Rifampicin
450mg bid, 14 days

The Challenge: *ESBL*
Targeted Therapy:
Ertapenem id
for 12 weeks to avoid AmpC
induction risk associated
with other beta-lactams.

Close collaboration with the Infectious diseases department was pivotal to avoiding therapeutic failure in the septic environment.

Results & Outcome

Clinical Outcomes
Radiographic consolidation at 12 months.
Pain-free, mobilization with PWB.
No clinical or lab evidence of infection
(CRP normalization (0.1 mg/dL)).



Figure 1 and 2- XRay of the inferior members pre operatively, showing shortening of the left leg, 15/11/2024



Figure 3 and 4 - Xray showing the deformity in recurvatum and varus, 21/03/2024



Fig 15 (AP) and 16 (lateral) - after Ilizarov removal, Jan 2025



Fig 17 and 18 - clinical state postop

Discussion & Conclusion

This case highlights the importance of a multidisciplinary and staged approach. A staged radical debridement (down to viable, bleeding bone margins), ensuring biological clearance, combined with targeted antimicrobial therapy for multidrug-resistant polymicrobial flora, enabled conversion of a severe septic environment into a suitable biological bed for bone transport, underscoring the importance of close collaboration with infectious diseases specialists in complex limb salvage.

While techniques such as the Masquelet-induced membrane, nail-guided bone transport, or retrograde nailing could be valid alternatives, the Ilizarov method proved most advantageous in this case. It allowed for simultaneous management of infection, large-volume bone transport (>5 cm), and correction of the mechanical deformity, without placing definitive internal hardware, avoiding amputation.

Key Takeaways

Limb salvage in complex, multidrug-resistant infected distal tibial nonunions with severe bone loss is achievable.

- Radical surgical debridement:** Essential to convert septic terrain into a biological bed.
- Ilizarov bone transport:** Effectively managed infection, bone defect, and deformity.
- Targeted Antibiotics:** Essential role of ID specialists in managing ESBL-producing bacteria.

References

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Initial microbiology (Jul/2024, bone biopsy): *Staphylococcus epidermidis* and *Staphylococcus caprae*.

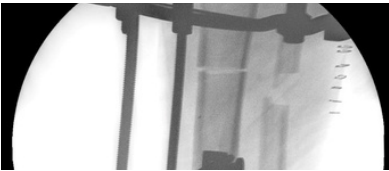


Fig. 5 (AP) and 6 (lateral) - nov/2024 stage 1

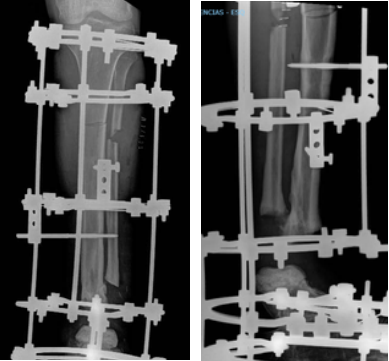


Fig 7 (AP) and 8 (lateral) - jan/2025 stage 2

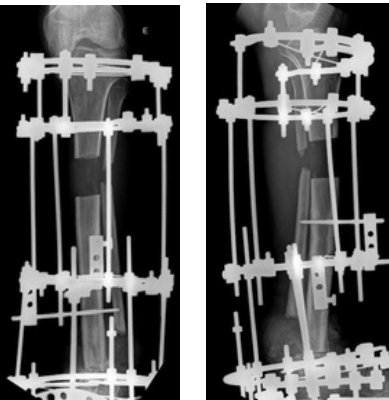


Fig 9 (AP) and 10 (lateral) - distraction complete

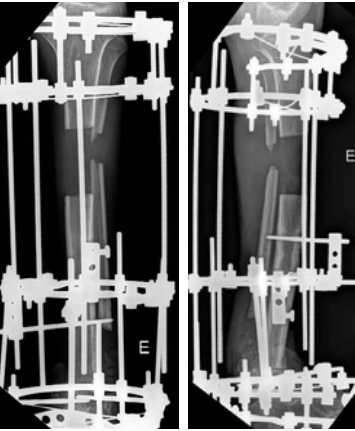


Fig 11 (AP) and 12 (lateral)

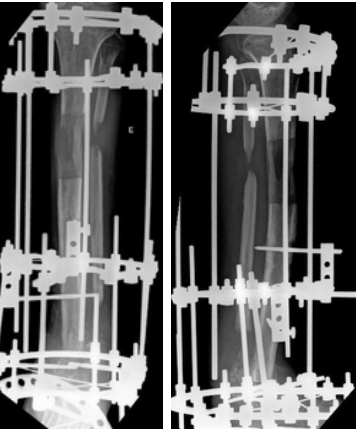


Fig 13 (AP) and 14 (lateral) 12 months follow-up, before frame removal



Fig. 19- final XRay of the inferior members, Jul/2026

Microbiology (Nov/2024, deep intraop. cultures): *ESBL-producing Enterobacter aerogenes*

Surgical Timeline

DATE	STAGE
Nov 2024	Stage 1 Radical debridement with sequestrectomy, Local antibiotic with cement spacer (Vanco/Flucloxa), Proximal tibial osteotomy Ilizarov application
Jan 2025	Stage 2 Docking site preparation Autologous cancellous bone graft (iliac crest)
	Bone transport Total defect: 7 cm Distraction rate: 0.75 mm/day (0.25x3/day)
feb 2025	Distraction completed
nov 2025	Ilizarov removal (12m follow-up)

Feb/2025

Sept/2025

Nov/2025