

From suppression to cure: staged management of infected tibial fracture with implant retention failure and conversion to intramedullary nailing

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1. Introduction

Fracture-related infection remains a major challenge in the management of open tibial fractures, particularly in elderly patients. Implant retention combined with prolonged suppressive antibiotic therapy may provide temporary infection control. Failure of infection control requires reassessment of both the infectious and mechanical strategies.

2. Case report

Initial injury – August 2024

79-year-old patient.
Low-energy motorcycle accident.
Gustilo-Anderson grade II open distal tibia and fibula fracture.



Initial external fixation.

Definitive fixation – September 2024

Removal of external fixator and ORIF of tibia and fibula with plates.



Subsequent lateral wound dehiscence and drainage.
Infected osteosynthesis.

First infection treatment – October 2024

Lateral plate removal with surgical debridement + local antibiotic treatment.
Intraoperative cultures: *Pseudomonas aeruginosa*.
Targeted antibiotic therapy.
Transition to long-term suppressive antibiotic therapy.

Failure of suppressive strategy – June 2025

Progressive medial implant exposure.
CT: incomplete fracture healing, with partial cortical bridging.



Revision surgery: medial plate removal, antegrade intramedullary tibial nailing, and local antibiotic delivery.



Intraoperative cultures: *Staphylococcus haemolyticus*.
Targeted antibiotic therapy was initiated.

Follow-up at 1 year after last surgery

4 months of postoperative antibiotic therapy - Antibiotics discontinued after clinical and radiographic improvement.
Wounds healed, no signs of infection.
Inflammatory parameters remained persistently negative throughout follow-up.
Latest radiograph: fracture consolidated.



3. Discussion

The soft-tissue envelope around the distal tibia and ankle is particularly vulnerable in elderly patients, with open fractures further increasing the risk of wound complications and fracture-related infection.

Suppressive antibiotic therapy may provide temporary infection control when definitive surgery is not immediately feasible, but could not eradicate the underlying infection. In this case, progressive wound breakdown and implant exposure occurred despite prolonged suppressive therapy.

Persistent infection may compromise fracture healing, while incomplete union and mechanical instability may further contribute to infection persistence. In this case, the coexistence of persistent infection and failure of fracture healing defined an infected nonunion.

Implant exposure and incomplete healing required surgical revision, with hardware removal, thorough debridement and conversion to intramedullary nailing. Local antibiotic delivery with calcium sulfate loaded with meropenem complemented systemic therapy, addressing both infection control and fracture stability.

Changing from a rigid fixation construct to a less rigid intramedullary fixation may have improved the mechanical environment for fracture healing by allowing controlled interfragmentary micromotion and promoting secondary bone healing.

4. Conclusions

Suppressive antibiotic therapy may provide temporary infection control, but failure requires reassessment and definitive surgical management. Changing the fixation method and adding local antibiotic delivery can address both infection control and fracture stability, supporting successful fracture healing.