Revision Ankle Arthrodesis via Conversion of a Tibiotalocalcaneal Nail to a Lateral Plate Construct: Decision Making and Outcome in a Rare Case

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Introduction

- Ankle fractures are amongst the most common ankle fractures in geriatric patients, and due to the comorbidities in this population, achieving adequate fixation can be difficult.[1]
- Open reduction internal fixation (ORIF) has been the standard treatment for years, but tibio-talo-calcaneal (TTC) nailing is emerging as an alternative approach in the elderly.
- There is mixed evidence supporting improvements in complication rates, shorter hospital stays, and fewer returns to the operating room.[2,3,4]
- When TTC nails are utilized, complications can include surgical site infections (11.2%), implant failure (8.1%), nonunion, malunion, and periprosthetic fractures, with unplanned return to surgery occurring in 10.1% of cases.[5]
- When TTC nails fail, however, details outlining the revision options are limited in the current literature.[6,7]
- There is some biomechanical data supporting the benefit of a lateral plate construct, which provides superior compression at the tibiotalar and subtalar joints compared with intramedullary nails and greater resistance to plastic deformation, particularly in osteopenic bone.[8,9]
- Thus, we present a case of late TTC failure managed with conversion to a lateral femoral locking plate construct for revision ankle arthrodesis.

Case Description

- 89-year-old female with a past medical history of osteoporosis, obesity (BMI 32.2), type 2 diabetes mellitus, and cardiopulmonary disease.
- Presented to clinic 2 years status post TTC nail for a displaced trimalleolar fracture with progressive pain, skin-threatening hardware prominence, and radiographic evidence of proximal and distal interlocking screw loosening.
- She underwent a revision surgery to remove the failing hardware and replace it with a more rigid lateral plate construct.
- The surgery consisted of removing the existing hardware, resection of the distal fibula, joint preparation with autologous bone graft from the excised fibula, and fixation of a contoured femoral locking plate spanning the tibiotalar and subtalar joints.
- Post-operatively she experienced minor wound complications with a superficial dehiscence that was managed non-operatively
- At 5 months status post revision, radiographs demonstrate interval consolidation of the ankle fusion with maintained alignment
- The patient is progressing with physical therapy and is currently weight bearing as tolerated in a CAM boot with a plantigrade foot.

Results

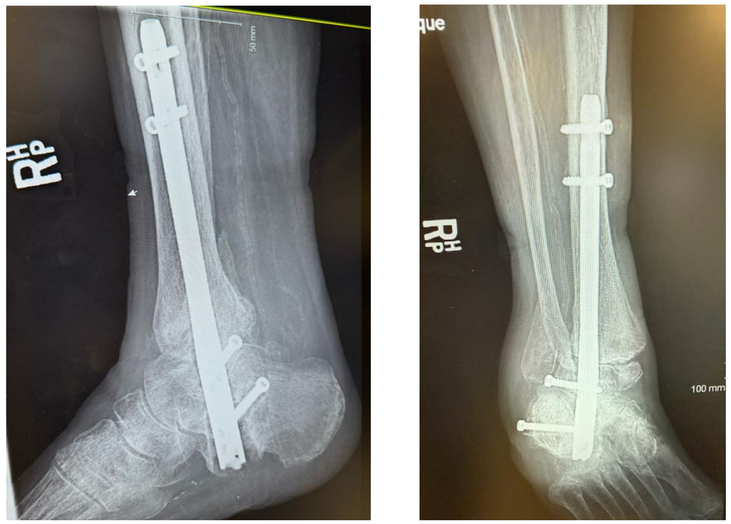

Figure 1: Preoperative Lateral and Mortise view X-rays of the right ankle

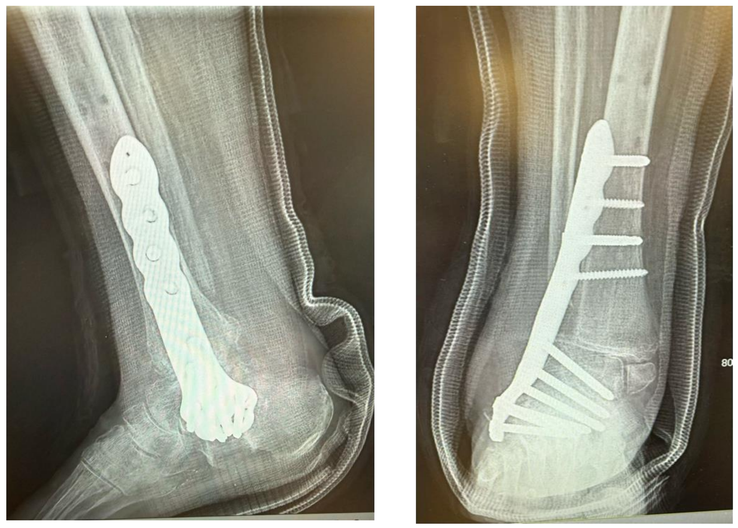

Figure 2: Postoperative Lateral and Mortise view X-rays of the right ankle

Discussion

Discussion:

- Comorbid factors in this patient, such as obesity, poor bone quality, and type two diabetes mellitus, likely played a significant role in the failure of the initial nail construct, as these factors have been associated with higher rates of hardware complications in hindfoot arthrodesis.
- Hamid et al. demonstrated that lateral plate constructs provide superior compression at the tibiotalar and subtalar joints compared to intramedullary nails.[8]
- Chiodo et al. found that blade-plate-and-screw constructs showed greater resistance to plastic deformation compared to intramedullary rods, particularly relevant in osteopenic bone.[9]
- In this patient, removal of the failed TTC nail allowed for thorough joint preparation and maintenance of adequate alignment.
- Excision of the distal fibula provided several advantages: excellent surgical exposure to the lateral ankle and subtalar joint, autologous bone graft harvest without a separate donor site, and creation of space for a larger femoral locking plate laterally.
- Compression across both the tibiotalar and subtalar joints contributed to a stable construct that promotes fusion.

Limitations:

- This report is limited by its single-patient design and lack of long-term follow-up. The generalizability of this technique to other patients with TTC nail failure is unclear.

Future Studies:

- This case contributes to the limited body of literature on revision strategies after percutaneous TTC nail failure. Future studies to determine the optimal patient selection criteria, specific implant choices, and expected outcomes for this salvage technique require further investigation.

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