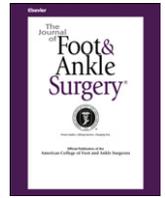




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Tips, Quips, and Pearls

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Use of Femoral Locking Plate for Salvage of Failed Ankle Arthroplasty after Trauma

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ABSTRACT

When total ankle arthroplasty fails, few good options are available for salvage. We report a case of total ankle arthroplasty displacement after trauma. The injury was initially repaired with an anterior ankle arthrodesis plate for ankle fusion. On the follow-up radiographs taken during the fourth postoperative week, internal fixation failure was noted. A second revision was undertaken, using a femoral locking plate to obtain tibio-talocalcaneal fusion. We present this case as an alternative method for developing a stable construct in revising total ankle take down.

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Currently, 3 options are available for salvaging a failed total ankle arthroplasty: revision arthroplasty, bearing exchange, or arthrodesis (1,2). In cases of significant bone loss or angular changes that are too great to be corrected by revision arthroplasty, arthrodesis is warranted. In response to the amount of bone loss and resultant instability when removing a total ankle system, previous investigators have advocated the use of plate fixation over screw fixation alone using double anterior or humeral locking plates (1,3). Locked screw plates are ideal for revision fixation because of their purchase of osteoporotic bone, in bone with compromised blood supply, and in anatomic zones in which previous implants have limited the areas from which an approach can be made (2,4,5). Periprosthetic fractures in total ankle arthroplasty have been documented in patients with osteoporosis, those with inflammatory arthritis, and those who have been implanted with a stemmed total ankle replacement system (5). We report a case in which traumatic displacement of a total ankle implant was initially treated with anterior ankle arthrodesis using an ankle-specific locking plate, which failed. We successfully used a femoral locking plate to convert the failed ankle arthrodesis into a tibiotalocalcaneal arthrodesis.

Case Report

A 48-year-old female patient with a history of gout, cancer, heart disease, hypertension, foot and leg cramping, varicose veins, and post-

traumatic arthritis presented to our clinic with a chief complaint of chronic ankle pain that had precipitously worsened during a 6-month period. She related a vast history of fractures and recurrent sprains to her left ankle. Conservative measures were attempted for 2 years until she finally underwent a total ankle prosthesis (Agility, LP Total Ankle System, DePuy Synthes, Warsaw, IN), gastrocnemius recession, and midfoot fusion. The patient experienced a stable, nonsymptomatic pseudoarthrosis of the tibiofibular joint. This construct proved satisfactory for 5 years (Fig. 1), until the patient fell down a set of steps.



Fig. 1. Postoperative lateral radiograph with agility ankle prosthesis at approximately 5 years postoperatively.

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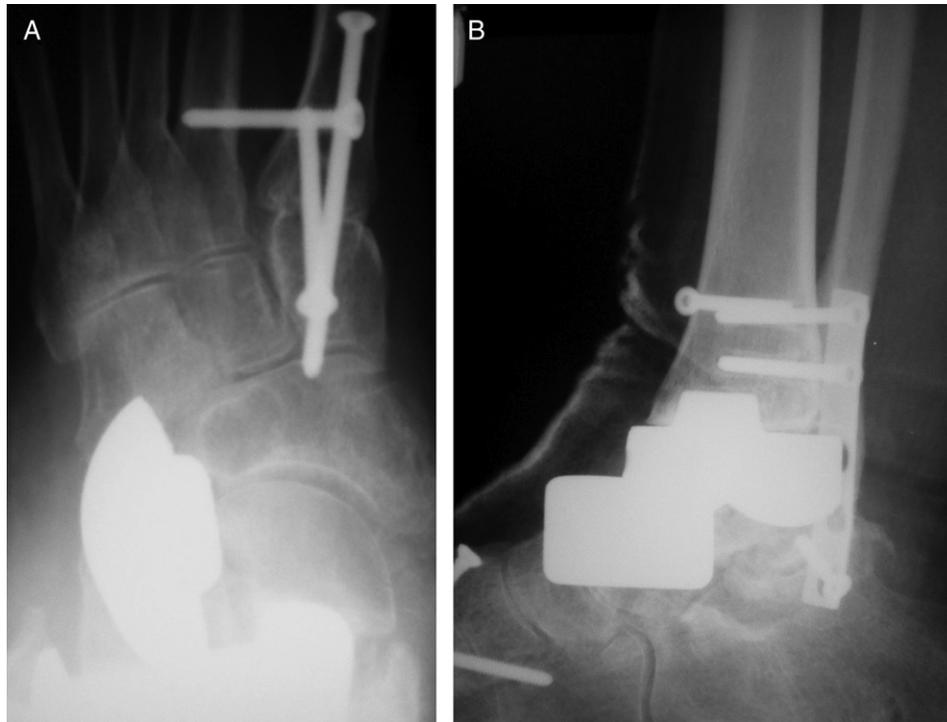


Fig. 2. (A and B) Anteroposterior and lateral radiographs demonstrating displacement of the talar component of the implant after the patient's traumatic injury.

After the accident, radiographs revealed the talar component had been anteriorly displaced and rotated. The pseudoarthrosis demonstrated no changes, widening, or instability; thus, we believed this was unrelated to the trauma (Fig. 2). A computed tomography scan showed anterior displacement and rotation of the talar component. Clinically, the patient showed signs of tenderness and swelling of the left ankle. She was pain free with range of motion to the subtalar joint. On the basis of the computed tomography findings, the patient was taken to surgery in an attempt to revise the ankle prosthesis. However, because of the significant bone loss from the lateral aspect of the talus, it was determined that a revision talar prosthesis could not be done. Instead, the total ankle arthroplasty was removed, and

ankle fusion was performed, using an anterior ankle arthrodesis locking plate in attempt to preserve the subtalar joint.

Initial Surgical Procedure

After removal of the tibial component, a large bone void was noted (Fig. 3). The lateral and anteroposterior radiographs also demonstrated the large bone void and significant bone loss secondary to the talus fracture (Fig. 4). Because the talus was fragmented significantly on the lateral portion, the ankle was grafted using Cerement (BoneSupport, AB, Lund, Sweden) and a fibular onlay graft. Two fully threaded positional screws were placed to provide rigid internal fixation (Fig. 5).

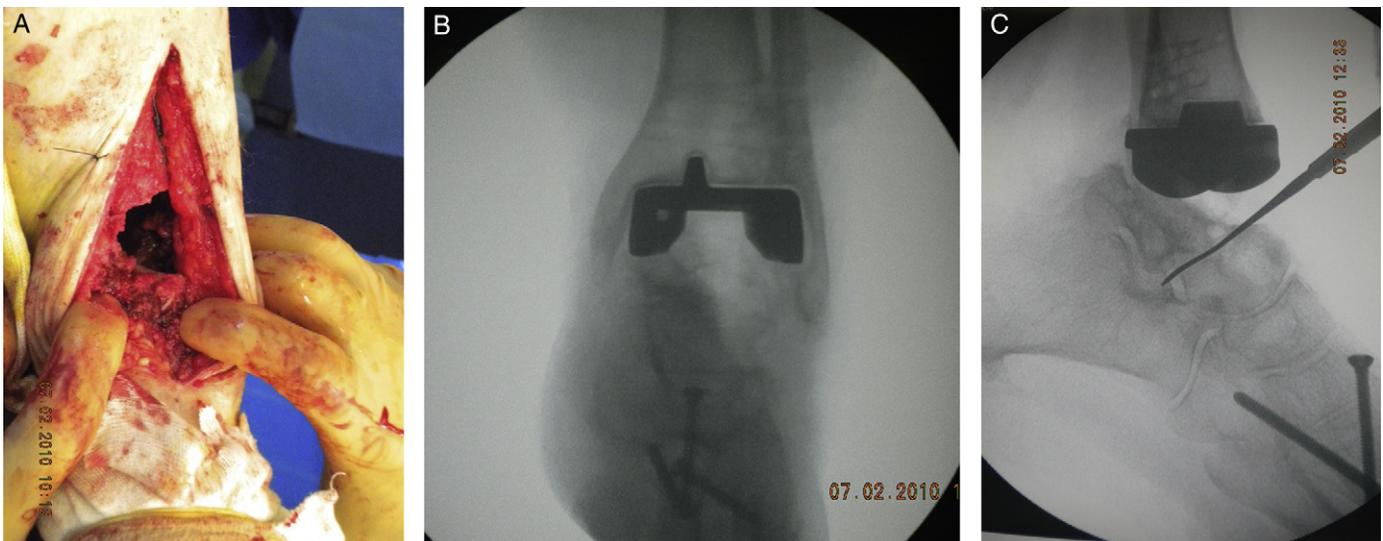


Fig. 3. (A–C) Intraoperative views demonstrating large bone void once the tibial tray and talar components were removed.

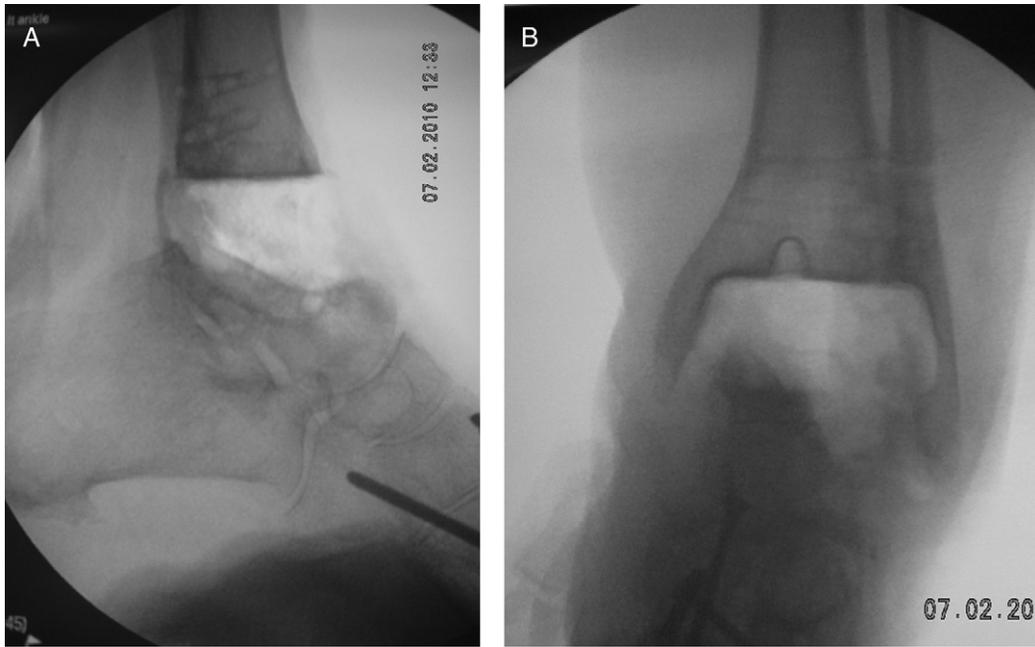


Fig. 4. (A and B) Lateral and anteroposterior radiographs demonstrating large bone void with entire implant removed. Note, amount of bone loss secondary to the talus fracture.

At the 4-week postoperative appointment, the radiographs demonstrated loss of fixation of the anterior talar screw (Fig. 6). With this bone loss of the talus after the initial take down and because of

concerns of stability, we opted to perform a tibiototalcalcaneal fusion using a femoral locking plate.

Second Surgical Procedure

The ankle was approached anteriorly through the previous incision, and the hardware was removed. The ankle joint and subtalar joint were then approached laterally in an effort to prepare for fusion. An autogenous iliac crest graft was chosen for this construct, followed by two 7.3-cm, fully threaded, screws placed from the calcaneus to the distal tibia and placement of a femoral locking plate (Fig. 7). The patient was placed in a below-the-knee, non-weightbearing cast for 8 weeks, followed by partial weightbearing with a controlled ankle motion walker. During a 10-week period, the patient was noted to have good trabeculation across the fusion sites, and she transitioned to full weightbearing with an ankle foot orthotic brace at that time. At

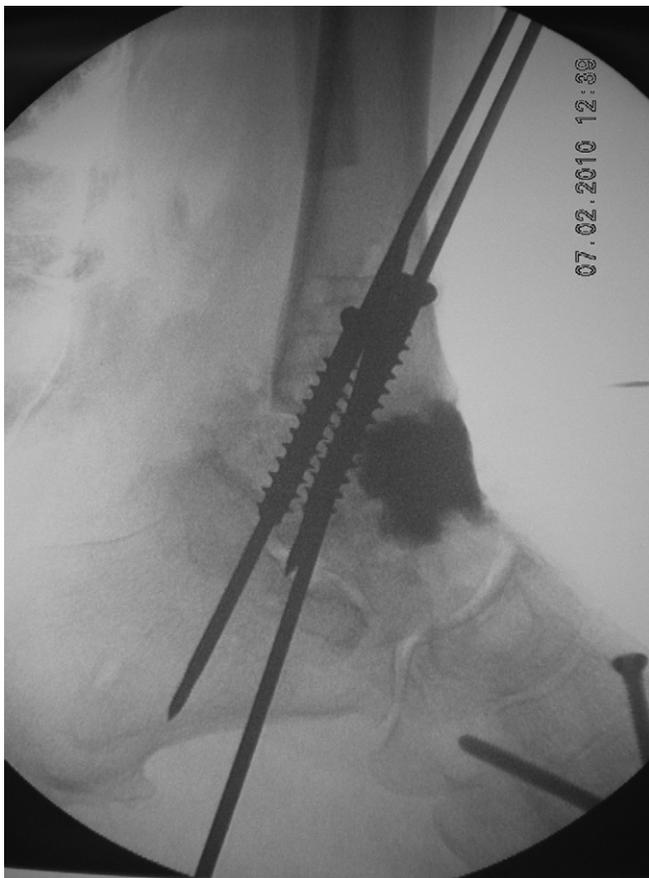


Fig. 5. Lateral intraoperative radiograph demonstrating void of the talus packed with autogenous fibular bone graft, a bone void filler, and 2 fully threaded positional screws for rigid internal fixation.



Fig. 6. Postoperative lateral radiograph demonstrating loosening of the hardware and failure of the construct. Additionally, the staples remained intact, preventing challenge to the wound healing.

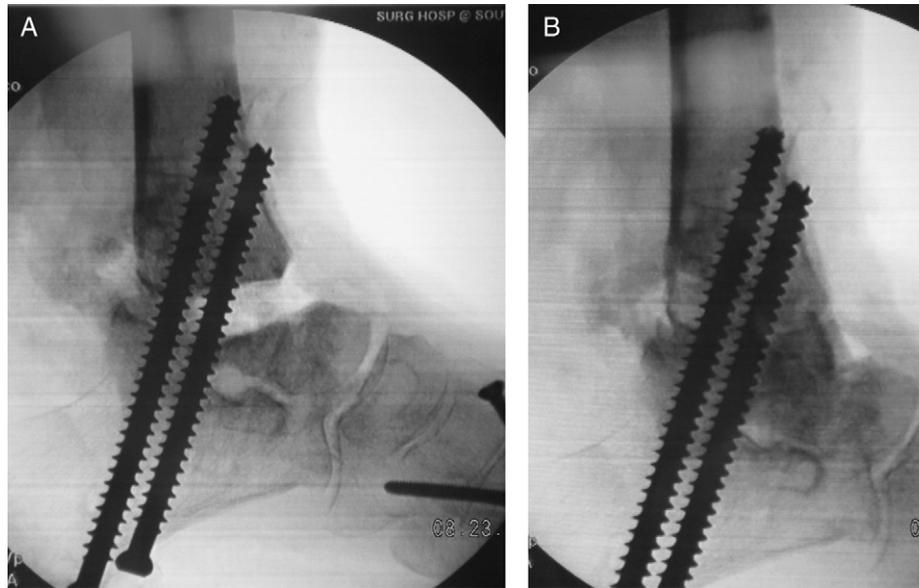


Fig. 7. (A and B) Intraoperative views after take down of the failed hardware and graft with extensive bone debridement. Two fully threaded positional screws with autogenous bone graft inserted for fixation and preparation for femoral locking plate application.

the 16-week follow-up visit, she was full weightbearing with a controlled ankle motion walker. Successful solid bony fusion, using 2 fully threaded positional screws and the femoral locking plate was noted on the anteroposterior, oblique, and lateral radiographs (Fig. 8). At the last follow-up visit, at 23 months postoperatively, the patient was ambulating with a solid nonsymptomatic tibiotalar arthrodesis (Fig. 9).

Discussion

Our patient experienced traumatic displacement of her total ankle prosthesis requiring salvage. Anterior plate fixation was inadequate owing to bone loss from the explanted total ankle arthroplasty and previous traumatic event. The femoral locking plate offered increased rigidity across a larger surface area compared with an ankle-specific plate while maintaining an anatomic fit to the fusion site. In the event that the plate requires contouring, this can be achieved by careful positioning of the lag screws. Additionally, the plate is able to bridge the tibiotalar segments to stabilize the fusion.

The size and load-sharing qualities of the femoral locking plate allowed capture of a larger bone mass. The osseous blood flow might have been partially compromised from previous surgical interventions, which also led to the decision to use a locking plate construct. It must be taken into consideration that there will be some devascularization from the dissection of the soft tissue to apply the plate. In both instances, a locked plate was chosen because of concerns with stability and the periosteal blood supply in the distal tibia.

Locking plates do not rely on the friction between the plate and bone; thus, the periosteal blood supply to the bone is not violated, such as it is with conventional plating. Owing to the fixed angle construct, the locked plate is able to withstand axial forces and valgus and/or varus stressors (5,6). Femoral locking plates have been described for bridging massive bone loss by acting as a cortical strut (6).

In conclusion, because the loss of bone after total ankle arthroplasty can be significant, we found a femoral locking plate to be an alternative fixation method that can successfully stabilize the

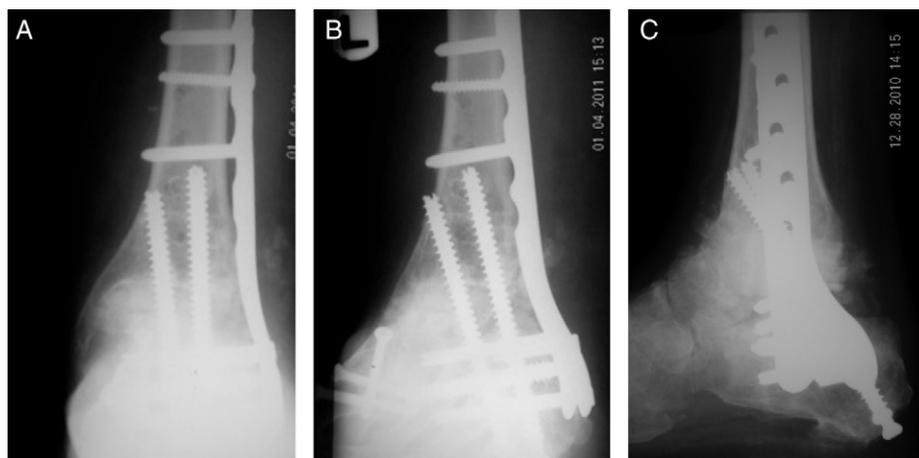


Fig. 8. (A–C) Postoperative anteroposterior, oblique, and lateral radiographs demonstrating successful solid bony fusion with the use of 2 fully threaded positional screws and a femoral locking plate.

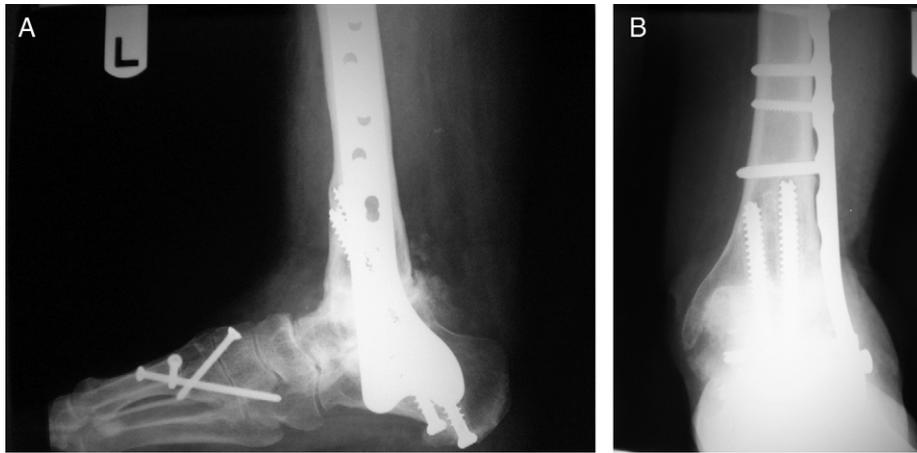


Fig. 9. (A and B) Follow-up radiographs at 23 months postoperatively showing stable construct.

rearfoot to the tibia. Not only can the plate bridge the rearfoot complex, but it also allows for near anatomic contouring along the lower lateral tibia, providing stability and rigidity to a large and unstable fusion site.

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