

Radical Reconstruction of Ankle Joint Recurvatum and Cavovarus Deformity with Opening Tibial Osteotomy and Tibiotalocalcaneal Arthrodesis.

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Statement of Purpose

Ankle fractures are one of the most common operatively treated injuries of the lower extremity. If improperly reduced, ankle fractures may lead to progressive deformity of the ankle and subsequently the foot. When determining whether to proceed with conservative or surgical care, the surgeon must evaluate displacement of the fracture sites.

The purpose of this case is to present the radical reconstruction of a traumatically acquired ankle joint recurvatum with cavovarus deformity of the foot.

Literature Review

Treatment of displaced fractures of the ankle has evolved from routine closed reduction with immobilization in a cast to open reduction and internal fixation for persistently displaced fractures. Lauge-Hansen described the most common patterns of ankle fractures, the mechanisms of injury for each pattern, and emphasized the closed treatment of fractures of the ankle. Subsequent long-term follow-up studies have demonstrated that patients with persistent displacement of the fracture had poorer long-term results than those without persistent displacement and patients with pronation-external rotation injuries had poorer results than those with supination-external rotation injuries (1).

Tibiotalocalcaneal arthrodesis (TTCA) with retrograde intramedullary nailing is typically considered as a salvage procedure for patients with low functionality. More recently, the spectrum of indications for retrograde nailing has expanded with the developments of new nails [2]. TTCA is performed in many indications such as patients with degenerative arthritis, inflammatory arthritis, post-traumatic arthritis, avascular necrosis of the talus, failed ankle arthrodesis, and Charcot neuroarthropathy (3). The advantages of intramedullary nail fixation are maintenance of alignment, length, and stability (4). This form of fixation also has been shown to provide a significantly stiffer construct for tibiotalocalcaneal arthrodesis when compared with the lag-screw technique (5).

Figure 1- Clinical Evaluation



Lateral views reveal grossly deformed ankle with anterior translation of the foot on the leg with recurvatum adaptation of the tibia and fibula

Case Study

A 70-year-old male presented to our office with chief complaint of a severe right foot and ankle deformity. When the patient was 5 years old, his right ankle was run over by a car resulting in fracture to the right ankle. At the time of injury, the patient underwent conservative casting. Due to malreduction of the fracture, the patient developed a progressive deformity to the right foot and ankle which had become painful and severely limited his ability to ambulate and wear normal shoe gear. The patient displayed an antalgic gait to the right lower extremity and ambulated with the assistance of a cane. On physical examination, the patient displayed anterior dislocation of the foot to the leg at the level of the ankle joint, with noted recurvatum adaptation of the tibia and fibula (Figure 1). On radiographic evaluation, a cavovarus deformity is appreciated with confirmation of recurvatum adaptation of the tibia and fibula at the level of the ankle joint (Figure 2-3). Procedural choices were discussed with the patient and the decision of opening tibial osteotomy, steindler stripping, resection of excess fibula, and tibiotalocalcaneal arthrodesis, all to the right lower extremity, was made.

The patient was brought to the operative room and placed supine. At this time, attention was focused to the plantar medial heel where a 1 cm stab incision was made. Blunt dissection was carried out to the level of the plantar fascia and first plantar muscular layer, at which time a steindler stripping was performed. Minor resolution of cavus deformity was noted following the procedure.

A curvilinear incision was made along the lateral aspect of the right ankle along the deformed fibula. The deformed 6 cm of distal fibula was then excised. Upon further dissection and fluoroscopic evaluation, anterior lipping was noted to the tibia and talus which was also excised. A transverse opening osteotomy was performed to the tibia with the use of a trauma saw. Bone excised from the fibula was then inserted into the medial of the tibia as an autograft.

The tibia, talus, calcaneus were then positioned in preparation for insertion of intramedullary nail. After proper positioning was done, the foot was then translocated posteriorly on the leg and appropriate alignment was noted. After this, a guidewire for the fusion nail was inserted and proper reaming of the fusion site was performed. The nail was then inserted as well as the proximal dynamic screw, followed by the proximal static screw. After proper positioning and confirmation by fluoroscopy, the calcaneal compression screw was inserted and the nail was compressed. After this, the calcaneal and subtalar screw were inserted and proper positioning was confirmed with fluoroscopy. The surgical site was then packed both medially and laterally with 15 mL of crushed cancellous chips at the area of the fusion site. The wound was then flushed and layered closure was performed. Following the procedure, the patient was placed in a posterior splint and was admitted for 23 hour pain control.

Case Study Continued

Three days postoperatively, the posterior splint was removed and a well padded cast was applied to the right lower extremity. Three weeks postoperatively, the cast was removed and the patient was placed in a CAM boot. The patient remained non-weightbearing to the right lower extremity for six weeks, at which time the patient was allowed to be partial weightbearing in the CAM boot and physical therapy was started. Three months after the procedure, the patient was made full weightbearing.

Figure 2



Anterior-Posterior (AP) and lateral views of the ankle reveal severe adaptation of the ankle joint with cavovarus deformity.

Figure 3a



Figure 3a: Lateral 3D CT reconstruction revealing gross deformity and adaptation of the distal tibia and fibula at level of the ankle joint with cavovarus deformity.

Figure 3b



Figure 3b: Anterior 3D CT reconstruction revealing severe degeneration of the ankle joint.

Results/Discussion

Three months following the procedure, radiographic fusion was noted to the surgical site (Figure 4). One year postoperatively, the patient relates to no pain to the surgical site and admits that he is able to ambulate in normal shoe gear for the first time in over forty years.

Tibiotalocalcaneal arthrodesis has been shown to be an effective procedure for multiple lower extremity disorders. Stone and Helal reviewed 20 tibiotalocalcaneal fusions fixated with an intramedullary rod for patients with rheumatoid arthritis with severe arthritic deformity of the ankle joint and subtalar joint stiffness. They found this technique to be a good salvage procedure for elderly patients with an unstable, painful deformity and cited its ability to achieve arthrodesis with a single surgery and with early weightbearing (6). In our case, we noted the correction of an acquired recurvatum of the ankle joint and cavovarus foot deformity with the use of an opening tibial osteotomy and tibiotalocalcaneal arthrodesis. The patient is currently 16 months postoperative, and continues to relate to overall satisfaction with procedure.

Figure 4



Lateral radiograph of the foot three months postop reveals fusion across the surgical site with reduction of cavovarus deformity.

References

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