

Tibiototalocalcaneal (ankle & subtalar) Arthrodesis By Distal Femoral Nail

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Abstract

Introduction: The goals of tibiototalocalcaneal (TTC) arthrodesis is to give relief of pain, to correct deformity, and to achieve solid fusion. Intramedullary nailing (IMN) has proved to be a generally accepted method of fixation for achieving tibiototalocalcaneal arthrodesis.

Case: 37 year male presented with 2 year posttraumatic ankle and subtalar painful arthritis with equinovalgus foot. He underwent multiple surgeries including flap cover outside. We did retrograde intramedullary nailing by distal femoral nail to achieve TTC fusion. After 5 months we observe solid fusion and patient become asymptomatic.

Conclusion: Retrograde IMN is good and effective technique for TibioTtotalocalcaneal (TTC) fusion, minimum blood loss, no external splintage, less hospital stay and early wt bearing are few advantages.

Keywords: Tibiototalocalcaneal arthrodesis, Intramedullary nailing

Introduction

The goals of tibiototalocalcaneal (TTC) arthrodesis is to give relief of pain, to correct deformity, and to achieve solid fusion. Numerous techniques exist for isolated tibiotalar arthrodesis, a procedure that leaves some motion at the subtalar joint. A number of clinical situations warrant inclusion of the subtalar joint as well. Disabling arthritis, subluxation or deformity of not only the tibiotalar, but also the talocalcaneal joint, are some of the indications for fusing the subtalar joint along with the ankle. In patients with poor bone stock, such as severe osteoporosis, talar AVN, or prior failed ankle fusion, the surgeon often seeks the extra purchase of calcaneal bone in achieving a fusion. Intramedullary nailing has proved to be a generally accepted method of fixation for achieving tibiototalocalcaneal arthrodesis. A nail inserted through the plantar aspect of the foot can afford excellent stability, position, and alignment. The process of tibiototalocalcaneal arthrodesis using an intramedullary nail, usually does not involve an ankle arthrotomy, preparation of the joint surfaces. Screws are placed proximally into the tibia in a standard fashion and, after compression, the nail can be mechanically locked distally with screws into the calcaneus and the talus.

Indication

The indications for tibiototalocalcaneal arthrodesis include avascular necrosis of the talus or failed total ankle arthroplasty with subtalar intrusion. Patients with a failed ankle fusion, as well as those patients with rheumatoid or osteoarthritis

involvement of these joints, are excellent candidates for tibiototalocalcaneal fusion. Various deformities about the hind-foot and ankle, such as pseudoarthrosis, neuromuscular disease, or severe defects after tumor resection often present for tibiototalocalcaneal and in certain instances, pantalar arthrodesis. With significant instability, subluxation, or arthritis involving not only the ankle and hind foot, but also the transverse tarsal joints, coupling the mid-foot to the hind-foot by fusing the transverse tarsal joints often gains essential stability(4).

Tibiototalocalcaneal arthrodesis (fusion).

Specific indications include:

1. Avascular necrosis of the talus
2. Failed total ankle arthroplasty
3. Trauma (malunited tibial pilon fracture)
4. Severe deformity or instability as a result of talipes equinovarus, cerebral vascular accident, paralysis or other neuromuscular disease
5. Revision ankle arthrodesis
6. Neuroarthropathy
7. Rheumatoid arthritis
8. Osteoarthritis
9. Pseudoarthrosis
10. Post-traumatic arthrosis
11. Previously infected arthrosis
12. Charcot foot
13. Severe endstage degenerative arthritis
14. Severe defects after tumor resection
15. Pantalar arthrodesis

Contraindications

Contraindications for tibiototalocalcaneal and pantalar arthrodesis with nail fixation include a dysvascular extremity or severe active infection. Patients lacking appropriate plantar skin or fat pad will most likely fail intramedullary fixation. Severe and fixed deformities of the ankle, hind-foot and distal

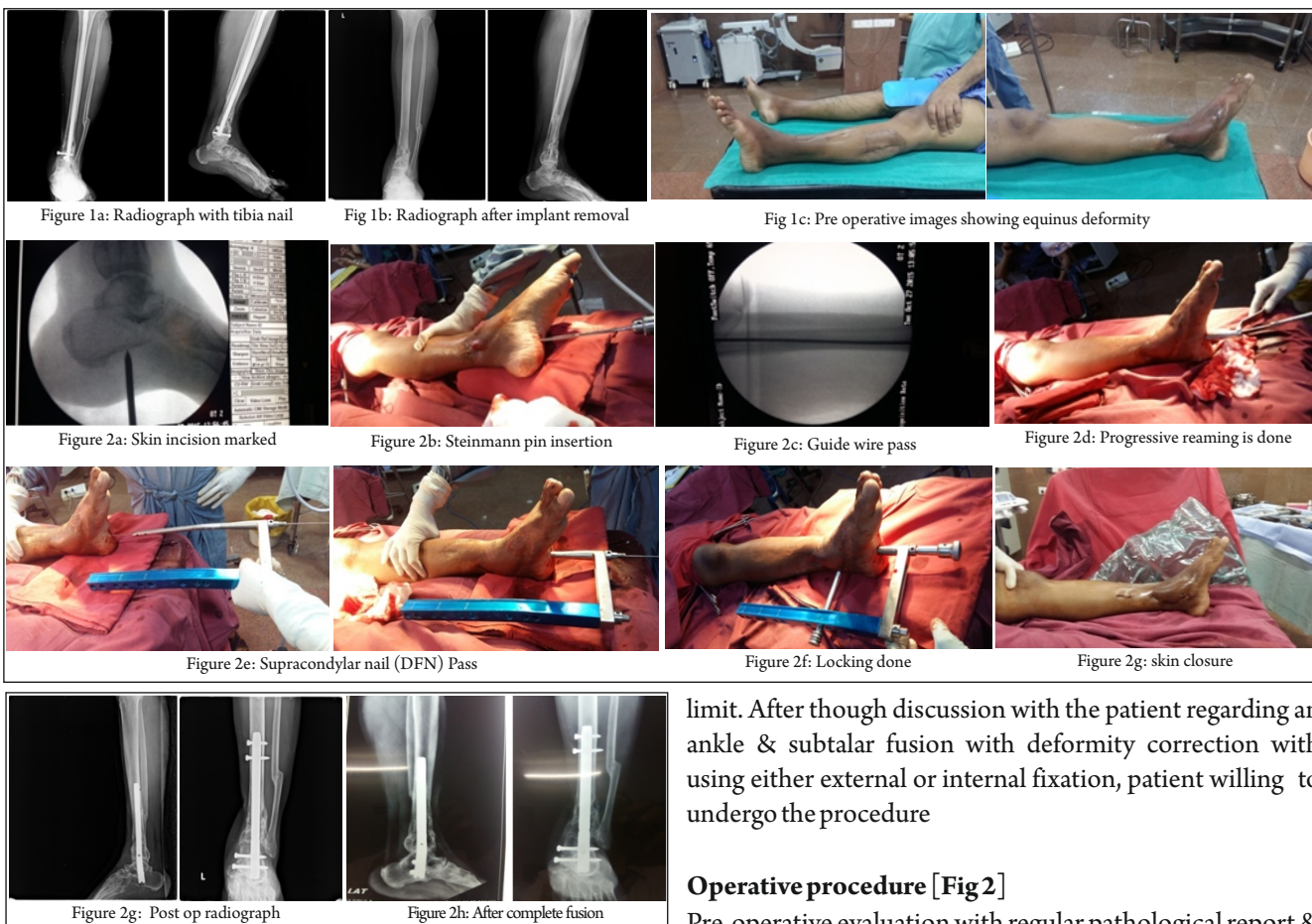
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tibia may be relative contraindications for closed nailing and arthrodesis. Because of the difficulty in obtaining a collinear reduction of the tibia, talus, and calcaneus; a more open procedure may be necessary with fixation either by nail, plates and screws or circular frame.

1. Dysvascular limb.
2. Severe longitudinal deformity.
3. Insufficient plantar heel pad.
4. Where an isolated ankle or subtalar fusion can be performed

Case Report

A 37 years male presented with chief complaints of left ankle pain since 2 years. The patient had a history of (L) lower end tibia fracture 3 years ago operated for Interlock Tibia nailing with muscular flap anterolateral aspect to close the defect. A year later patient started to develop pain around (L) ankle region. Thought to be due to hardware so painful hardware (tibia nail) was removed in another hospital [Fig. 1]. After that the pain still persist in (L) ankle, patient underwent multiple physiotherapy with local steroid injection for ankle arthritis & talocalcaneal arthritis, in spite of all these thing pain persist Physical examination reveals fixed equivovalgus position at (L) ankle & hind foot region. No active dorsiflexion or planter flexion at (L) ankle joint. There is painful passive dorsiflexion of (L) ankle joint. Dermatological examination within normal limit except flap, vascular & neurological examination within normal

limit. After though discussion with the patient regarding an ankle & subtalar fusion with deformity correction with using either external or internal fixation, patient willing to undergo the procedure

Operative procedure [Fig2]

Pre-operative evaluation with regular pathological report & chest x-ray with ECG done, written & informed consent taken. Patient underwent surgery under spinal anesthesia on regular radiolucent operative table with radiograph (C-Arm) guidance.

Post operative Course

Total 3 dose of IV antibiotic given, On 2st post-operative day 1st dressing & 1st radiograph was taken Patient was discharge on 3rd post-operative day & advice non weight bearing walking till suture removal. After 15 days suture removed & advice for full weight bearing walking with help of single stick/cruch and advice to discontinue gradually. 2nd radiograph was taken after 6 weeks & so on till bony union. Pain was gradually decrease. By end of 6 weeks most of previous pain-disappear. Solid bony union was seen after 5 month.

Discussion

Retrograde IMN ankle and subtalar arthrodesis has been shown to be an effective method for complex reconstructive procedures of the ankle and hind foot. Recent biomechanical studies have shown superior strength with the use of IMN fixation over that of conventional cross screw techniques for ankle and hind foot fusion, offering the advantage of being useful in conditions of either distal tibial and talar bone loss or when conventional screw fixation is suboptimal. Upon biomechanical comparison of IMN fixation and lag screw fixation for TTC arthrodesis, the IMN construct was shown to be significantly stiffer than the

crossed lag screw construct after cadaveric specimens were subjected to cantilever bending tests in plantar flexion, dorsiflexion, inversion, and eversion as well as in internal and external rotation[2,3]. Thus, the IMN can be seen as more helpful in aiding the maintenance of hind foot alignment during union, which ultimately increases the rate of fusion. IMN also allows for immediate stability and alignment with less dependence on external immobilization. Ankle arthrodesis using the retrograde IMN is an effective method of correcting deformity and providing a plantigrade, braceable foot in patients with severe Charcot arthropathy and diabetes mellitus. Dalla Paola et al[5] achieved complete bony union of the ankle panarthrodesis with use of the IMN in 14 of 18 patients with Sanders pattern IV Charcot neuroarthropathy with no intra- or perioperative complications. In a similar subset of patients, Pinzur et al[6] investigated the use of a longer, femoral nail for ankle arthrodesis and its role in decreasing the risk of tibial stress fractures compared with shorter nails. All 9 patients achieved fusion of their ankle arthrodesis with a longer retrograde femoral nail. There was no evidence of infection, stress fracture or stress concentration at the proximal metaphyseal tip of the nails and all patients were ambulatory without localized pain. Ankle fusion with longer IMNs dissipates the stress along the entire shaft of the tibia and prevents its concentration at the tip. In patients with tibial fractures previously treated with external fixation, there is a greater risk for infection with ankle arthrodesis using the IMN. Pawar et al[1] were able to achieve union and eradicate infection with an antibiotic-coated locked IMN in five

patients with infected Charcot ankles, 3 of whom had failed treatment with circular external fixation for infected ankle neuroarthropathy. Retrograde IMN is associated with several complications which include wound slough, infection, malunion, delayed union and nonunion, hardware failure, plantar foot pain, stress fractures, cortical hypertrophy, or stress risers at the proximal nail junction. Deep infection with proximal extension often requires removal of the implant, debridement and salvage with an external fixator if arthrodesis is incomplete. Initial treatment for delayed unions and nonunions includes removal of the proximal locking screws and adjunctive use of bone stimulator. If nonunions are symptomatic, reaming and exchange to a larger rod, or alternatively salvage with blade plate and bone grafting augmented with compression screw fixation may be necessary. Plantar foot pain is minimized with placement of the nail flush with the plantar cortex of the calcaneus and avoiding insertion on the weight-bearing heel pad[4].

Conclusions

Retrograde IMN is good and effective technique for Tibiotalar and Talocalcaneal fusion Minimum blood loss, no external splintage, less hospital stay and early weight bearing are few advantages

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