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## Distraction arthroplasty for post traumatic osteoarthritis of the ankle joint: A case report

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### Abstract

Treatment modalities for post traumatic osteoarthritis of the ankle joint are a challenge for orthopaedic surgeons worldwide. Ankle distraction arthroplasty is a useful alternative to arthrodesis or total ankle arthroplasty and is especially useful in younger individuals who are reluctant towards an ankle fusion. It involves the use of an external fixator to distract and thereby mechanically offload the ankle joint and simultaneously permit a stable range of motion. The purpose is to allow intermittent intra-articular flow of synovial fluid and to relieve the mechanical stresses on the cartilage. The procedure is extremely rewarding for individuals seeking an alternative to ankle arthroplasty or fusion.

**Keywords:** Ankle osteoarthritis, distraction arthroplasty, ilizarov, joint preserving procedure

### Introduction

Ankle osteoarthritis is commonly seen as a sequel to high energy trauma. Total ankle arthroplasty (TAA) and arthrodesis may relieve pain and provide good short term results<sup>[1, 2, 3]</sup>. However both these procedures are associated with potential complications like increased stress on adjacent joints leading to wear, failure and subsequent revisions with the former and degeneration, increased energy expenditure, malunion and non-union with the latter. Ankle distraction has emerged as an alternative joint preserving procedure<sup>[4]</sup> which dramatically reduces pain and improves ankle function, thereby obviating the need or delaying the time to TAA or fusion<sup>[5]</sup>.

### Aim of Study

To alleviate pain, improve ankle function and a delay the time to ankle arthroplasty or fusion.

### Materials and Methods

Based upon a review of previous literature<sup>[5, 6]</sup>, we included patients with a painful arthritic ankle with preserved motion of at least 20° and without severe distortion of intra-articular geometry. We excluded the following: (a) acute or chronic infections, (b) age above 60 years, (c) associated multiple comorbidities, (d) poor general condition, and (e) neuropathic feet, arterial or venous insufficiency<sup>[5, 6]</sup>. We selected one patient for the procedure based on the above criteria.

A 33 year old male, a high demand individual, sustained a grade II (Gustilo and Anderson) open bimalleolar ankle fracture with a syndesmotic injury, for which he underwent a debridement and primary internal fixation. 10 months later, he reported to us with severe pain and restriction of ankle motion, without any history of instability. Clinically, he had 0° of dorsiflexion and 20° of plantar flexion with normal inversion/eversion. Markers of infection/inflammation (ESR and CRP) were negative. Weight bearing radiographs of the ankle revealed an anterior subluxation of talus with marginal sclerosis and a loss of congruency of tibio-talar articulation. An NCCT of the ankle showed a marked reduction of joint space, juxta-articular osteopenia and subchondral cysts. The individual was desirous of a pain free ankle joint with functional range of motion.

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**Fig 1(a):** Pre-op radiographs of affected ankle (AP and Lateral views)



**Fig 1(b):** Pre-op NCCT of affected ankle (coronal and sagittal sections)



**(b)**

**Fig 2 (a) and (b):** Clinical photographs of fixator in situ

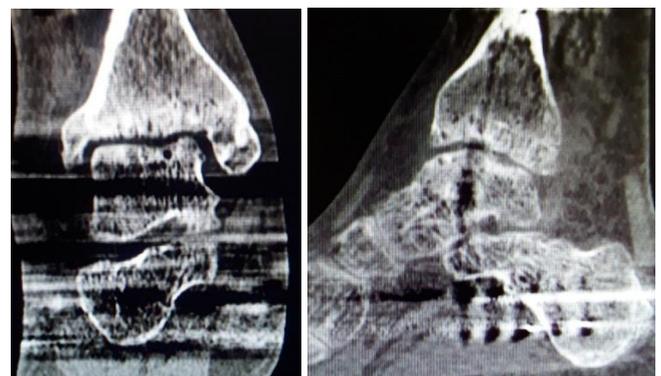
**Results**

A complete physical assessment and radiographic evaluation was done at 6 months and 1 year post-op. Weight bearing radiographs showed an increased joint space with a decrease in juxta-articular osteopenia. NCCT showed a congruent tibio-talar articulation with a reduced number of cysts. The fixator was removed at 6 months and gradual physiotherapy was initiated. At 1 year, the AOFAS (American Orthopaedic Foot and Ankle Society) score was 86 compared to 58 pre-op. MOXFQ (Manchester Oxford Foot Questionnaire) score was 22/64 as compared to 50/64 pre-op. Ankle range of motion improved to 10° of dorsiflexion and 45° plantar flexion. VAS (Visual Analogue Score) for pain reduced from 4/10 to 0/10. The only complication encountered was a superficial pin site infection. The results of our study were comparable to similar studies by Tellesi *et al.* and Bernstein *et al.* [4,5]

Ankle distraction arthroplasty was done using the Ilizarov's external fixator. Following a TBW removal, the tibial rings were applied approximately 10 and 15 cm above the ankle joint, perpendicular to the long axis of the tibia with a circumferential two finger breadth spacing. Next, the foot frame was applied and connected to the distal tibial ring using hinges placed along the anatomical axis of rotation of the ankle joint (Inman axis), which runs roughly from the tip of the medial malleolus to the tip of the lateral malleolus. The joint was distracted acutely to 5 mm and weight bearing was permitted as per tolerance. Follow up was done at 3 months, 6 months and 1 year.

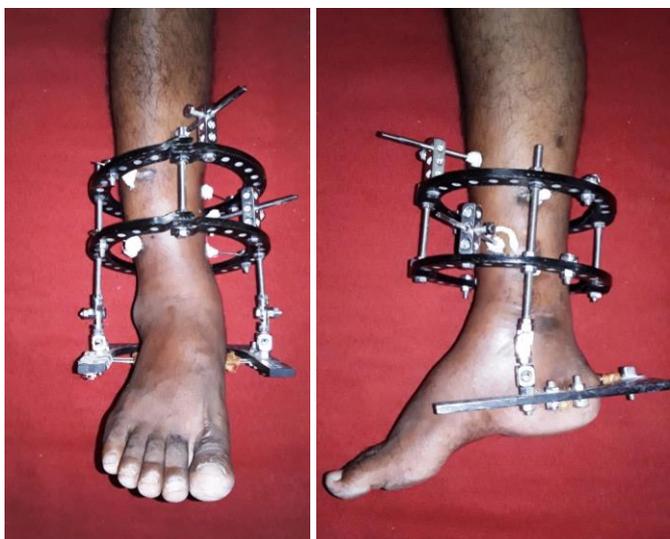


**(a)**



**(b)**

**Fig 3 (a) and (b):** Radiographs and NCCT at 6 months post-op



**(a)**



(a)

Fig 4 (a): Radiographs at 1 year post-op



(b)



(c)

Fig 4 (b) and (c): Clinical photographs of ROM at 1 year post-op

### Discussion

By applying an external fixator and distracting the joint, the axial load and shear stresses on the articular surface were relieved, allowing the cartilage to undergo a reparative process [7]. Also, weight bearing and walking with the frame promoted cyclical fluctuations in the intra-articular hydrostatic pressure and release of growth factors from the exposed marrow spaces, improving the local environment for cartilage healing. The local inflammatory responses recruited the pluripotent mesenchymal stem cells which differentiated into chondroblasts that generated hyaline or fibrocartilage. Radiographically, an improvement was seen in the density of subchondral bone with resorption of subchondral cysts.

### Summary

The present study confirms that distraction arthroplasty is a promising solution for a young patient with severe ankle arthritis. The procedure has successfully alleviated pain, improved ankle motion and restored the functional requirements, thereby avoiding a complex intervention such as an arthroplasty or a fusion.

### Patient Declaration Statement

“The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.”

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