

# Single-Stage Correction of Severe Rigid Ankle Equinus Deformity by Talectomy and Tibiocalcaneal Fusion in Adulthood: A Case Report

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## Learning Point of the Article:

Talectomy is a useful procedure in some cases of severe ankle equinus deformity correction and tibio calcaneal fusion yields satisfactory clinical outcome.

## Abstract

**Introduction:** Equinus deformity is commonly seen in children with underlying diseases such as arthrogryposis multiplex congenita congenita, spina bifida, and myelomeningocele. It is the most common deformity of the lower limb following poliomyelitis in the developing countries. The equinus deformity may be accompanied with varus (equinovarus), cavus (equinovarus) or cavus, and varus (equinocavovarus). If the deformity is not treated in early childhood, it becomes progressive, rigid, and difficult to treat.

**Case Report:** In this article, we describe a case of 35-year-old lady who had severe rigid equinus deformity due to poliomyelitis. We did talectomy and tibiocalcaneal fusion to achieve single-stage correction of the deformity. At 2 years follow-up, patient had painless plantigrade foot and satisfactory esthetic and functional outcome.

**Conclusion:** Severe rigid ankle equinus deformity in adults can be corrected by midfoot osteotomies and/or gradual correction using external fixator. When the patient is not compliant for gradual correction technique, the deformity can be corrected by talectomy and tibiocalcaneal fusion. The purpose of presenting this case report is to demonstrate and share satisfactory outcome of single-stage talectomy and tibiocalcaneal fusion.

**Keywords:** Severe ankle equinus deformity, talectomy, tibiocalcaneal fusion, equinus.

## Introduction

In adults, severe deformities of foot and ankle can be seen in conditions such as poliomyelitis, meningomyelocele, arthrogryposis multiplex congenita congenital or post-traumatic conditions. These severe deformities can be treated with osteotomies and/or gradual correction using an external fixator. In developing countries, some people do not choose opt for this option due to the cost and time involved in gradual correction of the deformity; hence, single-stage correction of deformity can be a good alternative for them.

In adults tibiocalcaneal fusion has been described in the literature for the management of post-traumatic avascular necrosis of talus [1] and neuropathic ankle deformity [2].

In this report, we present a case of severe neglected equinus deformity in a 35-year-old lady due to poliomyelitis, treated with single-stage talectomy, and tibiocalcaneal fusion.

## Case Report

A 35-year-old lady reported to us with severe ankle equinus deformity since childhood. She suffered from poliomyelitis at the age of 4 years. Then, she developed the deformity at ankle and started walking on her toes. As she never received any treatment for the deformity in childhood, the deformity became fixed till adulthood. Because of severe deformity, she could not use footwear. She came to us for treatment when she started getting pain in ankle, hip, and lower back. To maintain the length of foot,

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## Author's Photo Gallery



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**Figure 1:** Clinical pre-operative photograph. (a and b) Clinical pre-operative photograph showing severe equinus deformity. Patient was walking on head of metatarsals.



**Figure 2:** Pre-operative radiograph. Pre-operative anteroposterior and lateral radiographs showing almost vertically oriented talus and posterior tuberosity of talus articulating with tibia. There is evidence of arthritic changes in ankle and subtalar joints.

midfoot osteotomy and gradual correction with Ilizarov external fixator, but due to time and cost involved in it, she refused gradual correction. We offered her single-stage correction of the deformity for which she was ready. Talectomy and tibiocalcaneal fusion was planned for her affected foot.

**Pre-operative evaluation**

Thorough clinical examination was performed to detect components and rigidity of the deformity (Fig. 1), limb length discrepancy, and neuromuscular evaluation. True and apparent limb lengths were measured. There was 1 cm shortening of tibia. The strength of quadriceps and other proximal muscles was evaluated and it was normal. Examination of spine and hip was performed to rule out associated pathology.

Weight bearing anteroposterior and lateral radiographs of foot and

ankle were taken (Fig. 2). Radiographs showed posterior part of talus articulating with distal tibia. Arthritic changes were noted in ankle and subtalar joints.

**Operative procedure**

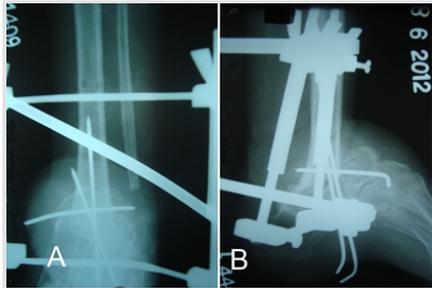
Patient was operated in supine position under spinal anesthesia. A thigh tourniquet was applied. The patient was prepped with Povidone-Iodine Solution and draped under sterile conditions.

Anterolateral approach was taken to expose the ankle joint. The incision measured 10 cm in length starting 8 cm above the ankle joint line and 1 cm anterior to the anterior border of fibula. It was extended vertically downward up to 2 cm below the ankle joint and ended at the base of fourth metatarsal. Incision was deepened in layers and dissection was done to expose the fibula. Distal 4 cm of fibula was excised (Fig. 3a).

Osteotomy of distal 4 cm of fibula was done for transfibular approach (Fig. 3a). Ankle arthrotomy and subperiosteal dissection around the talus was performed. All ligament attachments of talus were excised and talectomy was done (Fig. 3b). Although significant correction of equinus was achieved at this stage (Fig. 3c), there was



**Figure 3:** Intraoperative Photographs. (a) Anterolateral approach is taken to excise and osteotomy of distal 4 cm of fibula was done.. (b) Talectomy is done through the same approach. © Note the correction of deformity after talectomy and excision of 1 cm 5 mm of tibia.



**Figure 4:** Immediate Post-operative Radiographs. (a and b) Immediate post-operative radiographs showing two K-wires from calcaneum into tibia and one K-wire from navicular into tibia. Arthrodesis site is stabilized with Charnley clamps.



**Figure 5:** Post-operative Clinical Photograph showing. (a and b) Clinical photographs showing fixation with Charnley clamp. Note the posterior assembly in the frame to protect the posterior skin graft.

significant tightness in Achilles tendon and posterior soft tissues. To achieve complete correction, 1 cm of distal tibial metaphysis was excised with the saw. Percutaneous tenotomy of the Achilles tendon was done. While correcting the foot to neutral position, there was rupture of delicate posterior skin at the tenotomy site. The defect thus created in the skin measured 3 × 2 cm in size. At the end of the procedure, this defect was covered with split thickness skin graft obtained from left thigh.

For the tibiocalcaneal fusion, superior surface of the calcaneum including all three facets was prepared with the help of curette, rongeur, osteotome, and multiple drills. Distal tibia and superior surface of calcaneum were opposed to each other and held together with two 2 mm Kirschner's wires (K-wires) passed from calcaneum into tibia.

The K-wires passed from calcaneum into tibia helped to maintain good alignment (Fig. 4a). One K-wire was passed from navicular into tibia. after preparing tibial and navicular surfaces (Fig. 4b).

To fix the tibiocalcaneal arthrodesis site, Charnley fixator was used. Charnley clamps were applied to two dunham pins. First 4.5 mm dunham pin was passed from medial to lateral in the calcaneum. Another pin was passed from lateral to medial side in the distal tibia (Fig. 5a). Calcaneal and tibial surfaces were opposed to each other with compression by two Charnley clamps applied on each side of dunham pins. Three extra connecting rods were applied on the posterior aspect of heel to make a square frame to protect the skin graft (Fig. 5b). Anterolateral incision was closed in layers with loose sutures without drain. Sterile dressing was

applied.

Patient was hospitalized for 7 days. Circulation, swelling, and toe movements were assessed in the post-operative period. Patient was ambulated non weight bearing and encouraged to do knee and toe movements.

After discharge, patient was asked to keep follow-up every week in the outpatient department.. All three K-wires were removed after 6 weeks and Charnley fixator was removed 10 weeks after surgery. Then below knee cast was given for 3 weeks. After removal of the cast, patient was advised gradual weight bearing with walker. Radiographs were taken every month.

Satisfactory soft-tissue healing was noted in 6 weeks. Sound fusion at tibiocalcaneal and tibionavicular joints joint was noted in 3.5 months.

At 2 years follow-up, patient was able to walk plantigrade without pain and use footwear with shoe raise. The radiographs at 2 years follow-up showed sound tibiocalcaneal and tibionavicular fusion (Fig. 6). There was 4 cm shortening of the limb for which shoe raise was given. Patient was happy with the functional and esthetic outcome of the surgery (Fig. 7a, b). Patient was a daily wages worker and was able to perform her earning activities without any difficulty.

American Orthopaedic Foot and Ankle Society score had improved from preoperative 13 to post-operative 61 and revised foot function index score had improved from pre-operative 234 to post-operative 85.



**Figure 6:** At 2 years follow-up, anteroposterior and lateral radiographs showing sound tibiocalcaneal and tibionavicular fusion.



**Figure 7:** Clinical photograph showing severe equinus deformity of the left ankle before surgery (a) and plantigrade foot with excellent esthetic and functional outcome at 2 years follow-up after correction (b).

## Discussion

Severe neglected and rigid deformities noted in adulthood pose unique problems of soft-tissue coverage and neurovascular compromise during surgical correction. The surgical options described in the literature for correction of severe equinus deformity include talus and midfoot osteotomies [4, 5], gradual distraction by Ilizarov method [6, 7], amputation, and fusion. Midfoot osteotomy and gradual correction with external fixator help to maintain limb length and may preserve the joints.

We offered this treatment option to our patient; however, because of the cost and length of treatment, patient was not ready for it. Therefore, we used single-stage talectomy and tibiocalcaneal fusion as a salvage procedure in this patient.

In children, total talectomy has been used to correct equinus deformity with intractable congenital diseases such as arthrogryposis or myelomeningocele [8].

Talectomy and tibiocalcaneal fusion was first described by Blair [9] in 1943. He performed this procedure in patients with avascular necrosis of the body of talus.

Mirzayan et al. [3] published a case series of single-stage talectomy and tibiocalcaneal arthrodesis in 2001. They have published successful outcome of this corrective procedure in seven adult males with neglected clubfeet and post-traumatic equinovarus deformity with satisfactory outcome.

Myerson et al. [10] performed tibiocalcaneal fusion using an adolescent condylar blade plate and allograft bone for correction of severe neuropathic ankle and hindfoot deformities. Mann et al. [1] described nine tibiocalcaneal fusions in eight patients between

1986 and 1991. The surgical indications for fusion were failed previous surgery, post-traumatic talar avascular necrosis, and rheumatoid arthritis. They concluded from their study that tibiocalcaneal arthrodesis should be reserved as a salvage procedure because it is technically difficult and has a significant risk of complications.

Holmdahl (1956) reported good results in over 80% cases treated with talectomy and found it particularly useful in correcting equinus deformity caused by poliomyelitis [11].

In our case, the functional and esthetic outcome after single-stage correction of severe deformity by talectomy and tibiocalcaneal fusion is excellent. Patient's quality of life is greatly improved due to reduced pain and increased ability to ambulate. We have used Charnley fixator to stabilize the arthrodesis site. This decision was taken to protect the split thickness skin graft covering the posterior wound; otherwise other modalities of fixation can be used.

## Conclusion

Severe rigid ankle equinus deformity in adults can be corrected by midfoot osteotomies and/or gradual correction using external fixator. Our clinical experience with the management of this case suggests that talectomy with tibiocalcaneal fusion can be used effectively as a salvage procedure in patients with severe rigid equinus deformity with arthritic changes.

## Clinical Message

In some cases of severe fixed ankle equinus deformity, talectomy may be needed to correct the deformity and tibiocalcaneal fusion achieves satisfactory clinical outcome.

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