

# Zimmer® Trabecular Metal™ Total Ankle System Valgus Deformities

## Introduction

A valgus deformity of the ankle may be confined to the ankle joint, but typically also involves valgus orientation of the subtalar joint. With a valgus deformity, the objective is to realign the joint in the Alignment Stand and to correct any abnormalities that may predispose the joint to return to valgus postoperatively. Features of the Alignment Stand Assembly allow the surgeon to realign a valgus ankle before milling the joint surfaces to accept the implants. Essentially, this is accomplished by using the Calcaneus Pin to bring the hindfoot into a more neutral position, and by using the Talar Neck Pin to align the tibiotalar joint.

## Aligning the Joint

After securing the foot to the foot plate, the Calcaneus Pin is inserted parallel to the valgus deformity. The correction is made by pulling eccentrically on the pin with greater distal distraction on the lateral aspect of the pin than the medial aspect. The Calcaneus Pin is secured to the foot plate with Calcaneus Pin Hooks to maintain the corrective force on the calcaneus.

Using a similar technique, the talar neck pin can also be used to correct a valgus deformity. The talar neck pin is also inserted parallel to the deformity. Fluoroscopy can be used to facilitate this placement. The correction is made by applying a superiorly directed force to the talar neck pin. When the appropriate alignment has been achieved, the talar neck pin is clamped to the Talar Pin Connector attached to the foot plate. Fluoroscopy can then be used to confirm that the hindfoot is in neutral alignment.

To help maintain the correction, a laminar spreader can be inserted on the lateral side of the joint. Then a stabilizing Carbon Fiber Rod can be added between the distal tibial pin and the talar neck pin on the medial side. This rod can also be used to achieve some additional correction, if necessary. After tightening the clamps on the Carbon Fiber Rod, the laminar spreader is removed, and the joint is checked to ensure that the correction has been maintained. If the alignment of the hindfoot is still not fully restored, a calcaneal osteotomy should be considered.

## Addressing the Fibula

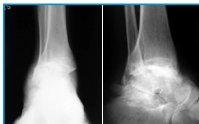
Longstanding valgus cases often involve some plastic deformation and erosion of the fibula. This may result in a large gap between the fibula and the talus, increasing the potential for the talus to shift into valgus over time. This concern can be addressed by making wedge resections proximally and medially on the distal fibula, allowing it to be positioned closer to the talus.

## Case Studies

### Case 1

This case involves a 66 year old male patient with severe valgus, subtalar arthritis, and talonavicular arthritis with an osteophyte at the talonavicular joint. The talus is somewhat flat, and the distal tibia has some erosion. The patient was particularly interested in preserving his level of activity so he wanted to avoid fusion of the subtalar joint.

The valgus was unusual in that the distal fibula impinged on the calcaneus. The patient compensated by walking with the foot supinated to minimize movement at the talonavicular joint and to avoid contact between the fibula and the calcaneus. This made the case appear to be one of varus on initial observation, but radiographic examination revealed the significant valgus at the ankle joint.



Anterior (left image) and Lateral (right image) x-ray of an ankle with valgus deformity.

The alignment was achieved in two steps. First, the subtalar joint was aligned, and then the tibiotalar joint was aligned. To align the subtalar joint, it was necessary to move the calcaneus into greater valgus. This was accomplished by inserting the Calcaneus Pin at a point that was slightly more proximal on the medial side. The pin was then advanced obliquely and exited slightly more distally on the lateral side. Thus, it allowed the calcaneus to be distracted and locked into the same valgus angle as the talus. With the calcaneus and talus in the same alignment, the entire hindfoot could then be manipulated to where the talus was parallel to the joint line by pushing proximally on the talar neck pin. A laminar spreader was then inserted into the ankle joint to maintain the alignment while the distal and proximal tibial pins were locked onto the Alignment Stand.



Intra-operative fluoroscopic image of the ankle during the Zimmer Trabecular Metal Total replacement procedure.

This maneuver tensioned the deltoid, which compensated for the cartilage erosion and helped restore height. It not only facilitated correction of the deformity, but also helped establish the appropriate deltoid tension, and resulted in less bone removal. To enhance the rigidity of the construct, a Carbon Fiber Rod was attached from the talar neck pin to the distal tibial pin. This locked the components in the proper alignment and maintained the joint space.

The goal in this case was to achieve maximum bone coverage to optimize stress distribution, particularly in the anteroposterior dimension, while minimizing overhang in the mediolateral dimension and avoiding compromise of the medial malleolus. Postoperative images reveal a successful arthroplasty with excellent bone coverage, correction of the alignment at both the ankle joint and the subtalar joint, no compromise of the medial malleolus, and no impingement of the fibula.



Anterior (left image) and Lateral (right image) x-ray of an ankle with a valgus deformity.



Anterior (left image) and Lateral (right image) x-ray of an ankle joint replaced with the Zimmer Trabecular Metal Total ankle prosthesis.

Because there were no anterior ligament attachments, and the calcaneofibular ligament was not attached, the osteotomized distal fibula was everted posteriorly rather than inferiorly. The foot was placed in the Alignment Stand with 15° of plantar flexion to ensure appropriate access to the posterior aspect of the joint. Approximately 8mm of bone was removed from the posterior tibia.

Postoperative images show a well-aligned joint with successful re-attachment of the lateral ligaments.

## Case 2

This case involves a patient with approximately 10° of valgus at the ankle joint, and no soft tissue on the distal fibula, suggesting longstanding lateral instability. In the lateral view, the calcaneal pitch is higher than is typically found in a valgus ankle, which is evidenced by greater visibility of the subtalar joint. This indicates that the subtalar joint may be in slight varus, which is confirmed in the posterior-to-anterior alignment view showing that the calcaneus is not lateral to the alignment axis. Varus at the subtalar joint suggests that the calcaneofibular ligament is absent.



Anterior (left image) and Lateral (right image) x-ray of the ankle joint replaced with the Zimmer Trabecular Metal Total ankle prosthesis.