Total Ankle Arthroplasty in the Patient with a Pathologic Fibula

Lawrence A DiDomenico DPM, FACFAS; Keith Jacobson DPM, FACFAS\(^2\); Danielle Butto DPM, AACFAS\(^3\); Olivia Stransky DPM, PGY-III\(^4\)

1Fellowship Director, Ankle and Foot Care Centers, Youngstown OH, 2Advanced Orthopaedic & Sports Medicine Specialists, 3Institute of Regenerative Medicine and Cellular Therapy, Haitiort, CT, 4Highlands Presbyterian St. Luke’s Podiatric Surgical Residency Program

Total ankle replacement and implant devices have evolved greatly. Nonetheless, the surgery can be challenging especially when pre-operative deformity exists. It is widely reported that a contraindication to total ankle arthroplasty is lack of an intact fibula\(^1\). In the post traumatic ankle status post open reduction internal fixation, the fibula can be left in a shortened position. In addition, a fibula take-down is sometimes performed in ankle arthrodesis. We present two surgical techniques to re-establish the lateral fibula as a “lateral post” to provide stability and prevent lateral subluxation/dislocation of the talus allowing one to perform a total ankle arthroplasty.

Case Study 1: Shortened, posteriorly rotated fibula w/ 20 degree ankle valgus

A lateral incision is made over the shortened and posteriorly rotated distal fibula. Once the fibula is exposed, an ostotome is made mid-shaft (Figure 1). Dissection is then carried down to the syndesmosis which is completely debridged and the bone surfaces are extensively prepared for syndesmotic fusion. Next, the deformity within the tibia was corrected with an opening wedge osteotomy (base lateral and apex medial) and fixed with a plate and screws. The fibula was able to be lengthened distally and rotated anteriorly into the incision. The fibula was then brought to length, rotated and held in a corrected position with a plate over the fibula. The syndesmosis was stabilized with four syndesmotic screws inserted across the syndesmosis through the fibula plate (Figure 2). In this particular case, a staged approach was employed. Once there was adequate consolidation across both the tibial ostotomy and across the syndesmosis, confirmed via CT scan, the patient was brought back to the operating room for a total ankle replacement (Figures 3 and 4). An incision was made through the previous lateral ankle surgical site. A fibular osteotomy was made below the syndesmosis fusion and above the level of the ankle joint ensuring not to disturb the distal tibial fibular syndesmosis fusion, allowing space through which to re-approximate the distal tibia. The Zinner Trumbauer Metal total ankle was then implanted using the standard approach.

Case Study 2: Previously resected fibula

This patient had a previous ankle fusion with fibular onlay graft (Figure 5A) lateral incision was made through the previous ankle arthrodesis surgical site. The incision was carried approximately 10 cm proximal to identify the remaining fibula. A distraction arthrodesis of the subtalar joint with iliac graft allograft was performed to correct the valgus hindfoot and restore height. The desired placement of the ankle joint was identified and the ankle joint fusion was taken down utilizing the technique for placement of a Zimmer Trumbauer Metal total ankle. Once the implant was inserted, the distance from the tip of the fibula to the talar component was measured. This is the amount of fibula deemed necessary to provide an adequate lateral strut. In our case, the distance measured eight centimeters; therefore, a transverse osteotomy was made eight centimeters proximal to the tip of the remaining fibula. The minimal amount of dissection of the fibula was performed to provide freedom of motion of the fibula strut and maintain as much blood supply as possible (Figure 6). The fibula was then rotated in the sagittal plane allowing the most proximal portion of the strut to be placed distal. The medial side of the fibula, extending to the talus component, and the lateral side of the tibia were prepared to promote a syndesmotic fusion(Figure 7). The fibula strut was fixed using a six hole 3/5 tubular plate. The three proximal holes were used to insert a 3.5 corticon nailing screw and placed using corticon. The distal hole was filled with a 3.5 cortical non-locking screw and placed bicortically in the fibula to prevent a valgus tilt of the fibula (Figure 8 and 9).