Subtalar Joint Arthrodesis for Elective and Posttraumatic Foot and Ankle Deformities

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KEYWORDS

- Posttraumatic osteoarthritis subtalar joint • Subtalar joint arthrodesis
- Foot and ankle deformities

KEY POINTS

- Identify the appropriate patient who suffers from posttraumatic subtalar joint osteoarthritis.
- Joint preparation is very important and most time should be spent preparing the joint for arthrodesis.
- Fixation construct needs to be done very well and effectively to provide a solid Arbeitsgemeinschaft für Osteosynthesefragen (AO) construct for good results.

Subtalar joint arthrodesis is a procedure used in posttraumatic arthritis, osteoarthritis, tarsal coalition management, posterior tibial tendon dysfunction, and inflammatory arthropathies.[1,2] It also can be used in deformity correction before or at the same time as total ankle arthroplasty and is incorporated in the tibial-talocalcaneal fusion. The goals of the procedure are to eliminate pain, improve function, restore stability, and realign the rearfoot.[1] The procedure has high patient satisfaction with low complications, while preserving motion in adjacent tarsal joints.[1,3] Union rates are reported from 84% to 100%.[1,2,4] Screw removal is reported between 13% and 22%[4] (**Fig. 1**).

This article discusses the use of the subtalar joint arthrodesis in both elective and posttraumatic foot and ankle deformities.

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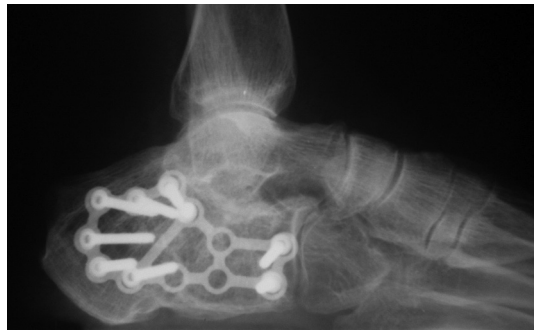

Fig. 1. A lateral radiograph projection demonstrating posttraumatic subtalar joint arthritis secondary to an unsuccessful open reduction internal fixation of a calcaneal fracture. Note the decrease in the calcaneal inclination angle, thus the talus sits more parallel to the ground instead of in a declination along and parallel to the first metatarsal. This change of the talar position also causes changes at the tibial talar joint where abutment of the talus occurs on dorsiflexion of the ankle. This impacts the ankle joint and will cause a limitation in range of motion at the ankle joint secondary to the position of the talus relative to the calcaneus.

ANATOMY AND BIOMECHANICS

The subtalar joint is composed of the dorsal surface of the calcaneus and the plantar surface of the talus. There are 3 facets on each surface: anterior, middle, and posterior. The posterior facet of the calcaneus is the largest of the 3.[5] The sinus tarsi is located laterally as the end point of the sulcus tali and sulcus calcanei. The sulcus tali and calcanei form the sulcus tali in which the interosseus talocalcaneal ligament lies. The bifurcate and cervical ligaments along with the inferior extensor retinaculum insert on the sinus tarsi.[3,6]

The subtalar joint has both an extraosseous and intraosseous blood supply. The extraosseous blood supply to the subtalar joint comes from the posterior tibial artery, the anterior tibial artery, and the peroneal artery. The posterior tibial artery gives branches that anastomose with branches from the anterior tibial artery and the peroneal artery. The posterior tibial artery also gives off a branch known as the artery of the tarsal canal. The artery of the tarsal canal gives off a large branch to the talar body and smaller branches to the calcaneus. Additionally, in anastomoses with the artery of the sinus tarsi. The intraosseous blood supply centers around the talus. The talar head is supplied by the dorsalis pedis and the artery of the sinus tarsi. The main bloody supply to the body of the talus is from the anastomoses between the artery of the tarsal canal and branches of the dorsalis pedis. The body receives additional blood supply from the deltoid branch of the artery of the tarsal canal. The calcaneus and navicular have a rich vascular connection with the talus through intraosseous ligaments and the joint capsule.[5]

The subtalar joint is responsible for the conversion of rotatory forces of the lower extremity and dictates the movement of the midtarsal joint. The subtalar joint moves as a single unit around a single joint axis. The joint axis is oriented 42° form the horizontal plane and 16° from the sagittal plane oriented obliquely posterior-plantar-lateral to anterior-dorsal-medial. The joint exhibits triplanar motion.[5] Movement in the frontal plane occurs along the longitudinal/sagittal axis producing inversion and eversion. A 2:1 ratio of supination to pronation is considered “normal.” Movement in the transverse plane occurs along the vertical component of the axis. This movement is