Triple Arthrodesis for Adult Acquired Flatfoot

Alan R. Catanzariti, DPM[a,*], Brian T. Dix, DPM[a], Phillip E. Richardson, DPM[a], Robert W. Mendicino, DPM[b,c]

KEYWORDS

• Adult acquired flatfoot • Triple arthrodesis • Image intensification • Bone graft

KEY POINTS

- The primary goal of triple arthrodesis for stage III and IV adult acquired flatfoot is to obtain a well-aligned plantigrade foot that will support the ankle in optimal alignment.
- Ancillary procedures including posterior muscle group lengthening, medial displacement calcaneal osteotomy, medial column stabilization, peroneus brevis tenotomy, or transfer and harvest of regional bone graft are often necessary to achieve adequate realignment.
- Image intensification is helpful in confirming optimal realignment before fixation.
- Results of triple arthrodesis are enhanced with adequate preparation of joint surfaces, bone graft/orthobiologics, 2-point fixation of all 3 tritarsal joints, and a vertical heel position.

Triple arthrodesis for adult acquired flatfoot is typically indicated in stage III and stage IV deformities.[1–4] These patients often have end-stage arthritis and significant deformity that is nonreducible. The authors also consider triple arthrodesis when there has been a failed joint-sparing procedure or a failed arthrodesis of an isolated tritarsal joint to address stage II adult acquired flatfoot. The goals of surgery include resolution of symptoms, realignment, and sound arthrodesis.

Acceptable outcomes following triple arthrodesis in stage III adult acquired flatfoot are based on the surgeon's ability to obtain a plantigrade foot that will support the ankle in optimal alignment. Therefore, realignment becomes the most important factor relative to good results. A well-aligned triple arthrodesis will result in normal physiologic contact pressures throughout the ankle, and prevent medial soft-tissue attenuation and ensuing degenerative changes. A triple arthrodesis with residual valgus deformity predisposes the ankle to attenuation of medial soft-tissue constraints and subsequent valgus deformity in addition to degenerative joint disease.

[a] Division of Foot & Ankle Surgery, West Penn Hospital, 4800 Friendship Avenue, Pittsburgh, PA 15224, USA; [b] OhioHealth Orthopedic Surgeons, Hilliard, OH, USA; [c] Foot & Ankle Surgical Residency, West Penn Hospital, 4800 Friendship Avenue, Pittsburgh, PA 15224, USA
* Corresponding author.
E-mail address: acatanzariti@faiwp.com

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Preoperative imaging should include weight-bearing radiographs of the foot and ankle, hindfoot alignment/long-leg calcaneal axial radiographs, and advanced imaging. Weight-bearing radiographs of the ankle are necessary to evaluate the presence of valgus deformity and degenerative changes. Long-leg calcaneal axial and hindfoot alignment views provide information regarding frontal alignment. The authors sometimes consider magnetic resonance imaging (MRI) to evaluate the ankle arthritis that might be equivocal on standard radiographs. In addition, when the foot deformity is somewhat severe and the ankle is congruent on an anteroposterior (AP) radiograph, an MRI is obtained to evaluate the deltoid ligament. In such situations whereby the deltoid ligament is attenuated on MRI, the authors will consider as adjunct procedures a medial displacement osteotomy to offload the deltoid ligament, and deltoid repair.

Several ancillary procedures are necessary to obtain a plantigrade foot. Posterior muscle group lengthening, in the form of either an Achilles tendon lengthening or gastrocnemius recession, is invariably required in stage III adult acquired flatfoot. The authors use gastrocnemius recession in most cases. However, following realignment of a severe deformity, an Achilles tendon lengthening may be necessary to obtain adequate length and restore sagittal plane position.

Medial displacement osteotomy of the calcaneus has been mentioned previously as an adjunct procedure to address ankle valgus or medial soft-tissue attenuation (**Fig. 1**). Resnick and colleagues[5] have shown that a triple arthrodesis in

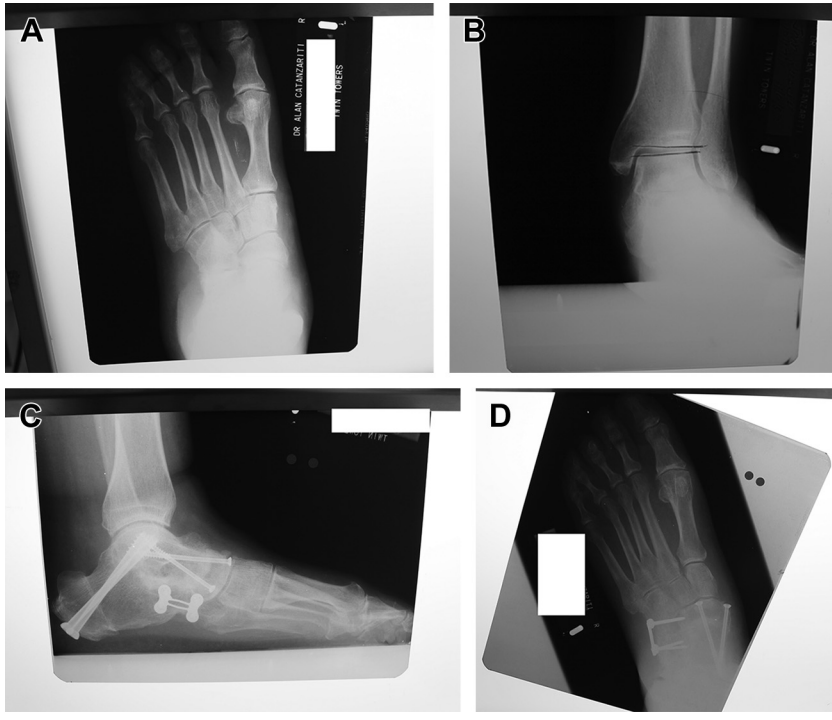

Fig. 1. (*A*) Anteroposterior (AP) radiograph of flatfoot deformity. (*B*) AP radiograph of the ankle, showing valgus deformity. (*C*, *D*) Postoperative radiographs of triple arthrodesis combined with medial displacement osteotomy to address valgus deformity of the ankle.