Triple Arthrodesis

Tips and Tricks to Navigate Trouble

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KEYWORDS

- Triple arthrodesis • Talonavicular arthrodesis • Subtalar arthrodesis
- Calcaneocuboid arthrodesis

KEY POINTS

- The goal of triple arthrodesis is to restore a stable, plantigrade foot.
- Keys to success are predicated on thorough preoperative evaluation of the patient, meticulous surgical technique, and the use of adjunctive procedures to help correct other preoperative deformities to achieve one's goal.
- Salvage options may include revision triple arthrodesis or other procedures involving the midfoot to reconcile a plantigrade foot.

BACKGROUND

Triple arthrodesis was first described by Ryerson[1] in 1923, as a dual-incision approach to arthrodesis of the talonavicular (TN), subtalar (ST), and calcaneocuboid (CC) joints for correction of rigid deformity secondary to paralytic conditions. While paralytic conditions resulting in rigid hindfoot deformity have become less prevalent, triple arthrodesis has been adapted to treat hindfoot deformity related to trauma, inflammatory arthropathies, and long-standing peritalar subluxation with posterior tibial tendon dysfunction or cavovarus deformity with arthritic changes.

Triple arthrodesis can be a powerful corrector of hindfoot deformity and a reliable procedure for pain relief in patients with hindfoot arthritis; however, it is not without complications.[2,3] Postoperative complications may include malunions and nonunions (**Fig. 1**A), lateral wound breakdown, and induction of adjacent joint arthritis.[4–6] Residual deformity (see **Fig. 1**B) may also accompany even a successful triple arthrodesis if remaining deformities of the foot are not considered and addressed at the time of initial evaluation and operative intervention.

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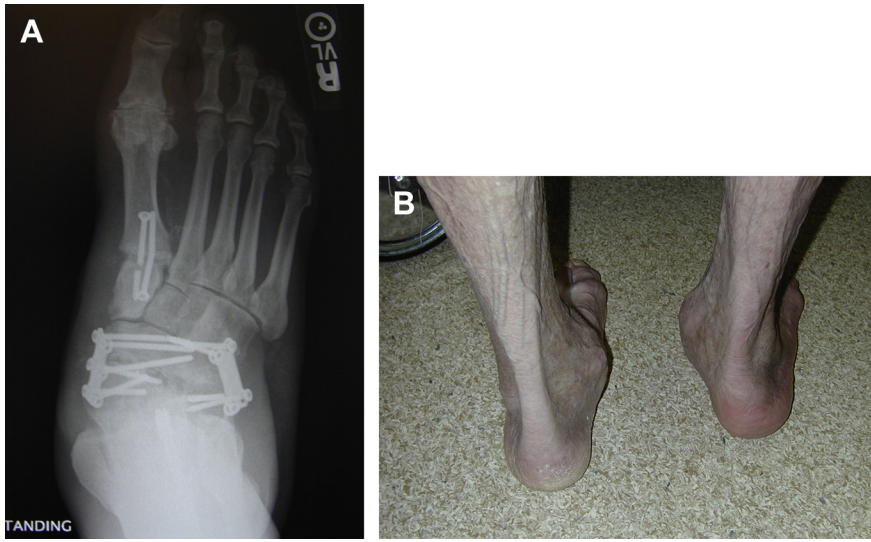

Fig. 1. (*A*) AP foot radiograph showing nonunion of talonavicular joint along with undercorrection of underlying peritalar subluxation. (*B*) Clinical photo of patient with residual deformity following attempted triple arthrodesis.

The goal of providing the patient with a stable, plantigrade foot to maximize function utilizing a triple arthrodesis can be maximized through meticulous preoperative evaluation, surgical planning, and surgical technique, including joint preparation and rigid fixation. The goal of this article is to provide pathways to maximize this goal through the use of cases to illustrate tips to avoid the common complications. Cases to illustrate salvage options for residual deformity following triple arthrodesis are also discussed.

PREOPERATIVE EVALUATION AND PLANNING

As with any encounter, the initial evaluation begins with a thorough history taking and physical examination of the patient. Patient medical comorbidities, medications, or social factors that may affect bone or wound healing require special attention, such as diabetes, steroid use, or tobacco use. Medical optimization of comorbidities and tobacco cessation may help to maximize risk reduction. Examination should include a thorough assessment of the entire lower extremity. Special attention should be given to lower extremity alignment proximally to assure that correction of the hindfoot will not exacerbate proximal deformity. Hindfoot alignment must be assessed in a weight-bearing position, and the rigidity of the deformity should be evaluated. Compensatory or contributory alignment of the midfoot and forefoot must also be assessed (**Fig. 2**), along with the status of the musculotendinous units driving foot alignment. Equinus deformity and whether it is an isolated gastrocnemius contracture or tendoachilles contracture, as well as contracture of other musculotendinous units and joint capsules, must be assessed.

Radiological examination begins with weight-bearing views of the foot and ankle in the anteroposterior, lateral, and oblique planes to assess deformity and plan for surgical correction. Weight-bearing radiographs allow for more accurate assessment of deformity, alignment, and loss of joint space (**Fig. 3**).[7] A simulated weight-bearing computed tomography (CT) protocol has been designed and implemented at the