Triple Arthrodesis

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KEYWORDS

• Triple arthrodesis • Traumatic arthritis
• Degenerative joint disease • Tarsal coalitions

INDICATIONS

Edwin W. Ryerson first described triple arthrodesis in 1923 as a fusion of the talocalcaneal, talonavicular, and calcaneal cuboid joints.[1] The goal was to create a well-aligned, plantigrade, and stable foot for patients with deformity or progressive neurologic and arthritic conditions. This procedure should be reserved for instances when all conservative measures have been tried and failed, and a more limited surgical procedure will not afford appropriate pain relief and reduction of the deformity. In cases of a flexible deformity, consideration should first be given to those procedures that are joint sparing, such as tendon transfers or osteotomies.

The following is a list of indications for triple arthrodesis:

- Subtalar osteoarthritis with either talonavicular or calcaneocuboid degenerative joint disease
- Charcot-Marie-Tooth disease
- Polio residuals
- Peripheral nerve injuries with fixed deformities
- Cerebrovascular accident
- Painful flexible or fixed rheumatoid hindfoot deformities
- Symptomatic posttraumatic malalignment (ie, following a fracture of the talar neck with involvement of both the talar neck and subtalar joint), or with hindfoot joint instability
- Posttraumatic arthritis, most commonly seen following a fracture of the talus or calcaneus (**Fig. 1**)

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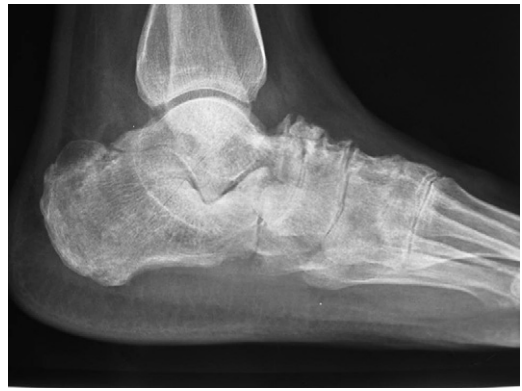

Fig. 1. Posttraumatic arthritis. Lateral view radiograph. Patient is status after calcaneocuboid fracture. Degenerative hindfoot arthritis is noted.

- Nonresectable calcaneonavicular or talocalcaneal coalition
- Posterior tibialis tendon dysfunction with a fixed deformity.[2–4]

CONTRAINDICATIONS

Contraindications for triple arthrodesis include any clinical situation that could be treated with a more limited fusion. It is important to isolate the affected joints. Initially this may be done through clinical examination and imaging evaluation. Alternatively, the affected joints may be isolated through the use of intra-articular lidocaine injections. Patients with peripheral vascular disease and blood supply inadequate for healing following surgery should not undergo the procedure. Preoperative evaluation by a vascular specialist is always advised when there is any question as to the patient's ability to heal. It is also not advisable to perform a triple arthrodesis on patients with neuroarthropathy or with systemic healing issues.

Advanced age and diabetes mellitus are not direct contraindications for triple arthrodesis, although it has implications for the postoperative care regimen.[3] Proper control of blood sugar is necessary to allow an optimal postoperative course.

PHYSIOLOGY AND PATHOMECHANICS

Evaluation of the foot in both standing and resting positions is imperative to patient evaluation. Usually, a varus hindfoot has a compensatory forefoot valgus with a plantarflexed first ray. In this case, additional procedures may be necessary to bring the foot in a plantigrade position following the triple arthrodesis. Claw toes may be present as well. Underlying neuromuscular disorders such as Charcot-Marie-Tooth disease or spinal lesions can cause a cavus foot type.

The hindfoot and forefoot are linked because they compensate for one another. A valgus hindfoot usually compensates with forefoot varus deformity and an abducted forefoot. This compensation is usually centralized around the Chopart joint. For this reason, there is little need for more distal surgery because much can be corrected simply with a triple arthrodesis. Sometimes in valgus foot the Achilles tendon becomes contracted. The Achilles tendon is shortened and calcaneus is laterally deviated. In such cases, the patient also has limited dorsiflexion of the ankle joint. If there is a rigid hindfoot deformity, it may not be possible to evaluate for contracture of the Achilles