CHAPTER **15**

FORGET ME NOT: The Triple Arthrodesis

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INTRODUCTION

The triple arthrodesis is a procedure that is performed much less commonly for the same conditions as it was 20 or 30 years ago due to the many joint-sparing alternatives that are commonly used today. These procedures include various osteotomies of the forefoot and rearfoot, isolated arthrodeses, implants, and soft tissue rebalancing procedures. The benefit of these procedures is that they avoid fusion, which has been known to result in increased stress and degeneration of neighboring joints.[1] This has been reported in the lesser tarsal joints and tibiotalar joints when doing a triple arthrodesis. Also, the function of the foot dramatically changes after a triple arthrodesis, and in certain cases, patients may not be able to perform certain physical activities after surgery.

On the other hand, the triple arthrodesis is a very versatile procedure in addressing complex foot deformities because it provides predictable results, significantly reduces pain, and provides stability to the hindfoot.[2] Even with the wide array of implants, isolated fusions, rearfoot and forefoot osteotomies, and tendon transfers that have been popularized over the years, a triple arthrodesis should not be avoided if it is truly what is indicated for a specific deformity. This time-tested procedure is one of the most dependable procedures in foot and ankle surgery. Described below are examples of when the triple arthrodesis should still be considered a reliable option.

POSITION, POSITION, POSITION

When significant positional deformities are present in the hindfoot, the surgeon predicts what procedure would provide adequate reduction of the deformity. A mistake that is too often made is under-correction of a positional deformity of the foot by trying to avoid a triple arthrodesis. Even when a triple arthrodesis is thought to be a last resort procedure, it should not be avoided if it will provide the best functional and mechanical outcomes for the patient postoperatively.

Case 1

MG is a 15-year-old patient who has had 2 previous surgeries on her left foot. The first consisted of an MBA implant and gastrocnemius recession at the age of 11. Within 6 months of the surgery, the implant was displaced from the sinus tarsi and she was taken back to surgery for a tendo-achilles lengthening and reinsertion of the MBA implant. After the second MBA implant was displaced shortly after she started bearing weight, a radiograph revealed a large calcaneonavicular coalition. Her rearfoot was rigid and in a severe valgus position and the forefoot was severely abducted on the rearfoot. She also had a considerable amount of residual equines (Figures 1-4).

It was determined that a triple arthrodesis would be necessary to correct the severe positional deformity of her foot and provide the best functional outcome long term.

Figure 1.

Figure 2.

Figure 3.

Figure 5.

Figure 4.

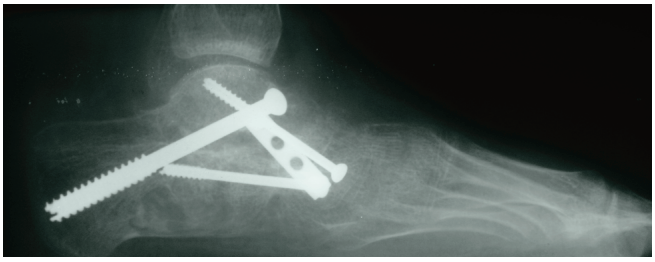

Figure 6.

Although she did not have pain or significant arthrosis of her midtarsal joints, addressing her severe sagittal and transverse plane deformity was most effectively corrected at this level (Figures 5, 6).

INSTABILITY AND WEAKNESS

Instability and lower extremity weakness can often lead to severe gait abnormalities. Smith described the Type III pes cavus foot type as the rigid type of foot that is often coupled with neuromuscular disease, making walking painful and sometimes difficult.[3] Occasionally, these rigid deformities can be corrected with various osteotomies or isolated fusions. An important factor in determining the appropriate surgical procedure is the amount of instability and the planar components of the deformity. Triple arthrodesis can provide multidimensional correction for multiplanar deformities with significant instability that may not be achieved with other isolated fusions or osteotomies. The triple arthrodesis can be combined with various tendon transfers to address a coexisting ankle instability and muscle weakness.

Case 2

MS is a patient with Charcot-Marie-Tooth disease. As a result of her condition, she has significant cavus foot deformity in addition to a dropfoot, which had failed multiple attempts at bracing. This led to significant instability and gait abnormalities. Figures 7 and 8 show the severity of her cavovarus foot deformity preoperatively. She subsequently underwent a triple arthrodesis, tibialis posterior tendon transfer, and dorsiflexory wedge osteotomy to correct her deformity and provide stability (Figures 9, 10).

Figure 7.

Figure 8.

Figure 9.

Figure 10.

Figure 11.

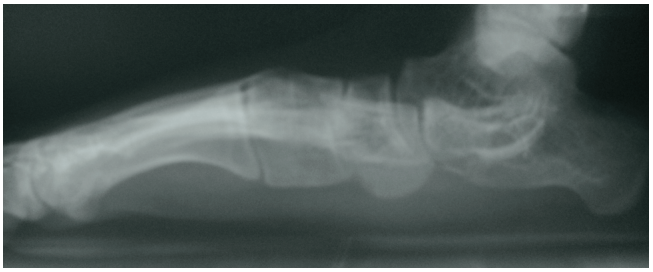

Figure 12.

Figure 13.

Figure 14.

SPASTICITY

There are a number of neuromuscular conditions that lead to lower extremity spasticity.[4] Many of these spastic conditions require extensive physical therapy and bracing to improve function. Due to the progressive nature of some of these diseases, reconstructive surgery may be necessary at some point during the patient's life. An arthrodesis is a reliable and predictable procedure for patients with spastic deformities of the lower extremity that require surgery. Triple arthrodesis is an excellent procedure to realign the entire foot in patients with severe spasticity.[4]

Case 3

CS is a 17-year-old male with cerebral palsy who has been managed with physical therapy and bracing until he developed pressure sores on the medial aspect of his foot from the braces. Due to the progressive nature of his disease, he is scheduled for a triple arthrodesis to stabilize his foot and to make him braceable (Figures 11, 12).

DEGENERATIVE JOINT DISEASE

Arthrodesis should be considered in patients with arthrosis of the hindfoot joints that do not respond to conservative treatment. It is not uncommon for a patient with severe subtalar joint arthritis to develop arthritis of the midtarsal joints over time. This is commonly seen in patients with severe longstanding posterior tibial tendon dysfunction (PTTD). In this type of patient, a triple arthrodesis will help to relieve the pain and prevent worsening degeneration of the joints. A double arthrodesis may also be possible if the calcaneocuboid joint is spared and is not needed to address a positional deformity.

Case 4

TM is a 56-year-old female with severe PTTD. She has noticed over the past few years her arch has slowly collapsed. She did not seek treatment until the foot was rigid and nonreducible clinically. She underwent a triple arthrodesis to correct her pain and deformity (Figures 13, 14).

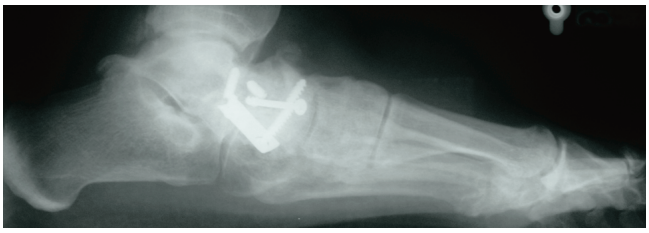

Figure 15.

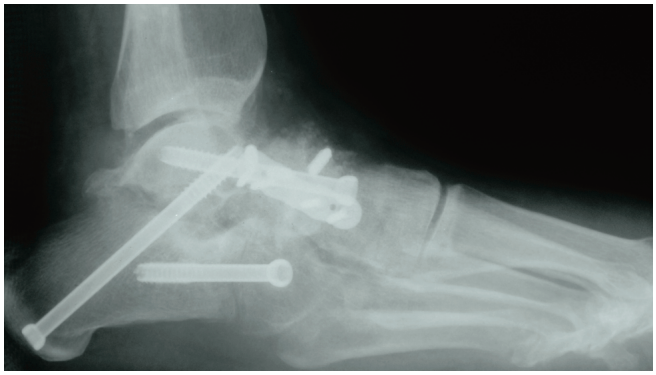

Figure 16.

PAIN

An exception to the above statement is if a patient does not have any evidence of midtarsal arthrosis but has significant pain in that area. Abnormal biomechanical stresses in the hindfoot can lead to pain in a joint before radiographic evidence of arthrosis is identified. Diagnostic blocks with a local anesthetic can help delineate which hindfoot joints are contributing to the patient's symptoms. If the patient is approaching surgical correction, then all painful joints should be addressed.

REVISION OF FAILED SURGERY

On occasion, rearfoot osteotomies and isolated rearfoot fusions fail due to a number of different reasons. In certain situations, a triple arthrodesis is a good option for revisional surgery.

Case 5

CP is a 37-year-old female with a traumatic brain injury after a motor vehicle accident. She subsequently had collapse of her right foot and underwent a talonavicular fusion. Due to her upper extremity involvement, the patient was unable to maintain nonweight bearing of her lower extremity after surgery. She went on to have a nonunion of her talonavicular joint and further collapse of her rearfoot (Figure 15). A triple arthrodesis was necessary to fully correct her deformity (Figure 16). She was also placed in a subacute nursing facility during the postoperative nonweight bearing period.

CONCLUSION

There are numerous procedures that have been popularized over the years that help surgeons and patients avoid a triple arthrodesis. These include isolated fusions, rearfoot and forefoot osteotomies, and tendon transfers or translocations. When possible, a surgeon should employ one of these alternatives to the triple arthrodesis if the deformity is amenable to such type of correction. This requires thorough scrutiny of the deformity, as well as the patient expectations and functional abilities. But if a triple arthrodesis is truly needed to improve the patient's pain and deformity, then it should not be avoided. It is only a disservice to your patients to use a surgical procedure that does not fully correct their problem.

REFERENCES

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