CHAPTER **10**

SAFE CONSTRUCT FOR EARLY WEIGHTBEARING WITH FIRST METATARSOPHALANGEAL ARTHRODESIS

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INTRODUCTION

Numerous techniques have been described for first metatarsophalangeal joint (MPJ) arthrodesis. Historically, the nonweightbearing period prescribed has been 6 weeks for adequate fusion. We have attempted a retrospective evaluation utilizing a small two-hole plate and one or two compression screw technique for first MPJ fusion to achieve early weightbearing.

MATERIALS AND METHODS

Patients selected for first MPJ arthrodesis were diagnosed with painful hallux valgus, hallux limitus, or hallux rigidus deformities. The average age of patients was 51 years (range 38-81 years). The number of patients we evaluated were 26, and 3 patients underwent bilateral procedures; therefore a total of 29 first MPJ fusions were performed. The patients that had procedures performed bilaterally were all staged. The construct we chose was one or two 3.0 mm or 4.0 mm compression screws, followed by the application of a two-hole plate (Figure 1). We utilized a locking screw in the distal hole of the plate, and the proximal screw was eccentrically drilled and nonlocking in order to obtain compression. Our postoperative course included an initial Jones dressing with posterior splint for 6 days, then a light dressing and heel weightbearing in a pneumatic cam-walker until forefoot walking was tolerated.

FUSION TECHNIQUE

The general principles for joint preparation were as follows: removal of all cartilage from the metatarsal head with a bone rongeur down to the subchondral bone, curettage of the cartilage from the base of the proximal phalanx, followed by burring and drilling of the subchondral plate. The sesamoid apparatus and crista of the metatarsal head were also

Figure 1A. Intraoperative view of two-hole plate construct with locking screw distally, and nonlocking screw proximally. Compression screw is inserted from proximal phalanx medially, and captures first metatarsal head laterally.

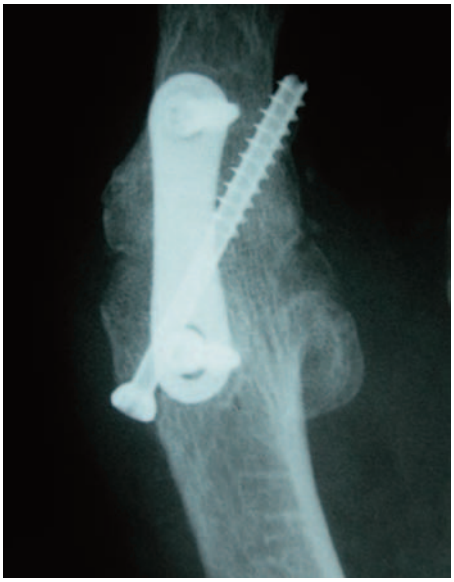

Figure 1B. Construct for first MPJ fusion consisting of a compression screw and two-hole plate with locking screw distally, and nonlocking screw proximally.

debrided of all cartilage in order to achieve fusion. Positioning of the hallux was achieved by loading the foot in maximum pronation with a flat plate to mimic weightbearing. A 0.054 inch Kirschner wire was then driven in a retrograde manner exiting the hallux distally and then into the metatarsal head (Figure 2).

The optimal position was based on the patient's ambulatory needs. Our general rule for proper positioning of the hallux is as follows: hallux nail facing upward, in alignment with the second digit transversely, and just off the weightbearing surface of the plate (Figure 3). Exceptions included patients who needed to kneel while working; and in those cases, the hallux was fused 2-4 mm above the flat plate. One or two compression screws were placed once adequate position was obtained, and joint congruity was confirmed by fluoroscopy. This was followed by the plating technique. The distal screw was placed first and locked to the plate, the proximal screw site was eccentrically drilled and a nonlocking screw was then inserted. Slight compression can be seen at the fusion site as the screw head engages the proximal plate. The final position is confirmed with fluoroscopy.

RESULTS

With this construct described, we obtained 27 successful fusions. One patient had an asymptomatic nonunion, and one had a painful nonunion. The latter patient underwent revisional reconstruction with calcaneal bone graft. In this series, one patient developed an acute Charcot neuroarthropathy event that consolidated with 12 weeks of nonweightbearing and application of an external bone stimulator (Figure 4). One advantage of this plate construct was the added structural support to the fusion site during the Charcot event. Also, 3 patients developed wound complications in our series. Two were superficial, and one had to have the plate removed with a rotational skin flap performed for coverage. The average time to full weightbearing was 2 weeks in a short pneumatic cam-walker.

CONCLUSION

There are numerous techniques utilized for first MPJ arthrodesis, from Kirschner wires to crossing screw fixation. Success can be achieved with the above techniques, but the construct that we have described with the addition of a small two-hole plate proved successful in achieving fusion while attempting early weightbearing. We believe that the most crucial aspect of this procedure is proper joint preparation and positioning. Early, safe weightbearing is an added benefit.

Figure 2. Intraoperative loading of the foot in maximum pronation with foot plate to mimic the position of first MPJ fusion when weightbearing.

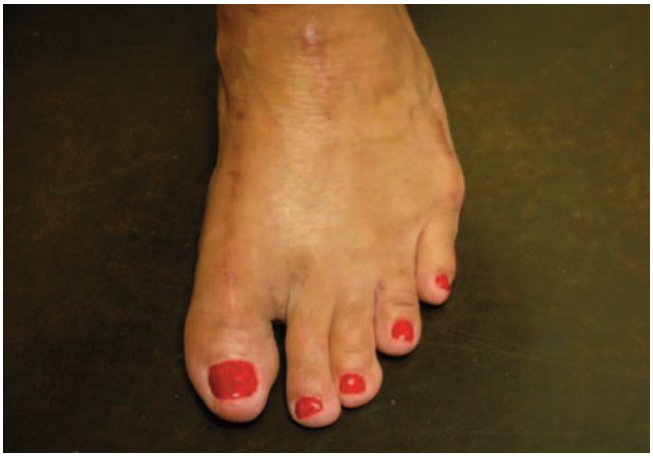

Figure 3A. Final position of first MPJ fusion with nail facing upward, and hallux aligned with the second digit.

Figure 3B. Final position of first MPJ fusion in the sagittal plane with the hallux just off of the weightbearing surface.

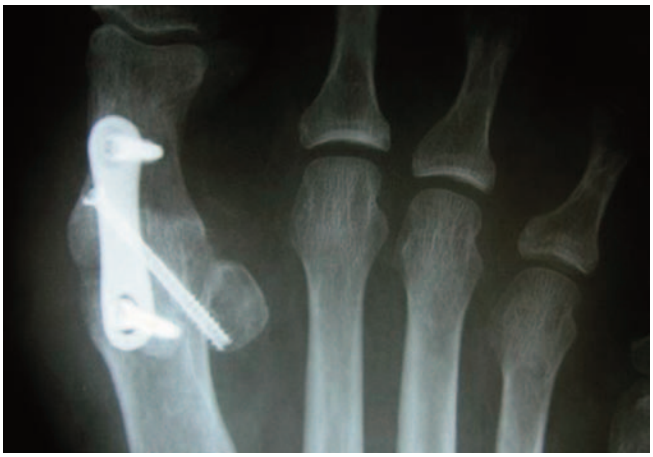

Figure 4A. Patient 8 weeks after right first MPJ fusion.

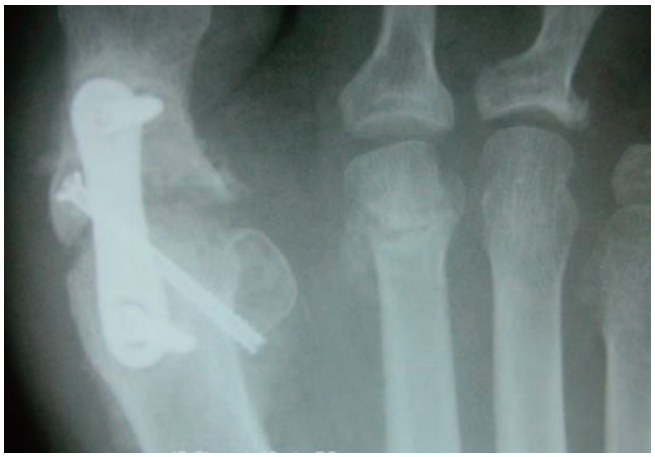

Figure 4B. Patient at 13 weeks after first MPJ fusion with acute Charcot neuroarthropathy event.

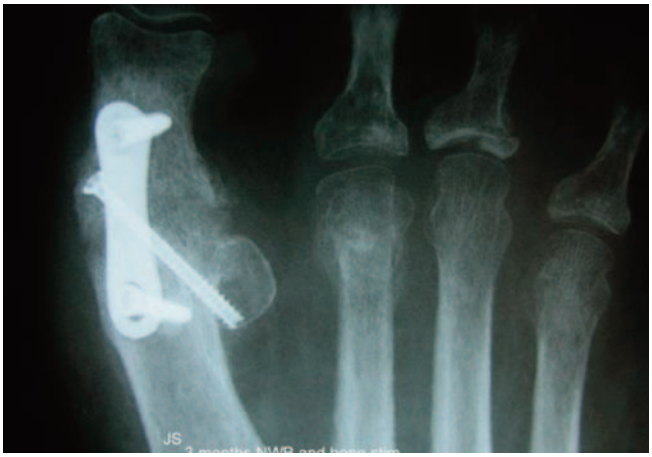

Figure 4C. Consolidation of first MPJ fusion site after 3 months of non-weightbearing with application of a bone stimulator following an acute Charcot neuroarthropathy event.