CHAPTER **32**

ANALYSIS OF EARLY WEIGHT BEARING FOLLOWING FIRST METATARSOPHALANGEAL ARTHRODESIS

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INTRODUCTION

Arthrodesis of the first metatarsophalangeal joint has traditionally been considered a procedure that requires cast immobilization with nonweight bearing for at least 6 weeks by the majority of the podiatry community. The reason for this has been that with traditional Kirschner-wire (K-wire) or crossed screw fixation, the ability of the surgical site to withstand any degree of bending and torque, produced by normal weightbearing is extremely limited.

Based on observations of the dramatic increase in strength with newer fixation constructs of locking plates and medium to heavy gauge memory metal staple constructs, the authors began instituting earlier weight bearing as tolerated in a pneumatic fracture walking boot. This article will look at the constructs utilized and show preliminary results in our first 10 patients allowed full weight bearing as tolerated in the first week

CONSTRUCTS

The two primary constructs utilized involve use of a dorsally-applied titanium locking plate or a box construct of 2 medium gauge heat-activated memory metal staples. In both constructs a K-wire or interfragment screw was most often utilized. In cases where the K-wire was left percutaneous after completion of the procedure, this was pulled at approximately 3 weeks (Figures 1, 2).

For the staple construct, after placement of the wire, the initial staple was applied below the joint axis from plantar medial aiming dorsal and lateral. The second staple was then applied from dorsal lateral aiming plantar central or plantar medial. In the locking plate construct after temporary wire fixation/and or screw placement, the plate was applied dorsally. The plate was aligned and initially fixated to the phalanx. Subsequently a non-locking screw was applied proximally into the compression slot and finally the fixation was consolidated using locking screws in the proximal metatarsal tabs.

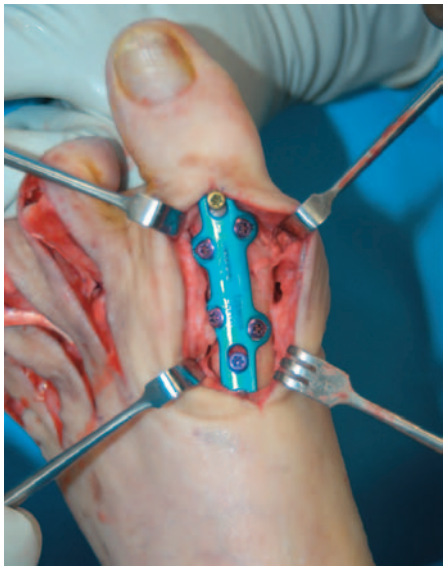

Figure 1. Intraoperative view of placement of dorsal locking plate. In this example a revision plate had been choosen due to the patient's neuropathy, for additional stability

Figure 2. Postoperative radiograph showing the typical memory metal box staple construct with temporary percutaneous Kirschner-wire in place.

SURGICAL TECHNIQUE

All fusion sites were exposed through a traditional dorsomedial longitudinal incision using the standard Podiatry Institute anatomic dissection technique (Figure 3). Using a linear or modified T-shaped capsular incision, the joint was exposed and prepared utilizing primarily hand instrumentation. Final subchondral bone plate preparation was performed with rotary burr and fenestration with a small K-wire.

After the surfaces had been prepared, temporary fixation was achieved with a smooth wire and the position was evaluated. Once optimal positioning was achieved, final fixation was applied as 1 of the 2 constructs described above (Figure 4).

Postoperatively patients were placed into a modified Jones compression cast and maintained nonweight bearing for the first several days. At the first postoperative visit dressing change was performed, radiographs were obtained and the patients were progressed to weight bearing as tolerated in a below-the-knee pneumatic fracture walking boot. At 3 weeks, dressings were discontinued and any percutaneous fixation was removed. Regular bathing was instituted, although the patients were kept in the boot for sleep and all weight bearing activities. At 6 weeks follow-up, radiographs were obtained and the patients were returned to regular shoes as tolerated.

Figure 3. Illustration of the standard dorsomedial approach, here for correction of longstanding (20 year) hallux varus.

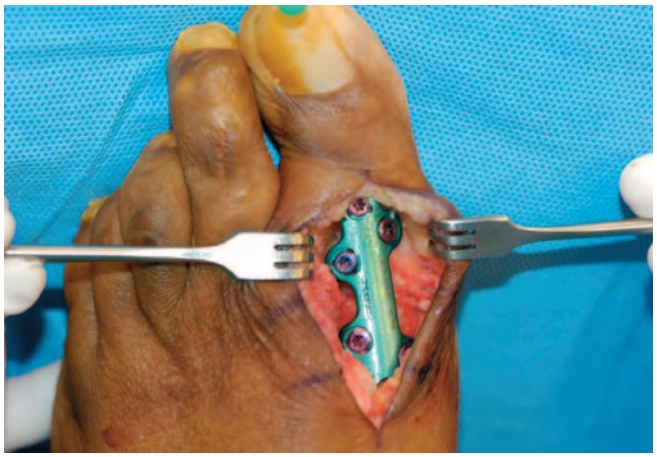

Figure 4. Intraoperative view showing standard plate application .

Table 1

TEN PATIENTS IN STUDY

PATIENT	DATE OF SURG	WT BEARING	FIXATION	OUTCOME	1ST SURG
D.N.	08/06/2009	POD 5	LP	Solid fusion	Prev Austin
K.Q.	12/26/2008	POD 5	SW	Solid fusion	Prev Chiel
W.P.	12/18/2008	POD 4	LP	Solid fusion	Yes
F.H.	10/09/2008	2 weeks	LPW	Solid fusion	Yes w Varus
H.T.	10/13/2009	POD 5 *	LP	Solid fusion	Yes w Varus
T.S.	11/12/2009	POD 8	SW	Solid fusion	Prev Chiel
A.F.	10/09/2009	2 weeks	LP	Solid fusion	
B.B.	02/23/2009	2 weeks	LP	Solid fusion	
A.L.	06/18/2009	2 weeks	LP	Solid fusion	
J.M.	07/10/2007	2 weeks	LP	Solid fusion	

RESULTS AND DISCUSSION

In our series of 10 cases, solid consolidation was noted with no failure of fixation (Table 1). We attribute this to careful site preparation, solid fixation, and the protection of the rocker sole of the pneumatic fracture walking boot. Interestingly, 6 of the 10 cases had had previous surgery, thus at least in theory placing them at greater risk of healing issues. Previous surgeries ranged from previous chielectomy to distal metaphyseal osteotomy to proximal procedures.

CONCLUSION

In summary, we have found that with solid attention to anatomic dissection and site preparation priciples for fusion combined with newer fixation construct options, it seems to be safe to allow for earlier protected weight bearing following arthrodesis of the first metatarsolphalangeal joint in selected individuals