CHAPTER **2**

BURIED KIRSCHNER-WIRE FIXATION FOR HAMMERTOE ARTHRODESIS

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INTRODUCTION

Hammertoe surgery often requires arthrodesis of the proximal interphalangeal joint. Toes 2, 3, and 4 are the most commonly fused toes. Traditional fixation for hammertoe arthrodesis utilizes a percutaneous, intramedullary, Kirschner-wire (K-wire) imbedded in the toe, from the base of the proximal phalanx out the end of the toe. These wires are typically removed after 6 weeks, as a simple office procedure.

Percutaneous hammertoe pinning, while time- and tradition-honored, is not without potential complications. These include pin track infection, inadvertent early removal of the wire, bending or breakage of the wire, and arthritis of the distal interphalangeal joint from crossing this joint with a wire where it is not necessarily needed.

An abundance of alternative hammertoe fusion devices have entered the market, all of which are more expensive than a K-wire, yet no more effective. To the contrary, many of these "designer" devices are bulky, remove more bone than is often desired, and the instrumentation technique is time consuming and not guaranteed to work.

An alternative, simplified method to these techniques is the use of a buried K-wire, crossing the proximal interphalangeal joint, as an intramedullary means of fixation. In the author's first 50 toes operated on in the following technique, there have been no complications – all toes have fused in a timely manner, with no infections or displacement of the wire.

TECHNIQUE

The buried K-wire hammertoe fusion also lends itself to creating an anatomically neutral and cosmetically normal position of the toe. The wire is typically bent in a plantar direction at the level of the fusion site, allowing for a slightly plantarflexed position of fusion. This prevents the toe from being "too-straight" for the adjacent toes, and prevents the desire of the toe to contract at the distal interphalangeal joint, reducing the potential for a mallet toe contracture.

Since there is less bone-to-wire interfacing, there is the potential for the bone to piston along the course of the wire. To prevent this, the surgical technique is careful to reapproximate the extensor tendon, and suture repair the collateral ligaments. The author typically uses a 0.045" diameter smooth K-wire to effect the procedure, however, 0.054" or 0.062" sizes may be used. Similarly, if a smaller diameter wire proves too loose in the bone, incremental up-sizing of the wire is possible, until a snug fit is achieved.

In patients who may have a suspected or known nickel allergy, a titanium wire can be used in much the same way. Difficulty in locating/procuring titanium K-wires can be encountered as these are not typically used for most bone and joint surgery. The author has found these wires available in the Synthes small fragment titanium bone fixation set. Also of note, the titanium wires are more stiff and do not bend as easily as stainless steel, and the author has only been able to find these wires in the 0.062" size.

The buried K-wire technique is safe, simple, effective, and cost-conscious. It meets the desired outcome of a fused toe, with nothing protruding out of the toe, and does not obligate the surgeon to cross the distal interphalangeal joint.

ILLUSTRATED TECHNIQUE

Figure 1. Exposure of the proximal interphalangeal joint for joint resection, leaving a long dorsal length of extensor tendon attached to the middle phalanx, to facilitate later reapproximation.

Figure 2. Joint surfaces are resected to bleeding cancellous bone, both from the head of the proximal phalanx and the base of the middle phalanx.

Figure 3. Predrilling the proximal phalanx cautiously as to not cross into the metatarsophalangeal joint.

Figure 4. Predrilling the middle phalanx, just to the head of the phalanx, not crossing into the distal interphalangeal joint.

Figure 5. Manual placement of the K-wire into the base of the proximal phalanx.

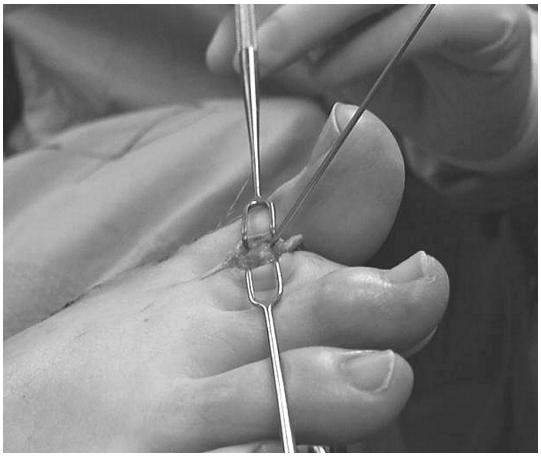

Figure 6. Lateral view of the wire in the proximal phalanx.

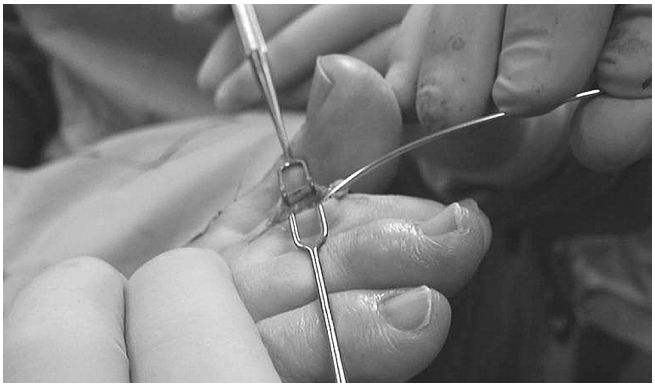

Figure 7. Prebending the wire into plantarflexion to effect a slightly flexed fusion position.

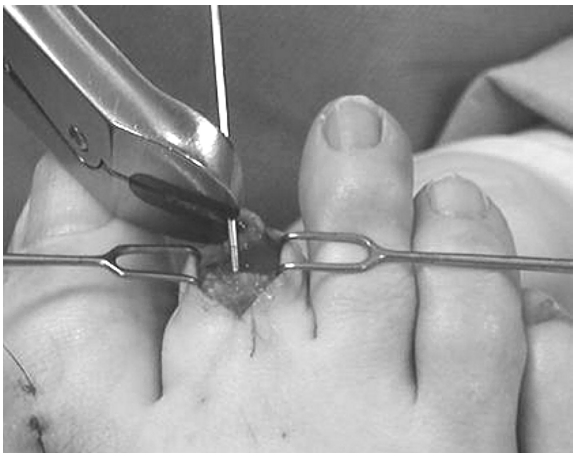

Figure 8. Cutting the wire to length, typically 1.0 cm past the end of the proximal phalanx.

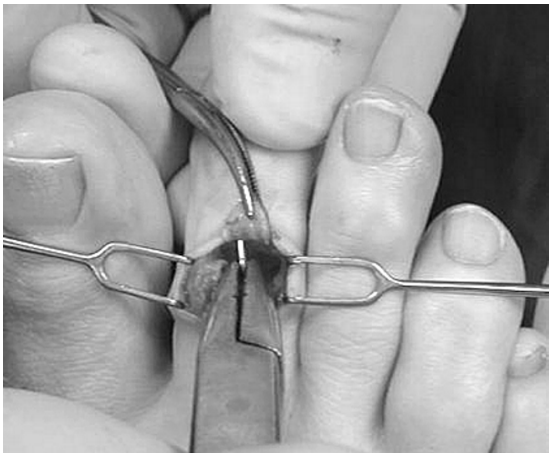

Figure 9. Seating the wire into the base of the middle phalanx.

Figure 10. Compressing the fusion site.

Figure 11. Inspecting bony apposition and stability of the fusion site.

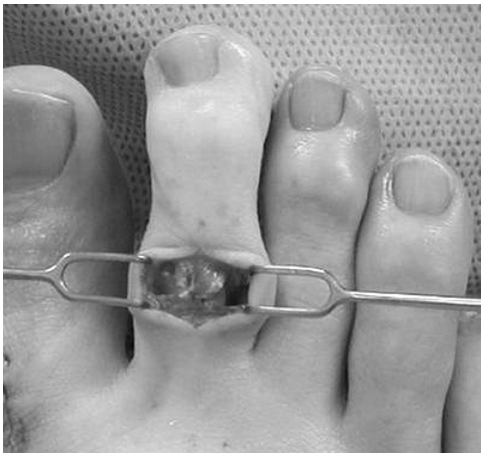

Figure 12. Suture repair of the extensor tendon and collateral ligaments.

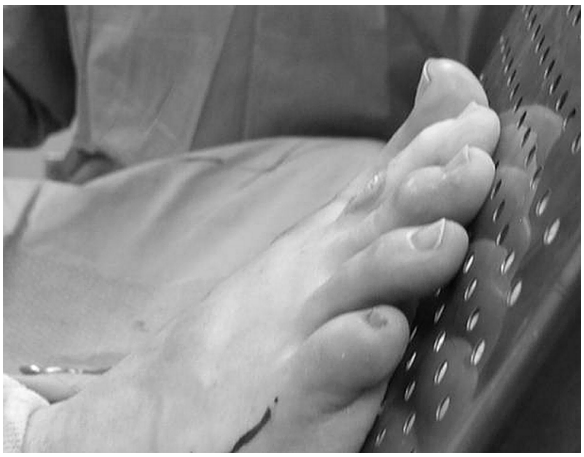

Figure 13. Intraoperative appearance of flexed fusion position with simulated weight-bearing.

Figure 14. Preoperative and 3 month postoperative view of bunion and hammertoe repair, using the buried K-wire technique in the second hammertoe.