# UPDATE ON ABSORBABLE SCREWS AND PINS

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Absorbable fixation continues to be a viable option for surgeons dedicated to reconstructive surgery of the foot and ankle. The relatively new product line of screws and pins available by Arthrex (Naples, FL) will be presented. The reader is advised that the author is a consultant with this company and the surgeon inventor of the Arthrex Trim It drill pin.

The benefits of absorbable pins and screws continue to be based on their more favorable modulus of elasticity compared with metallic implants, the reduced rate of need for removal and, specific to the Arthrex line of products, the TRIM-IT capacity that reduces stocking and backordering issues for surgey centers and hospitals. The ability of absorbable screws and pins to stably fixate bone until it safely unites is without question. The interested reader is referred to the author's original reporting on the topic of absorbable screws in foot surgery in the literature in both the 1995 Podiatry Institute Update - Reconstructive Surgery of the Foot and Leg, and the article "Current concepts of absorbable fixation in first ray surgery, Cicchinelli, San Juan, and Testa in *Clinics in Podiatric Medicine and Surgery*, July 1996, issue 13.

The modulus of elasticity of absorbable implants more closely approximates that of bone itself making them stress-sharing implants. The ME of metallic implants is much higher than bone, which makes them stiffer and adds the potential for stress shielding. Although certainly bone has healed and continues to heal with metallic implants, this concept nevertheless adds an improvement to the biology of bone healing and some substantiation of the concept of micro motion and the believed beneficial effect on bone healing.

Another attractive benefit of absorbable fixation is the reduced need for removal. This clearly reduces patient inconvenience, frees up operating room time, and reduces potential for pin tract infections. The clinical truth is that on occasion a screw head will irritate and need to be removed and patients will occasionally get a soft tissue foreign body-type reaction that requires removal/ debridement. These are very infrequent in the author's experience in the last 12 years of usage of absorbables and do not approach even closely the rate of removal for metallic fixation. These can happen even with PLLA, of which all current standard products are made. Late foreign body reaction has historically been an issue of PGA. The referenced reaction rate for PLLA approximates 0.2%. In the author's clinical experience approximately 40% of all metallic fixation requires removal.

The arthrex trim it screw and pin line add the eponymous TRIM IT to the market place. The pins and screws come in set lengths and therefore stocking issues are avoided. One size fits all. The standard measurements are taken and the screw or pin are trimmed to the desired length.

Some European doctors have questioned the rational for crossing the dip joint in digital fusions and the author considers this advantageous to prevent late mallet toe contracture. It is not recommended to cross the MTP joint at this time unless in combination with a panmet head resection. Lastly, a tapered version of the 2.0 Trimit drill pin is under production and a 1.5 mm pin is under production as well.

The following clinical series illustrates the practical and clinical use of absorbable screws and pins

## CLINICAL SERIES

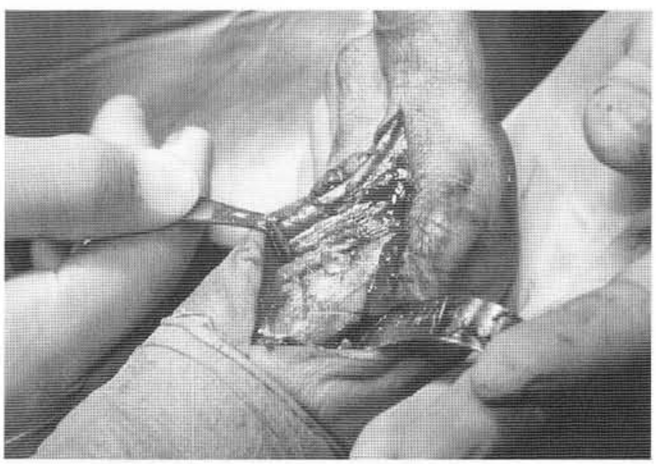

Figure 1. Intraoperative view of the first absorbable screw used in foot surgery in 1994 in Madrid, Spain for a proximal chevron osteotomy.

Figure 2. (Left) Preoperative radiograph. (Right) Postoperative radiograph showing complete consolidation at 18 months.

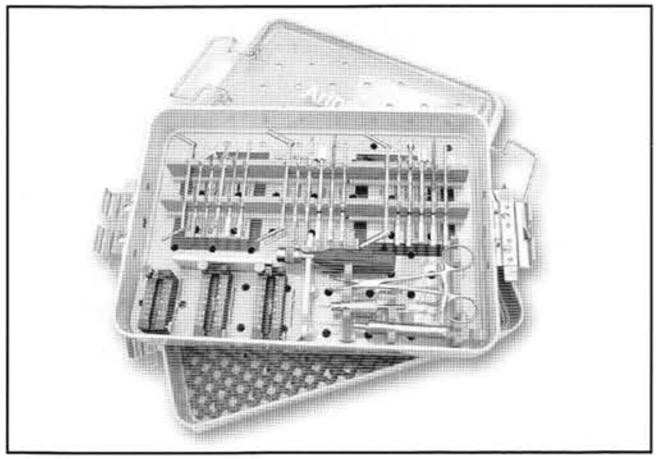

Figure 3. TRIM IT Screw set (Arthrex). The set houses instrumentation for 2.7 mm, 3.5 mm, and 4.0 mm screws. The instrumentation is standard and follows AO technique. The standard length of 2.7 screw is 30 mm, the 3.5 is 40 mm, and the 4.0 is 50 mm.

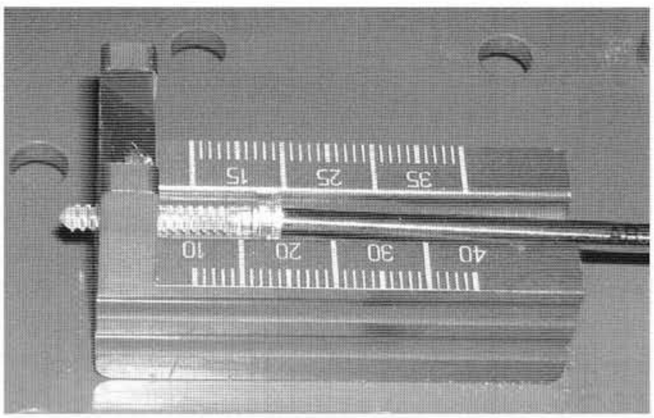

Figure 4. The trim it device is basically a pencil sharpener configuration. The screw is placed into the device and trimmed off at the correct length and then reversed and resharpened.

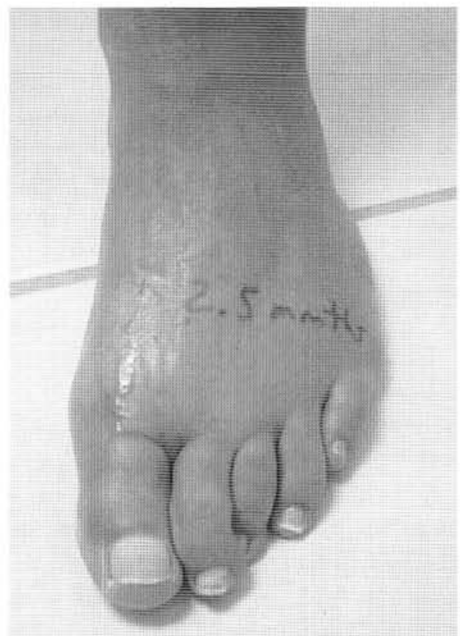

Figure 5. Clinical appearance of chevron bunionectomy fixated with a 2.7mm TRIMIT PLLA screw. A frequent question is whether these screws cause more swelling and they do not. The clinical appearance is identical to that of similar patients at similar postoperative time frames.

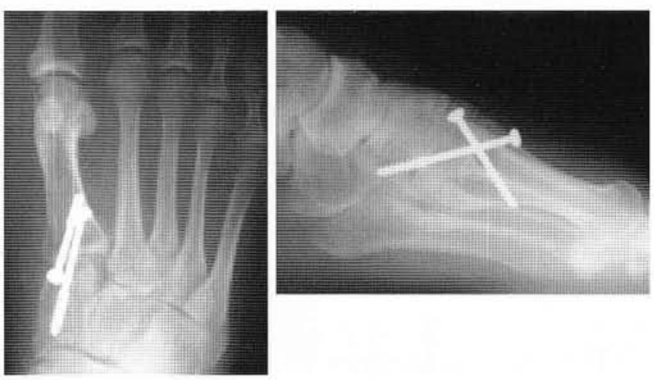

Figure 6. Standard screw orientation for a lapidus arthrodesis with 2 x 3.5 partially threaded screws.

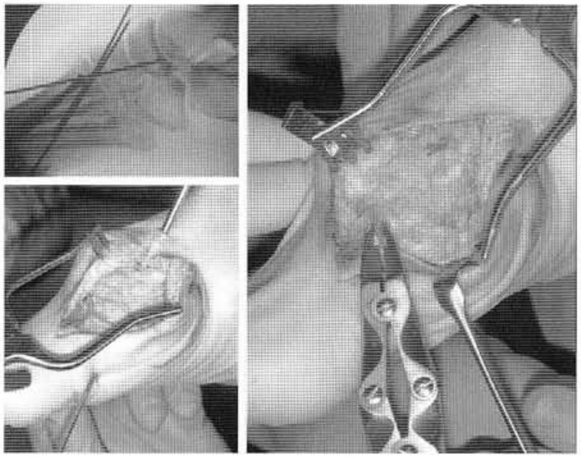

Figure 7. Lapidus fusion with fully threaded 4.0 PLLA screws and intraoperative fluoroscopic confirmation of fixation.in figure c the head of the screw is trimmed slightly to reduce soft tissue prominence.

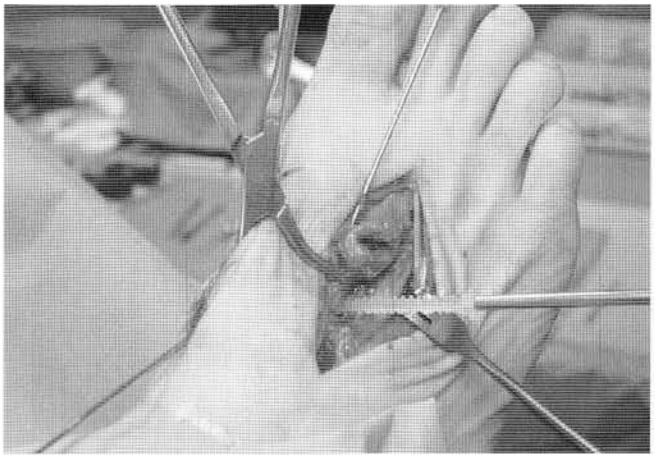

Figure 8. Lisfranc arthrodesis maybe performed with PLLA TRIMIT screws as well. The standard reduction and fixation principles apply

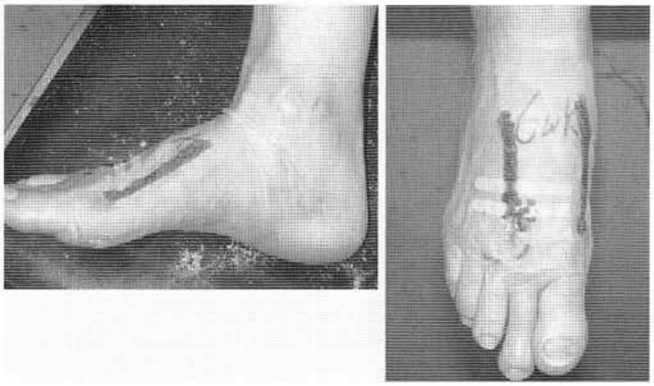

Figure 9. Postoperatve clinical at 6 weeks followup for Lisfranc fusion. No more appreciable swelling is noted compared to the same surgery fixated with metallic fixation.

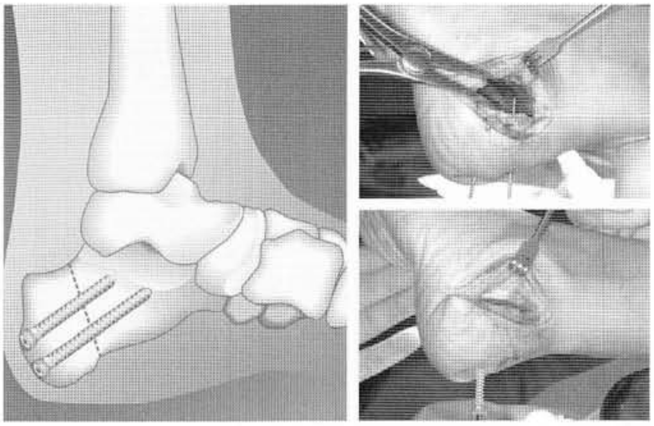

Figure 10. Absorbable screws may also be used to fixate calcaneal osteotomies here with 2 x 4.0 fully threaded screws. The TRIM IT DRILL PIN was designed to replace the standard Kirschner wire and allow for direct application while seated in a standard pin driver. It may be trimmed to length, countersunk under the skin in digital fusions and thereby eliminating external pins in digital fusions. The clinical use of the pin is exactly the same as the clinical use of the any standard K-wire.

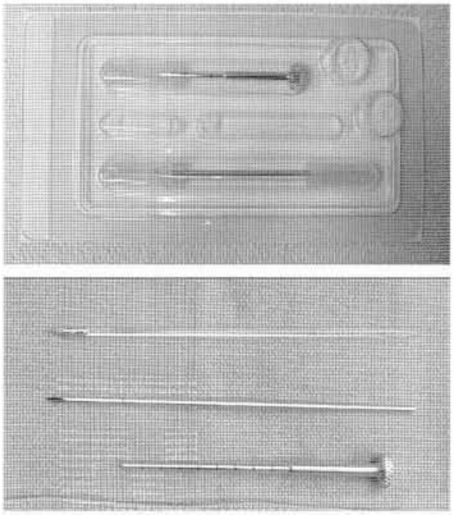

Figure 11. TRIMIT Drill Pin Package. The package includes a 2.0mm PLLA pin with a metal trocar tip on one end and a tapered opposite end, a tamp for countersinking under the skin or in bone and a predrill metal pin slightly smaller than the 2.0 mm PLLA pin. The predrill pin is laser marked every 10 mm to facilitate knowledge of depth while drilling.

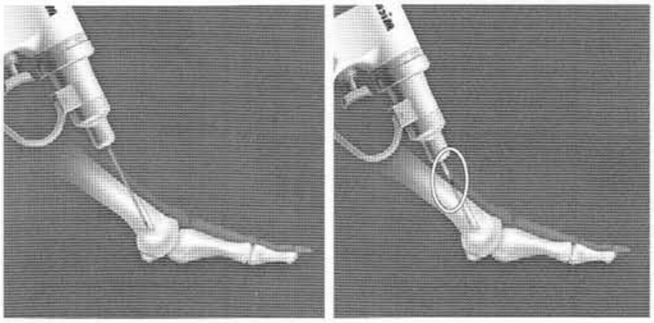

Figure 12. (Left) For cortical bone the predrill pin is used to create an initial hole. (Right) Then the PLLA Trimit drill pin is inserted with carefully attention to load the pin approximately 10 mm from the metal tip ONLY to avoid shear stress at the junction of bio and metal.

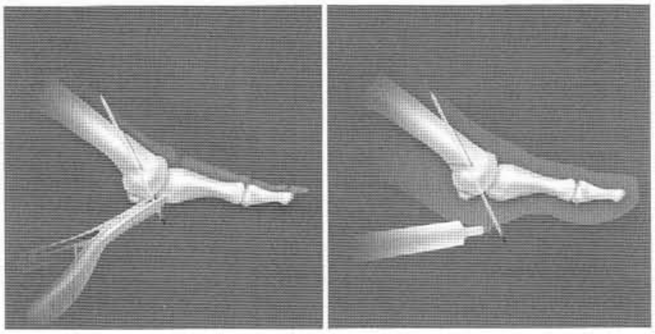

Figure 13. The Trimit drill pin is then advanced across the osteotomy and the metal tip may be cut off within the joint or external to the skin.

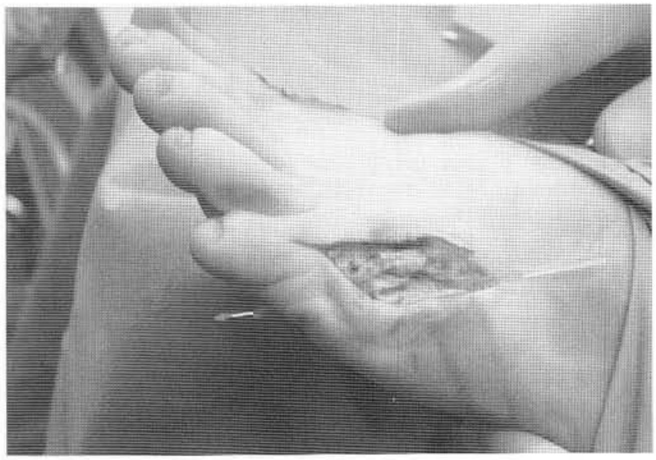

Figure 14. Clinical appearance of tailor bunion fixated with 2.0 Trimit drill pin.

Figure 15. Clinical and radiographic 3 month followup of chevron and mini chevron osteotomies fixated with Trimit drill pins. Note there is no more appreciable swelling than any other fixation device for these procedures.

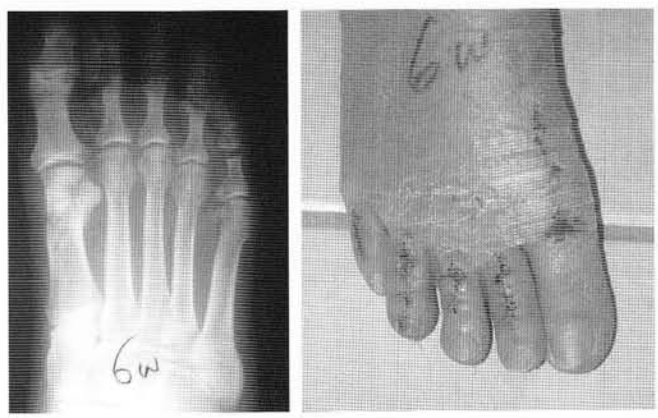

Figure 16. 6 week followup of digital arthrodesis and chevron bunionectomy showing excellent clinical appearance and no more appreciable swelling than any other mode of fixation

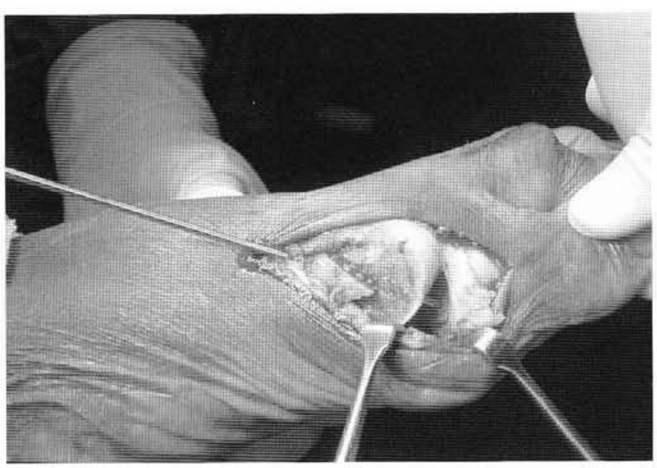

Figure 17. Intraoperative clinical showing use of the predrill pin to create pilot hole for trimit PLLA drill pin. In this case the PLLA pin will drilled directly into bone with the BIOTIP first.

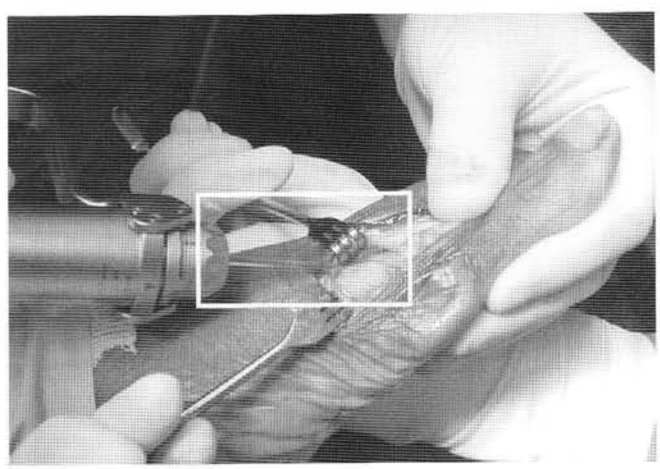

Figure 18. The Trimit drill pin PLLA is then loaded directly and drilled across the chevron osteotomy.

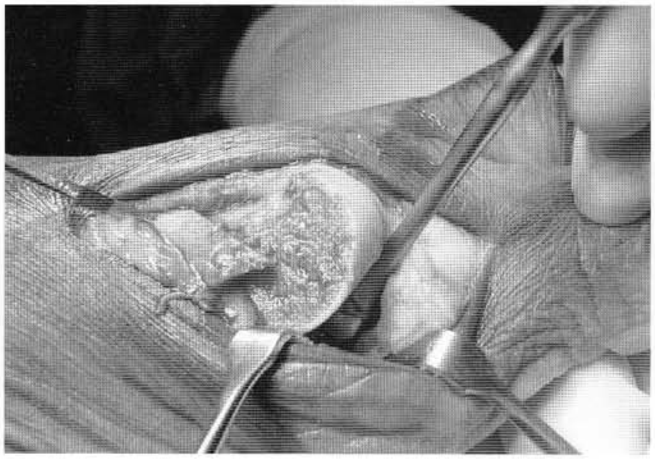

Figure 19. The bio tip is visualized within the joint and and then retrograded flush or deep to the cartilage.

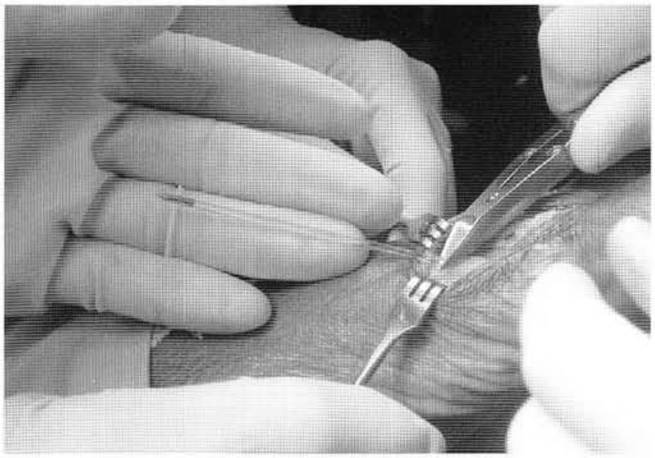

Figure 20. The remaining pin may then be trimmed off dorsally.

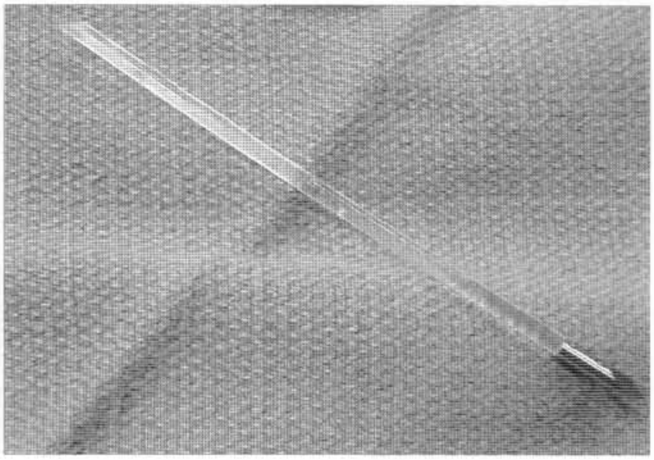

Figure 21. Picture of remaining pin.

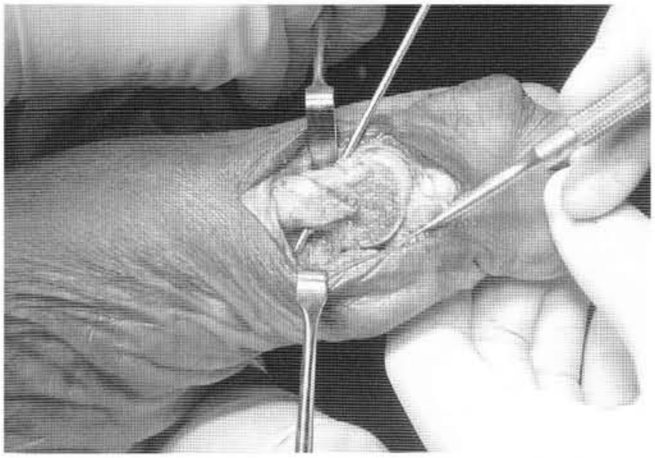

Figure 22. In this case, the remaining PLLA trimit drill pin was inserted from dorsal distal to plantar proximal and here pictured is the predrill pin creating the pilot hole.

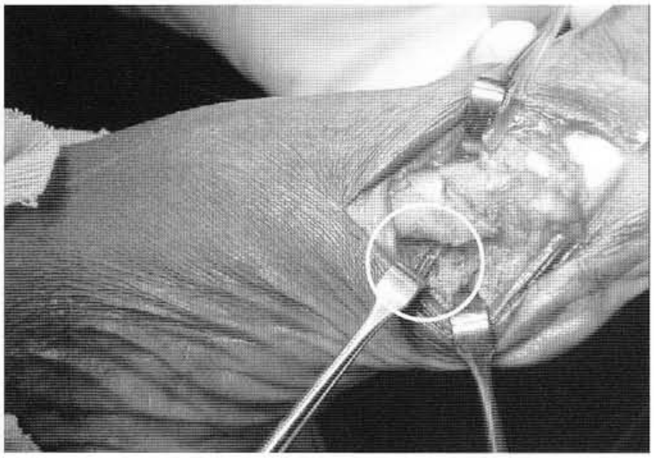

Figure 23. The PLLA trimit drill pin exits plantarly.

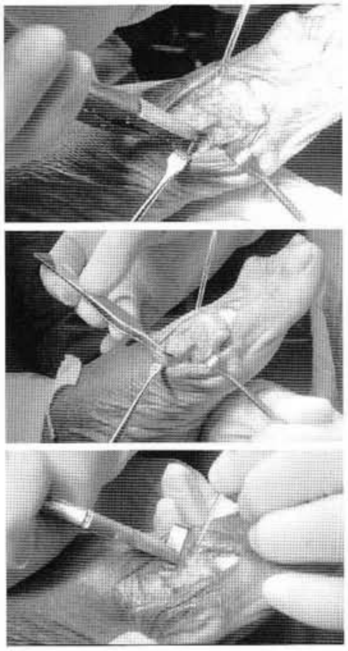

Figure 24. The metal tip is cut off plantarly, the tip is grasped, the dorsal protruding pin is cut flush as well.

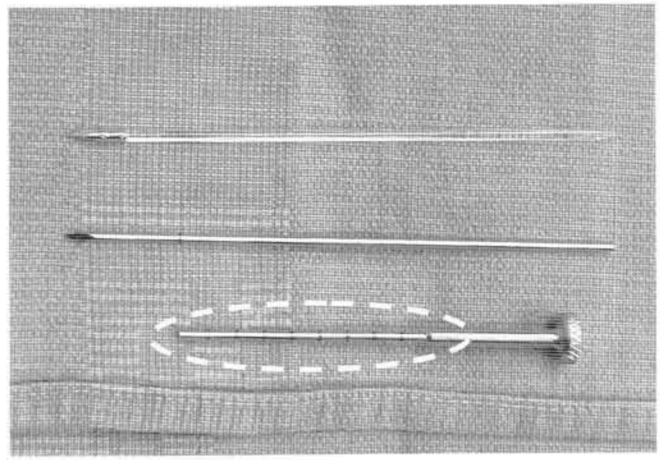

Figure 25. Components of PLLA Trimit drill pin, circle depicts the laser mark gradations of the tamp to facilitate the depth of countersinking.

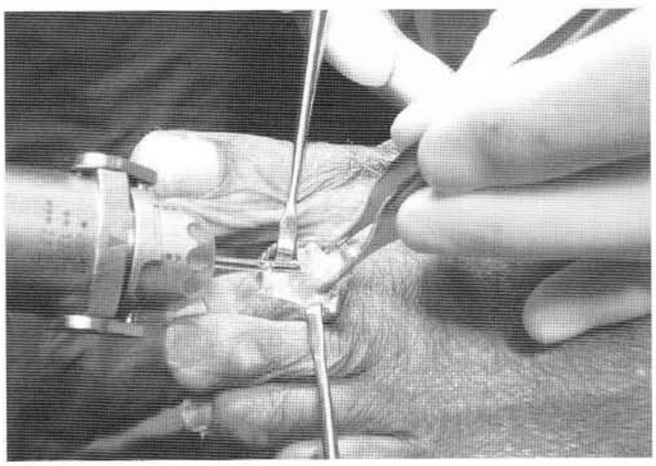

Figure 26. Hammertoe stabilization may be performed with the trim it drill pin as well. Due to the removal of the head of the proximal phalanx, the PLLA trimit drill pin may be drilled directly into the bone with the metal tip first.

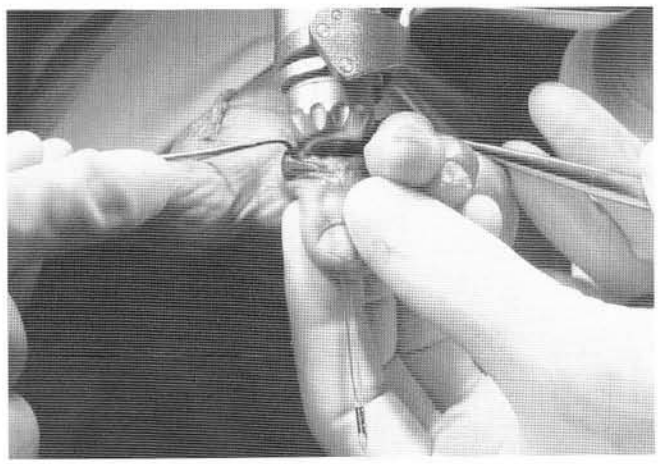

Figure 27. The PLLA Trimit drill pin is then drilled distally out the tip of the toe.

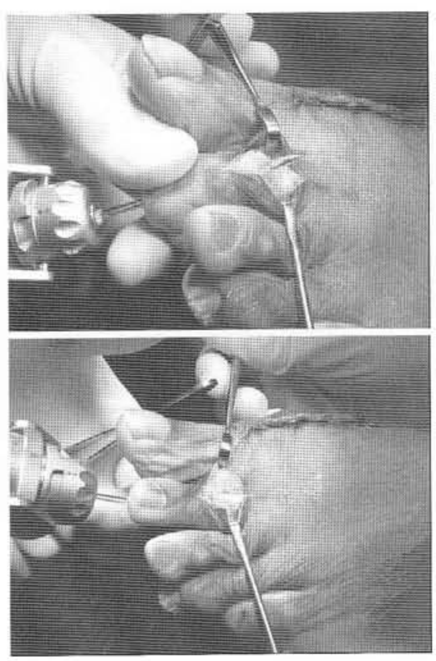

Figure 28. The pin is then drilled proximally back across the pip joint to the base of the phalanx into subchondral bone.

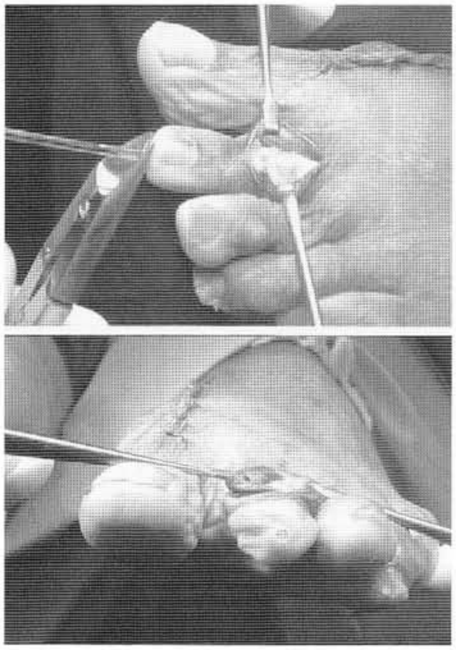

Figure 29. The pin is then withdrawn slightly from the base of the proximal phalanx and cut flush with the tip of the toe.

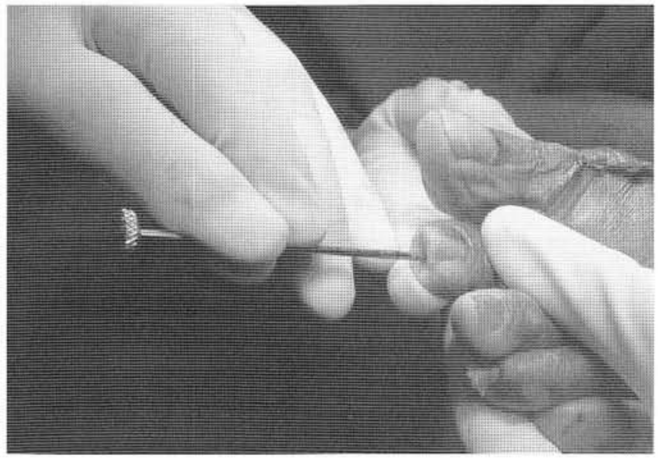

Figure 30. The tamp is then used to countersink the pin beneath the skin and into the distal phalanx.

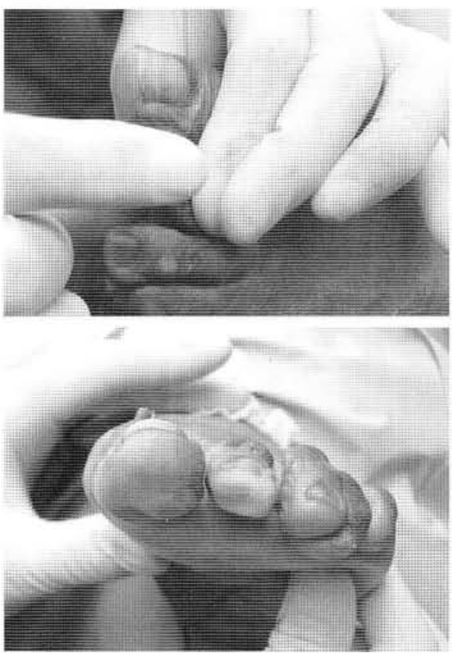

Figure 31. The author prefers a flexed toe fusion and after pinning of the toe, manual manipulation of the pipj joint is performed and the the toed is "flexed" to create better toe purchase and cosmesis.

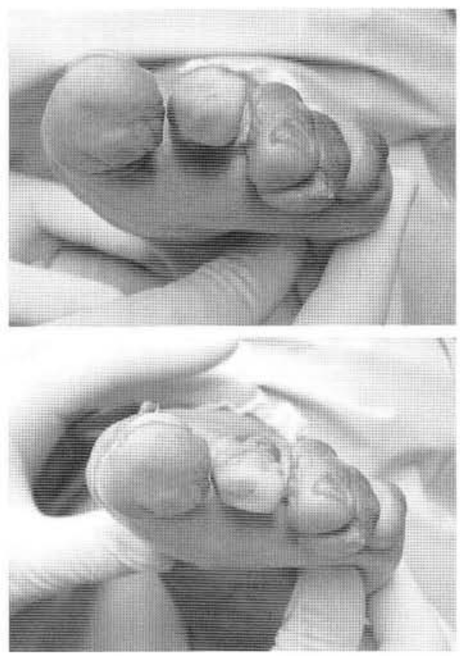

Figure 32. (Top) Pre-toe flexing and (bottom) post-toe flexing creating a flexed toe fusion.

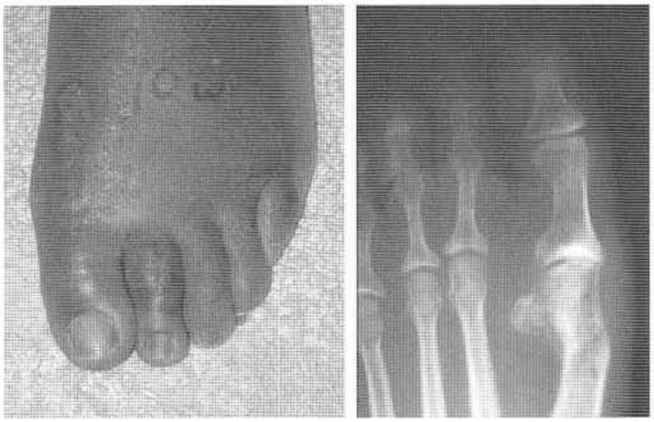

Figure 33. Clinical and postoperative radiograph at 10 weeks of same patient in above sequence showing radiographic union of toe PIPJ fusion and chevron osteotomy.

Figure 34. Straight on view of the flexed toe fusion showing excellent toe purchase.