CHAPTER **26**

AUGMENTED BUNIONECTOMY: USING PROXIMAL SUTURE ANCHOR

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INTRODUCTION

Bunionectomy remains among the most common procedures performed by the podiatric surgeon. Despite multiple procedures and technological improvements, difficulties still arise from poor bone quality, fixation failure, delayed union, nonunion, and recurrence. A significant number of the complications from bunion surgery arise directly from problems with osteotomy or arthrodesis failure. The vast majority of procedure options center around an osteotomy to "realign" the metatarsal bone, hallux, and sesamoid apparatus. Almost all of these options rely on secure capsular reconstruction about the first metatarsophalangeal joint (MTPJ) to "hold" correction. Even with non-absorbable, heavy suture, recurrence remains a major concern. Too much capsule correction and hallux varus becomes an issue. There exists a multitude of options in the configuration of the osteotomy and ultimately surgeon preference and experience seems to dictate the outcome. The majority of surgeons currently perform some variation of a chevron, scarf, closing wedge, or proximal arthrodesis.

Success rates and complications of these procedures are well documented and fairly well managed by the surgical community. In the past several years, newer options have been developed in an effort to avoid either osteotomy or arthrodesis. Originally described by David Friscia and recently modified by Todd Kile, a new technique provides some promise in minimizing hallux valgus surgery complications. They have included the usage of suture with metallic buttons or an absorbable screw between the first and second metatarsals to avoid the need for osteotomy altogether. This typically works best in more flexible deformities (Figures 1-2).

Complications of purely repositional bunionectomy without osteotomy have primarily been second metatarsal stress fractures (Figure 3). While this complication can be easily managed, if the fracture requires removal of the implant bunion, recurrence becomes a concern. As such, an evolution has continued around existing and proven osteotomy techniques with the addition of a new mechanical reinforcement device between the first and second metatarsals. This allows the surgeon the comfort of utilizing their proven technique of choice while minimizing complications and decreasing recurrence. The authors have utilized a new technique utilizing absorbable suture anchor fixation since 2008 with good results. The purpose of this article is to outline the surgical technique involved to correct hallux valgus with osteotomy and soft tissue reinforcement between the first and second metatarsals utilizing a suture anchor technique.

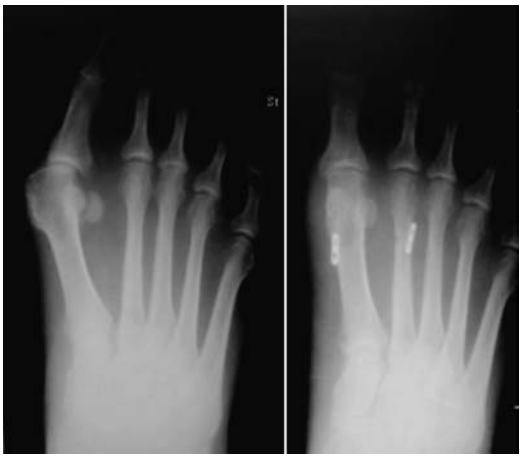


Figure 1. Preoperative and postoperative radiographs of distal Arthrex Mini TightRope procedure.

Figure 2. Preoperative and postoperative radiographs of 4.5 mm PLLA screw proximal procedure.

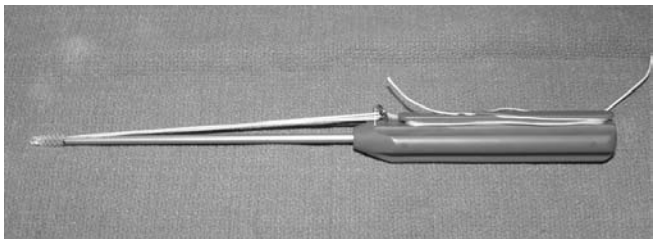
Figure 3. Stress fracture around second metatarsal bone.

DEVICE

The Arthrex Mini TightRope FT is a cannulated 4.5 mm bioabsorbable suture anchor with a recessed metallic button. The suture anchor is made completely of Poly-L Lactic Acid (PLLA) and the metal button is a stainless steel with #2 FiberWire suture (Figures 4-7). There have been over one million absorbable implants placed since 1994 with low rates of complication. The resorption time is approximately 12 to 60 months depending upon size of the implant and vascularity of bone. There have been reports of foreign body reaction and granuloma formation, but these are primarily with faster resorting materials Polyglycolic Acid (PGA).

PATIENT CRITERIA

While the technique can be performed on most bunions, greatest benefits are achieved in the deformity that responds to a distal metatarsal osteotomy. This is particularly beneficial in a flexible deformity and where the surgeon might typically consider a proximal procedure. The primary advantage is being able to do a distal procedure with soft tissue reinforcement and minimize postoperative morbidity. The surgical technique is described below.



Figures 4-7. Arthrex Mini TightRopeFT Device on inserter handle. Remaining images demonstrate 4.5 mm PLLA anchor with cupped metallic button.

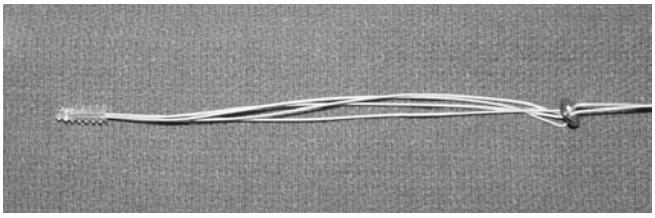


Figure 5.

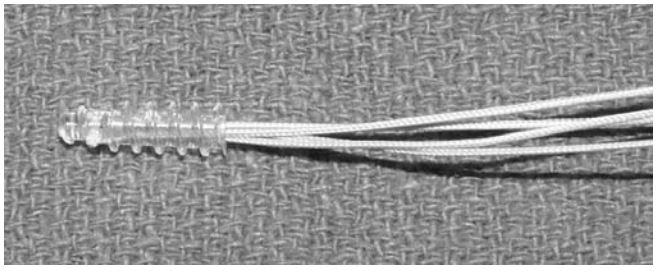


Figure 6.

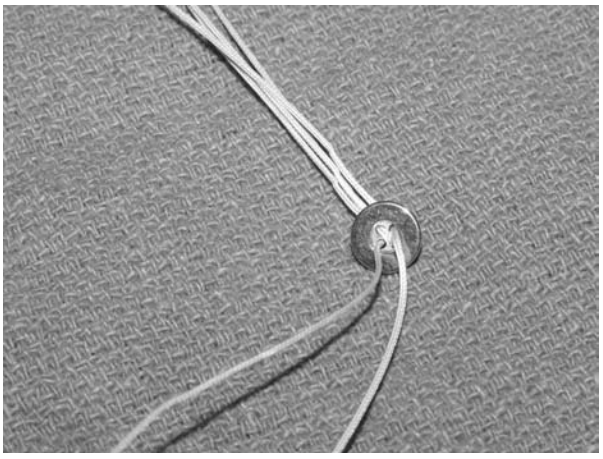


Figure 7.

TECHNIQUE

As with all hallux valgus procedures, the importance of appropriate soft tissue handling and rebalancing remains critical. The procedure can be performed from either a dorsal or medial incision based on surgeon preference. Typically, the author will perform a medial incision overlying the first metatarsophalangeal joint to achieve adequate joint rebalancing and contracture release. The hallux valgus deformity is addressed in a stepwise fashion in the following sequence:

Anatomic dissection
Exostectomy
Osteotomy and fixation
Evaluation of flexibility
Guide pin placement
Mini TightRope FT placement
Closure

Incision and Soft Tissue Release

As the anchor placement portion of this procedure is performed under fluoroscopic guidance, the patient needs to be positioned distally on the operating room table with their heels flush with the end of the bed. This will allow excellent visualization of the forefoot and mid foot structures under image intensification. The patient is prepped in the usual fashion, but care should be taken to administer local anesthesia proximally and dorsally across the level of the second and third metatarsal cuneiform articulations. Attention is then redirected back to the medial capsule where the surgeon's individual capsulotomy and osteotomy of choice is performed. Following osteotomy fixation, a critical evaluation of the degree of flexibility must be performed. If the foot is stable and adequate correction obtained, the surgeon can proceed with normal closure if no augmentation is required. If there is still some degree of flexibility, or tendency towards metatarsal splay, then the surgeon should move forward with proximal augmentation.

Proximal Augmentation

At this time, under fluoroscopy, the proximal aspect of the first metatarsal is identified. Depending upon whether or not a dorsal or medial incision was utilized, the metaphyseal flare of the first metatarsal is identified. Fluoroscopy is beneficial to assist in accurate placement approximately 1.5 cm distal to the first metatarsal cuneiform joint. At this time, the guide pin from the Mini TightRope FT is placed under direct image intensification across the second metatarsal base. Care should be taken to avoid any intra-articular placement of the guide pin and subsequent anchor.The angulation of the pin is important as the second metatarsal sits slightly higher than the first metatarsal so a plantar distal medial to dorsal lateral proximal direction must be achieved for accurate placement. An intraoperative lateral projection should be obtained to ensure that the guide pin purchases both the second metatarsal base.

Once appropriate placement of the guide pin has been verified, the step drill is advanced just into the second metatarsal base avoiding excessive penetration. In hard bone, a 4.5 mm overdrill can be utilized for the first metatarsal only. The cutting/punch device is then advanced into the second metatarsal base. The Mini TightRope FT anchor is then screwed securely into the second metatarsal base. Care should be taken to avoid over tightening and damage to the absorbable anchor or insertion driver. Lastly, the sutures are tightened and a metallic button secured against the medial surface of the first metatarsal to desired tension (Figures 8-13). The splay between the first and second metatarsals should be essentially eliminated, or reduced to the preference of the surgeon. Final fluoroscopy images are obtained. Capsulorraphy is then performed around the medial aspect of the first metatarsophalangeal joint finalizing the soft tissue rebalancing and stabilization of the joint. Subcutaneous tissues and skin are then reapproximated based upon surgeon preference.

Postoperative Care

This is an area of some controversy, but each patient needs to be evaluated carefully. Protected weight bearing in a short-leg fracture boot is recommended for the first 3 weeks. Depending upon the patient's age, activity, compliance, and bone quality nonweight bearing may be required, or usage of the fracture boot until 6 weeks.

SUMMARY

The proximal suture anchor is able to augment correction and soft tissue stabilization long enough for the osteotomy and soft tissue structures of the first MTPJ to remodel and stabilize. As the resorption period is anywhere from 1 to 5 years, the soft tissues have adequate time to rebalance. Additionally, because of the screw's physical presence within the screw hole, stress risers are minimized and the risk of stress fracture quite low. Case studies are presented, several with greater than 2 year follow-up to demonstrate the effectiveness of this technique (Figures 14-19). It is hoped that this technique will offer another option in treating hallux valgus deformities.

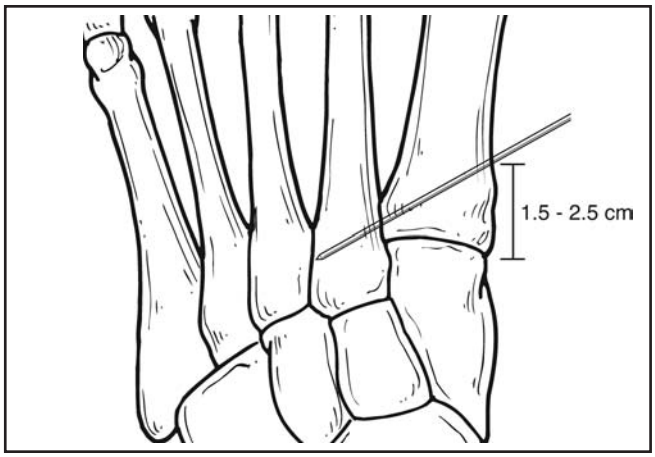


Figure 8. Approximate guide pin placement, 1.5-2.5 cm distal to the first metatarsophalangeal joint.

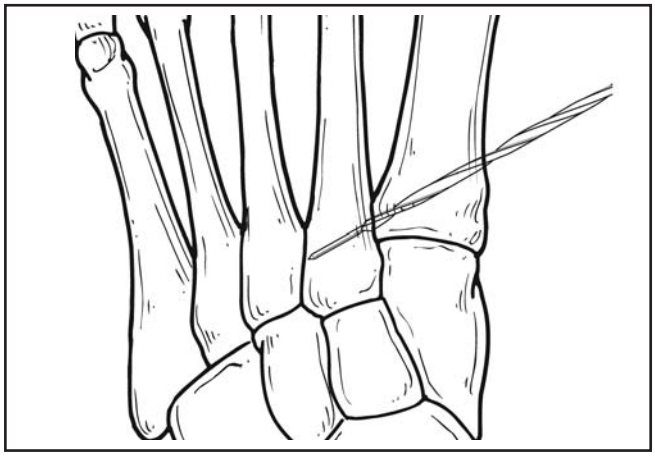


Figure 10. Drill just past medial cortex of second metatarsal ~3 mm.

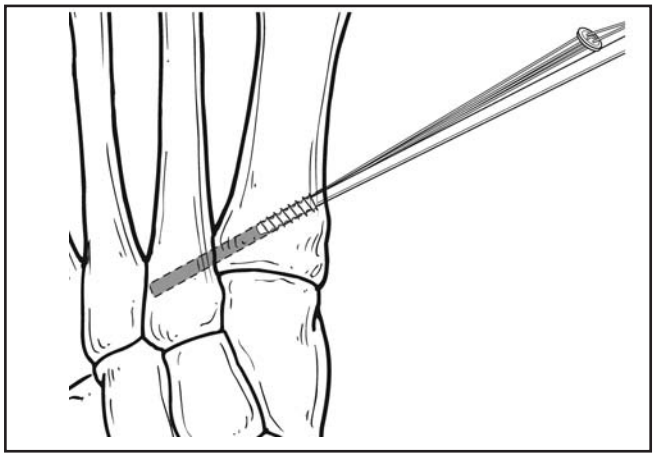


Figure 12. Final placement of Arthrex Mini TightRope FT Device.

Figure 9. Intraoperative fluoroscopic placement of guide pin after osteotomy.

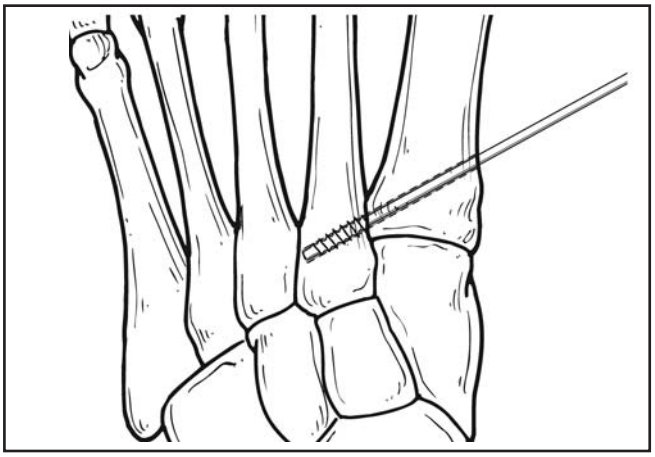


Figure 11. Cutting punch/tap into the second metatarsal.

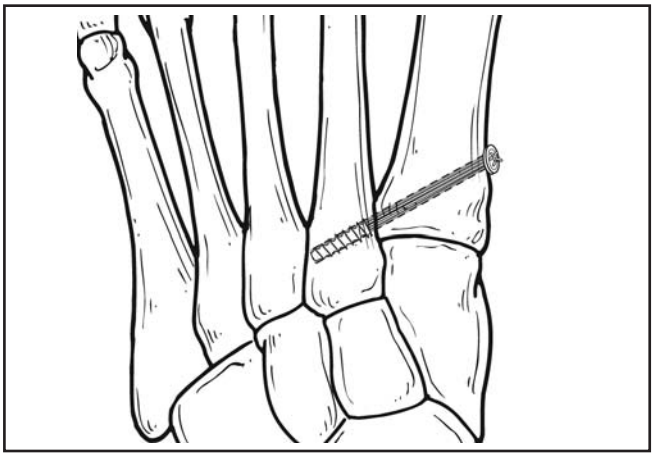


Figure 13. Final Placement.

Figure 14. Preoperative and postoperative radiographs in a 40-year-old woman.

Figure 15. Preoperative and postoperative radiographs in a 55-year-old woman.

Figure 16. Preoperative and postoperative radiographs in a 54-year-old woman.

Figure 17. Preoperative and postoperative radiographs in a 22-year-old woman.

Figure 18. Preoperative and postoperative radiographs in a 71-year-old woman.

Figure 19. Preoperative and postoperative radiographs in a 62-year-old woman.