CHAPTER **1**

FLEXOR TENOTOMY: A Simplified Technique

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INTRODUCTION

Tenotomies have been performed in foot and ankle surgeries for many years. Traditionally, open tenotomies were performed alone, in significant tendon contractures without osseous involvement, or in combination with osseous surgery when osseous changes were also present. Many foot and ankle surgeons have understood the importance of tenotomies in successful digital surgeries.[1-4] McGowan may have been first to describe a minimally invasive technique for tenotomies.[5]

Surgeons searching for less invasive procedures to address tendon pathology began utilizing percutaneous tenotomies for a multitude of various foot and ankle deformities. The vast majority of these have been described for clubfoot deformities.[6-8] Prior to the use of percutaneous tenotomies in clubfoot surgery, this technique was described for various Achilles tendonopathies.[9,10] More recently, authors have described the same technique in correction of the vertical talus deformity.[11,12]

Minkowitz first described a more simple technique for percutaneous tenotomies. He described using a large gauge needle for percutaneous lengthening of the Achilles tendon in a modification of the Ponsetti method in Clubfoot repair.[13] This method, utilizing a large gauge needle for tendon lengthening, has been used for many years by other surgeons. It may be used at the Achilles tendon for lengthening, or at any other anatomic level of the foot or ankle where a percutaneous tenotomy is desired.

INDICATIONS

A more beneficial use of this simple technique of percutaneous tenotomies for the foot and ankle surgeon is its use in the digits. This procedure may be used alone in the treatment of flexible digital contractures, and is especially useful in distal digital hyperkeratotic lesions and/or distal digital ulcerations. Used initially for mallet toe type deformities, the uses for this minimally invasive technique have been expanded to include flexor dominant hammertoe deformities, hallux malleus deformities, and floating digital deformities.

The key to choosing this procedure is that the digital deformity must be flexible or semi-rigid at the interphalangeal joint level and no contracture or a reducible deformity at the metatarsophalangeal joint level. This procedure cannot serve as an alternative for an arthrodesis or arthroplasty of the digit or a full sequential release at the metatarsophalangeal joint. A percutaneous tenotomy for flexible digital deformities would be rarely indicated for multiple adjacent digits. It is most often utilized on third and fourth toes.

The lesion pattern, hyperkeratotic, preulcerative, or full ulcer, must be taken into consideration. The majority of lesions best amenable to this procedure are lesions located at the distal aspect of the digit. This procedure provides a simplified technique to eliminate painful distal clavi or recurring ulcerative lesions (Figure 1).

Figure 1. Typical neuropathic ulcer at distal aspect of digit.

In the neuropathic or diabetic patient with preulcerative or ulcerative distal lesions, choices have historically been full sequential hammertoe repair, traditional flexor tenotomy, or a Syme's type distal amputation. Each of these procedures are more invasive and therefore, pose more risk to the sometimes already high-risk patient. Often the medical workup of this group of patients can be more deleterious to the patient than the surgery itself.

These patients are often medical nightmares with a multitude of medical problems. With their endocrine, renal, and cardiac complications, a simple effective solution needs to be considered. The percutaneous flexor tenotomy described here, will offer a much less risky procedure for the patient and a much simpler technique for the surgeon.

TECHNIQUE

Traditionally, digital tenotomies were performed in the office or out-patient setting using a local anesthetic digital block. A small incision was made at the flexor crease of the distal or proximal interphalangeal joint using a #15 blade or similar. The tendon was then transected, and occasionally the joint capsule of the affected joint was also incised. The incision was closed with several simple interrupted sutures and the foot bandaged. Postoperatively, the patient maintained the surgical site clean and dry for some allotted period of time and then sutures were removed at approximately two weeks (Figure 2).

The simplified technique utilizes an 18-gauge needle to perform the same surgery but does not require suturing and the patient may get the foot wet the next day. This technique is performed in the office under a local digital block. After the digital block is performed and the toe prepped, the same needle used to draw up the local anesthetic to administer the digital block can be used for the surgery. An adhesive bandage is often the only dressing required postoperatively. Total supplies needed for this percutaneous tenotomy surgery are a 3-ml syringe, a 25- or 27-gauge needle for the block, an 18-gauge needle for drawing the local anesthetic and performing the surgery, and an adhesive bandage.

The 18-gauge needle is inserted at the desired tenotomy level. Using the sharp beveled edge of the needle, a sweeping motion back and forth is carried out to transect the longitudinal fibers of the tendon (Figure 3). The needle can also incise the joint capsule if needed for additional contracture release. A bandage splinting the toe in a rectus position can then be applied. The patient is allowed to get the toe wet the next day and is instructed on applying an adhesive bandage or steri-strip to maintain the toe in a rectus position. This is continued for 1 to 2 weeks (Figure 4).

CONCLUSION

This percutaneous tenotomy procedure using an 18-gauge needle offers a very effective tool at correcting flexible digital deformities. This technique is minimally invasive, simple to perform, and has very few complications. As with any invasive surgical technique, no matter how minimally invasive, complications can occur. Complications from this needle percutaneous technique include infection, failure to correct the deformity or resolve the lesion, overcorrection, and the possible later need for a more aggressive surgery.

The 18-gauge needle percutaneous tenotomy technique provides an effective means to alleviate painful or ulcerative distal digital lesions with a low risk of failure. It has proven to be especially beneficial for the in-office treatment of the indicated pathologies in the high risk patient (Figures 5 and 6).

Figure 2. Traditional tenotomy technique.

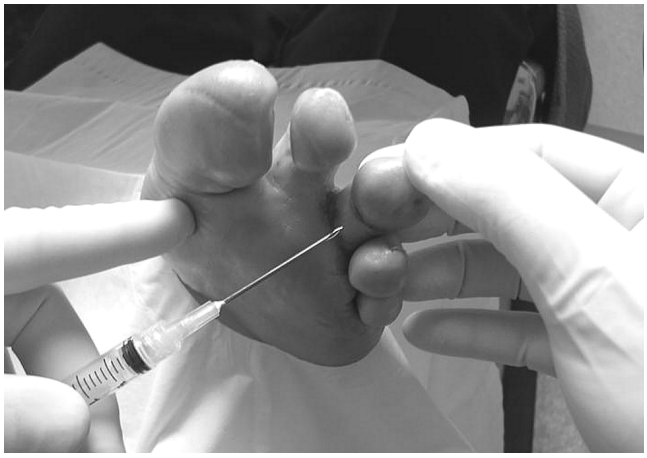

Figure 3. 18-gauge needle percutaneous tenotomy technique.

Figure 4. Steri-strip splint to hold digit in rectus position.

Figure 5. Preoperative appearance of distal digital ulcer.

Figure 6. Two year postoperative appearance with resolution of distal digital ulcer following 18-gauge needle percutaneous tenotomy techniqe.

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