

THE FLEXOR TENOTOMY REVISITED

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Hammertoe repair is as varied as the type of deformities that we observe in clinical practice. Differentiating between rigid and flexible, sagittal plane or combination deformity, flexor predominant or extensor compensated, alters the surgical approach to treating this wide array of clinical entities.

Traditional techniques that are widely accepted include simple arthroplasty techniques, limited arthrodesis, or combination deformity repair through complex repair and relocation of not only the digit but of the metatarsophalangeal joint. Digital implant arthroplasty has limited use in complex forefoot reconstructive surgery. Digital stabilization can also require destructive but definitive procedures such as phalangeal base resection with syndactylization of adjacent toes.

The diabetic patient in particular is at risk for complications related to contracted digits from a variety of standpoints. There are frequent instances of ulceration in regions of shoe or ground pressure, including the dorsum of the proximal or distal interphalangeal joints, and the distal tip of the clawtoe. Trophic ulcers often become infected, and can lead to proximal extension of cellulites, abscess, sepsis, prolonged hospitalization, bone infection, and amputation. Non-diabetic patients with clawtoes frequently have a distal digital clavus/heloma durum which can be extremely sensitive, and limit the ability to ambulate or tolerate pressure from shoes.

In certain clinical scenarios, it may be advantageous to address a digital deformity with limited surgical

exposure, as tenuous vascularity or an unpredictable bone-healing environment can complicate the healing of a relatively simple condition. In limited indications, a flexor tenotomy (and capsulotomy) can sufficiently address the contracted digit to the point where distal clavus or trophic ulceration can heal. The diabetic (or neuropathic) patient in particular possesses an incomparable challenge the clinician's ability to balance procedure selection against predictable outcome (Figure 1). Furthermore, the medical work-up of the elderly, diabetic, multi-organ system diseased patient can be costly both financially and practically. In instances of prior infection from distal digital trophic lesions, cases with poor healing potential from a vascular or immunologic standpoint, or in cases where an isolated arthroplasty can lead to progressive bony resorption and digital contracture, a simple tenotomy can sufficiently reduce the deformity to the degree necessary to heal a distal pressure lesion.

In instances of an isolated digital deformity, a simple arthroplasty technique may be sufficient to align a lesser toe and reduce pressure-related pain. However, a simple arthroplasty is unpredictable in that progressive and uncontrolled bony resorption can continue to occur for months to years following the surgical procedure. The unstable, flail digit, can retract, and be as significant a deformity as the original condition for which the first surgery was performed. A component of Charcot's disease can occur in the diabetic patient's arthroplasty, where the toe continues to deform gradually over time (Figure 2). In

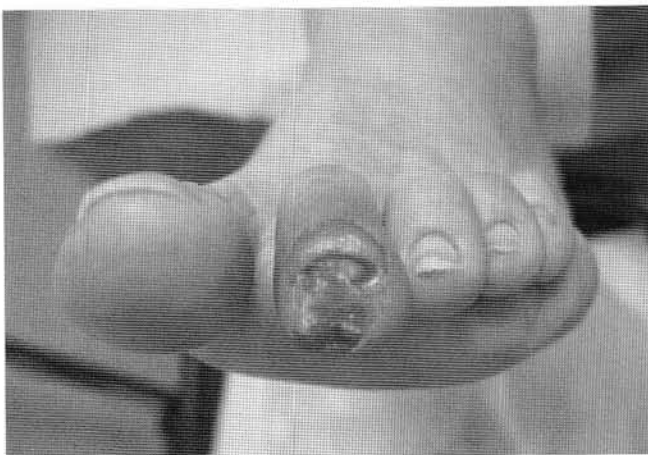


Figure 1. Typical distal digital ulceration with cellulites in a clawtoe deformity in a diabetic, neuropathic, patient with previous recurrent heloma durum of longstanding duration.

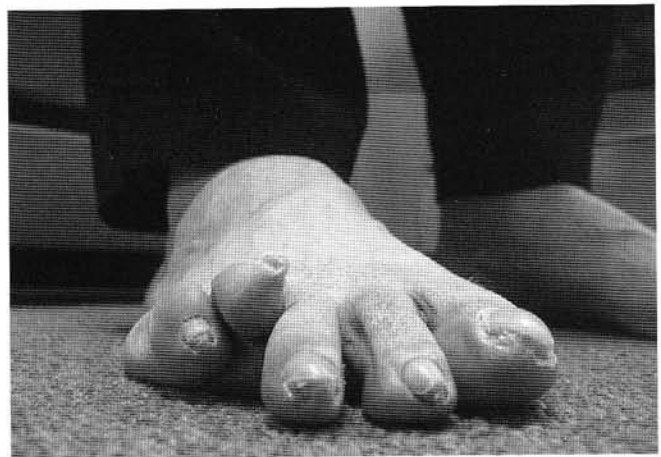


Figure 2. Postoperative year 2 in a patient with a simple PIP joint arthroplasty who experienced progressive bony resorption and dorsal contracture of the digit.

this clinical scenario, a less invasive and more predictable surgical approach would have benefits to the patient, and consideration should be given to an alternative to bone destructive procedures.

INDICATIONS FOR FLEXOR TENOTOMY

The author has strict indications for performing a flexor tenotomy over other surgical approaches for the correction of a hammertoe. The indications include: semi-flexible deformity, distal lesion, isolated digit, rectus metatarsophalangeal joint, and the benefits outweigh risks of open bone and joint surgery. In describing the indications for this technique, the goal of the surgery is usually something other than a purely rectus toe. Although the list of indications is narrow, the scope of patients with these factors is broad and routine in the typical podiatric practice.

This procedure has benefits over bone/joint surgery in many ways. It addresses a significant component of the patients often-recurring condition which can ulceration or infection. It carries limited risk of wound healing complications compared to open bone/joint surgery. It limits the risk of progressive bony resorptive disease which can lead to a flail toe. It can be done as an outpatient, often in the physician's treatment room without the need for hospitalization. It is cost effective and condition effective. It can be done under local anesthesia, without risk to the patient of a regional or sedative anesthetic (many of these patients are neuropathic to begin with). Aside from infection, there are limited risks other than lack of correction and recurrence of deformity. If recurrence does occur, then there has been little lost in the attempt of a soft tissue release.

TECHNIQUE

The procedure can be done either in an office or outpatient or hospital setting. Typical prepping and draping techniques are employed. Local anesthesia is utilized subdermally beneath the sulcus of the digit which is being addressed. A #15 scalpel is inserted plantarly at the level of the digital sulcus, and a medial-to-central, and then lateral-to-central incision is made through the flexor tendon, while resistance is placed on the toe in a dorsal

direction. If sufficient release is noted after cutting the flexor tendon, then no further dissection is necessary. If additional release is needed, then a plantar capsulotomy is performed at the level of contracture, allowing the blade to enter into the interphalangeal joint releasing the plantar capsular attachments and collateral ligaments on either side of the joint. Again, the digit is stressed in dorsiflexion while the release is performed, and the degree of correction is assessed manually. Once sufficient release is noted, the plantar "stab" incision is closed with a single non-absorbable simple interrupted suture (Figures 3-7).

Postoperative dressings are important to support the correction of deformity. The toe is cleansed and a topical skin adherent is applied to the plantar pulp of the toe, extending dorsally to the top of the toe, onto the phalanx to the level of the MP joint. A single 1/4" teri-strip is then applied under dorsal tension to align the toe to a rectus position (Figure 8). Local wound bandaging is performed, and the patient is discharged fully-ambulatory in a surgical shoe. The patient is followed at one week for the first bandage change, and then every other week for several weeks to monitor progression of healing of the trophic lesion or ulcer. The suture is removed at the three week mark. Bathing is initiated at one to three weeks postoperative.

Postoperative complications parallel any surgical procedure, such as wound dehiscence, infection, vascular impairment, recurrence, or overcorrection. The risk of wound breakdown is limited due to limited surgical exposure, however, since this procedure is often indicated in the high-risk patient, the risks do not diminish to any significant degree. Fortunately, the most typical complication is undercorrection of the deformity, and little is lost if additional surgery is needed to address the bony component of the deformity.

Flexor tenotomy is a viable and often preferred method of addressing the flexible hammer or claw toe in isolated digits where there is little metatarsophalangeal joint involvement. Distal digital trophic ulcerations or claw deformities are simply addressed and effectively eliminated in a relatively safe and uncomplicated surgical procedure. Benefits of the flexor tenotomy include low risk of bone healing complications, predictable outcome, limited need for a formal surgical setting, and no significant chance of the outcome being worse than the original condition.

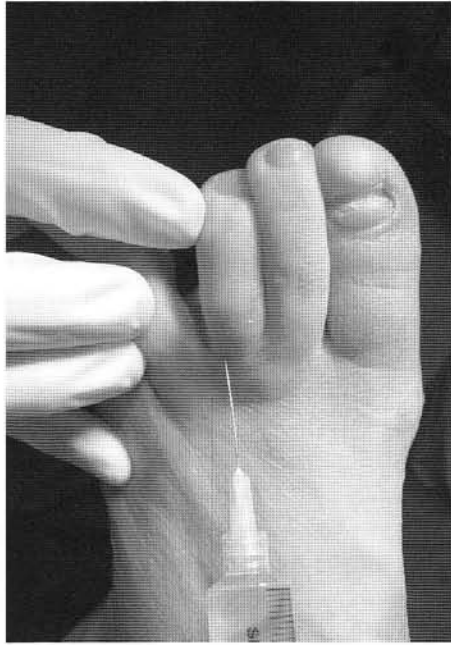


Figure 3. Local anesthetic administered to the plantar sulcus of the toe.

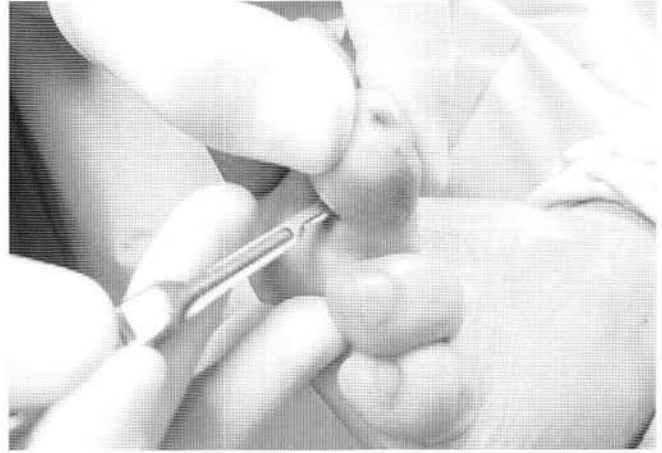


Figure 4. Plantar incision and tenotomy with release of the plantar capsule and collateral ligaments.

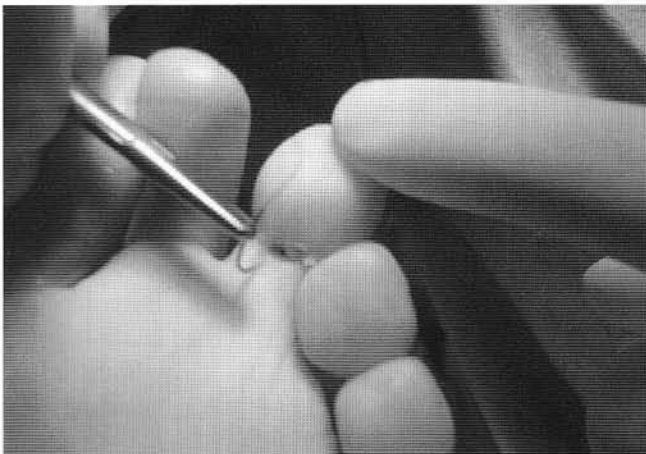


Figure 5. Plantar incision sutured closed.

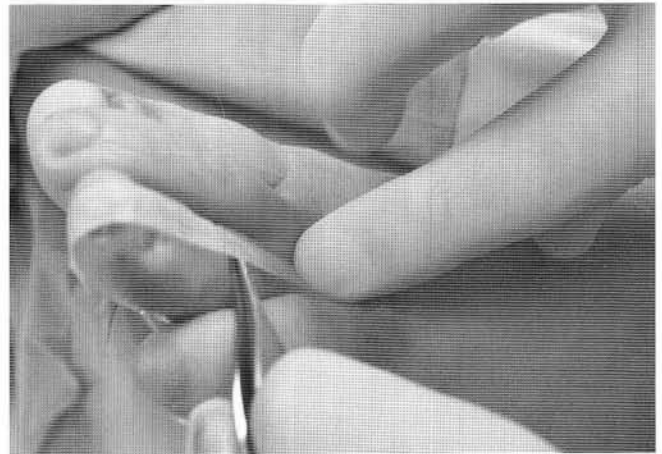


Figure 6. Steri-strip splinting of the toe in a rectus alignment.



Figure 7. Preoperative distal trophic ulceration with associated contracted toe.



Figure 8. Postoperative month 8 following plantar flexor tenotomy.