CHAPTER 10

Chronic Heel Pain: A New Approach to Therapy?

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INTRODUCTION

Heel pain, whether plantar or posterior, is arguably the most common presenting chief complaint of patients entering a foot and ankle specialist's office. If one were to query any number of foot and ankle specialists, each would have a standard protocol that seems to work well "in their experience," for the treatment of plantar heel pain. This protocol usually includes some regimen of stretching, icing, anti-inflammatory medication (either steroidal or nonsteroidal), use of custom-molded orthotics, night splints, and at times surgical intervention. Most surgeons relate that somewhere between 85%-90% of patients respond to conservative measures for treatment of plantar fasciitis. This claim is also supported by the scientific literature (1, 2). With that said, some patients do require surgical intervention to resolve their heel pain symptoms. Surgery is usually recommended after pain has been refractory to conservative therapy for 6-12 months (1-4).

Surgery for plantar fasciitis has can be divided into 2 categories, noninvasive and invasive (to be further subdivided into minimally invasive techniques). The most widely-used and studied noninvasive technique is extracoporeal shock wave therapy (ESWT) (5-7). Invasive surgical intervention involves partial fasciotomy or fasciectomy, and this is accomplished with a variety of open and partially open techniques including percutaneous and endoscopic releases of the plantar fascia (4, 8-10).

Posterior heel pain is an entirely different entity, however it is largely approached, in regard to therapy, in the same manner as plantar heel pain. Most surgeons employ conservative measures including stretching, icing, anti-inflammatory medication (either steroidal or nonsteroidal), use of custom molded orthotics, and night splints. Additionally complete immobilization and physical therapy are also performed because of the precarious nature of the insertion of the Achilles tendon. Surgery is usually the last resort in patients with posterior heel pain, and one usually waits until conservative measures have failed after 6-12 months. Unlike plantar fasciitis, surgical intervention usually includes removal of a large posterior heel spur and relocation of the Achilles tendon.

The most common cause of heel pain is plantar fasciitis (inferior) and insertional Achilles tendonitis (posterior). There are as many names for these conditions as there are treatment options. Some of these include heel spur syndrome, inferior/posterior calcaneal bursitis, or inferior/posterior calcaneal enthesopathy. Each of these names denotes the presence of heel pain, however the fact that there are multiple names may signify a poor understanding of the actual cause of the pain. Widely accepted etiologies and risk factors for heel pain include a combination of obesity, excessive foot pronation, excessive running, and prolonged standing. It is also accepted that both athletic and sedentary persons are affected equally with heel pain (3).

Further, foot and ankle specialists will agree that when any of the aforementioned risk factors are present, there is also an associated shortening or tightness of the Achilles tendon and/or plantar fascia. This leads to constant three-dimensional stress and strain on both the ligament and the tendon that over time begin to manifest itself as heel pain. Often, because of this stress and strain, a heel spur develops. It is generally accepted that this can be explained by Wolff's Law, but again, this is poorly understood. What is better understood is the fact that, over time there are changes within either the plantar fascia or Achilles tendon. The most marked changes are the decrease in inflammatory markers and thickening of the ligament and tendon (11, 12). This usually occurs between 6 and 12 months after presentation of symptoms, and is an indication that the condition has transitioned from acute to chronic. At this point, traditional and conservative measures are less effective and surgical options are considered. In this article, I will explore the use of ultrasound guided ultrasonic debridement of the plantar fascia and Achilles tendon for chronic plantar fasciitis (plantar fasciosis) and chronic insertional Achilles tendonitis (Achilles tendinosis) as an alternative to more traditional surgical approaches to chronic heel pain.

CASE FOR ULTRASONIC DEBRIDEMENT

The technique of using ultrasonic energy to debride and aspirate diseased tissue is widely accepted as the standard of care in cataract surgery (phaceoemulcification). The technique allows for removal of diseased tissue while protecting and maintaining normal healthy tissue all while using a balanced saline solution to irrigate and keep the debridement instrument cool. Since the harmonic resonance of diseased tissue (necrotic) is different from healthy tissue

(elastic), it stands to reason that this technology could be modified to work in and around chronically diseased and/or injured tendons and ligaments.

Chronic tendonitis and fasciitis (tendinosis/fasciosis) is a problem affecting over 10 million people per year. Based on 2013 ICD-9 diagnosis code data, approximately 3.1 million patients have plantar fasciitis and 5.6 million have Achilles tendinitis. Whether it be by overuse injury or the chronic cycle of micro-tear and repair, the diagnosis of tendinosis or fasciosis can be confirmed with musculoskeletal ultrasound. The appearance is usually a thickening of the ligament or tendon with hypoechoic or anechoic areas near the insertion. Options for therapy at this point for Achilles tendinosis and plantar fasciosis, when conservative measures have failed has been well researched, however Tenex Health has received US Food and Drug Administration approval for their TX-1 device designed to treat chronic tendinosis and fasciosis (13) (Figures 1, 2).

This therapy has recently been explored in the foot and ankle, but has been performed over 20,000 times including for chronic lateral epicondylitis, patellar tendinopathy, and in shoulder surgery. In the 2015 Podiatry Institute Update, Morrey, et al gave an overview of this treatment for chronic Achilles tendinosis and fasciosis, and Ellis, et al discussed its potential benefit in the healing of chronic ulcerations.

EXPERIENCE AND OBSERVATIONS

As with anything in foot and ankle surgery, time will always tell the true story. I can report that with the implementation of this technology in my practice, the way I approach treatment of plantar fasciitis and insertional Achilles tendonitis has changed. The use of diagnostic musculoskeletal ultrasound to differentiate a chronically-diseased tendon or fascia from one that may still be in a more acute phase is paramount. I have noticed that patients with thickening and hypoechoic signals at the insertion are less likely to respond to usual conservative measures, and have minimal relief of symptoms with cortisone injection and/or oral anti-inflammatories. Once this is recognized I have another option to offer besides prolonged conservative therapy or typical open procedures.

Heel Pain Protocol

At the initial visit, there is a discussion of the length of time the heel pain has occurred, and what previous treatments have been tried. Radiographs and diagnostic ultrasound are performed. I may consider cortisone injection today depending on the patient's pain level, or a 2-week course of nonsteroidal antiinflammatories. Standard therapy is discussed and implemented (stretching, orthotics, etc).

At the second visit, depending on the ultrasound findings we discuss ongoing therapy. If there is no thickening

Figure 1. TX1 console. There is a user interface with circuitry for precise and targeted tissue cutting and removal. Targeted diseased tissue is removed while sparing healthy tissue with built in safety features.

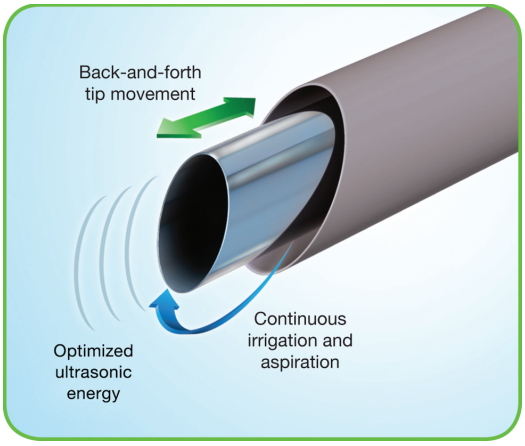

Figure 2. TX1 microtip with an 18 gauge percutaneous pen-like function.

of the plantar fascia or Achilles tendon and the area near the insertion shows no hypoechoic signs we typically continue the normal regime of stretching, icing, shoe modification, and orthotics. Patients with this presentation typically have marked improvement if they followed instructions from the previous visit, and continue to experience decreased symptoms over time. However, it is on this visit that I begin discussing ultrasonic debridement of the tendon or fascia in patients with diseased tendon or fascia. I have found that the earlier we intervene in these cases, the better the outcome and the earlier patients can return to the desired level of activity.

Procedure Technique Ultrasonic Fasciotomy of the Plantar Fascia

The procedure is simple for anyone who has experience with musculoskeletal ultrasound. But, even with no experience, it should not be too difficult to become oriented with moderate practice. I have performed this procedure under monitored anesthesia, regional popliteal nerve block, and local

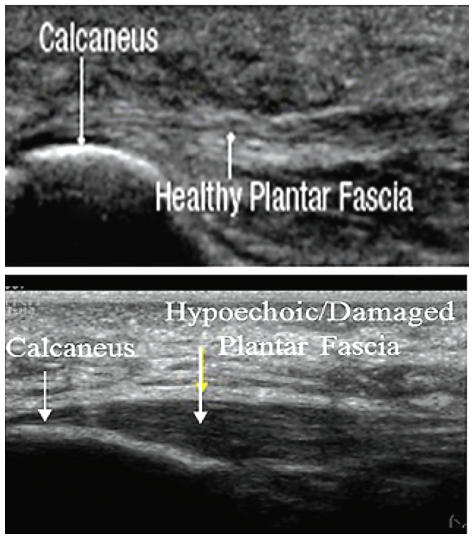

Figure 3. Ultrasound projection of normal plantar fascia and diseased plantar fascia.

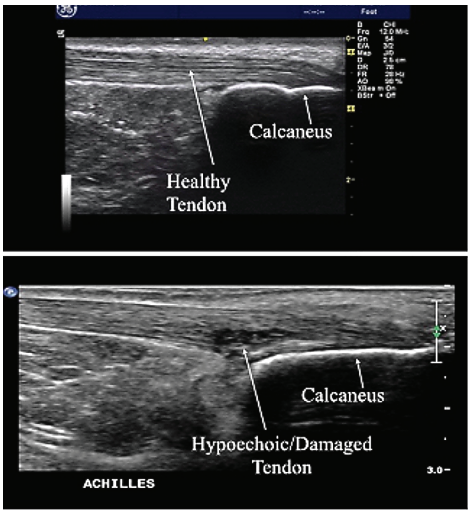

Figure 4. Ultrasound projection of normal Achilles tendon and diseased Achilles tendon.

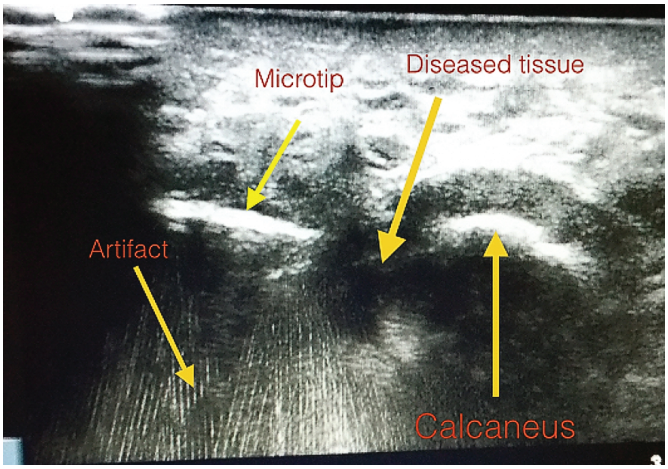

Figure 5. Microtip within the diseased ligament. Notice the artifact produced as the micro tip moves at ultrasonic speed through the diseased ligament.

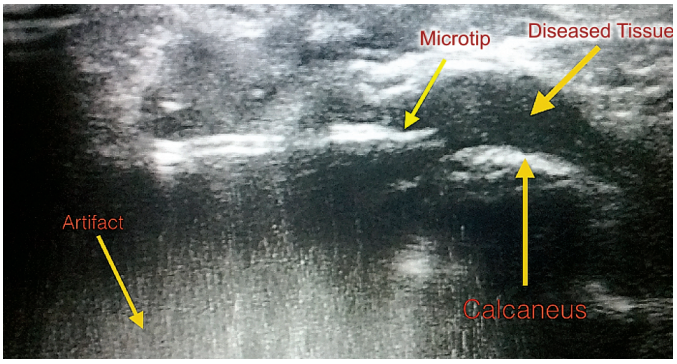

Figure 6. Microtip within the diseased ligament.

infiltration. However, my preferred method of anesthesia is a tibial nerve block. The pathology is identified in the long view and then the ultrasound transducer is rotated into the short view for therapy (Figures 3, 4). A portal is created from medial to lateral in line with the diseased tissue with a #11 blade. The TX-1 ultrasonic instrument is introduced through the portal and approaches the diseased ligament (Figures 5, 6). Diagnostic ultrasound is utilized throughout to insure proper placement of the instrument and to insure complete therapy. The console is set to medium energy and a foot pedal is depressed to activate the ultrasonic energy as well as the irrigation and aspiration mechanism. One can visually appreciate the instrument aspirating diseased tissue, however there is a distinct tactile feel that is experienced that allows for certainty that all tissue has been adequately treated.

At the completion of the procedure, a steri strip is applied followed by a 4x4 inch gauze and a tegaderm bandage. The patient is placed into a pneumatic CAM boot and allowed to ambulate immediately. Range of motion exercises are begun on day 3. I encourage use of the walking boot for 3 weeks, however in my experience, most patients have transitioned from the boot in 2 weeks. The manufacture recommends use of the boot for up to 6 weeks.

Procedure Technique Ultrasonic Tenotomy of the Achilles Tendon

This procedure is remarkably similar to the procedure for the plantar fascia. The differences are as follows: a popliteal regional nerve block is used for anesthesia, and the debridement of the tendon is accomplished longitudinally along the fibers of the tendon to prevent transection. Additionally, patients are kept non-weightbearing for 2 weeks following this procedure, and are maintained in a walking boot for at least 6 weeks.

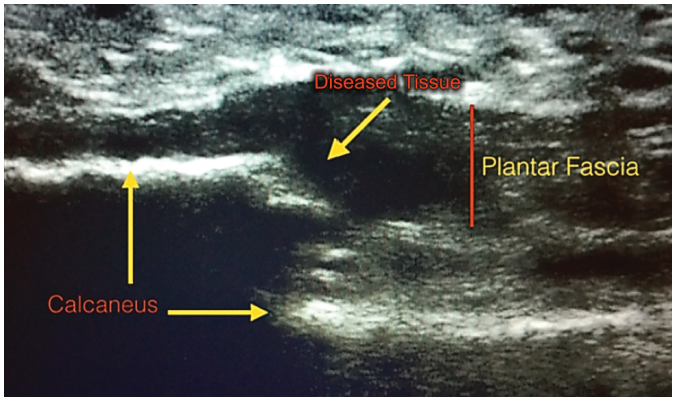

Figure 7. Diseased plantar fascia at insertion (long view).

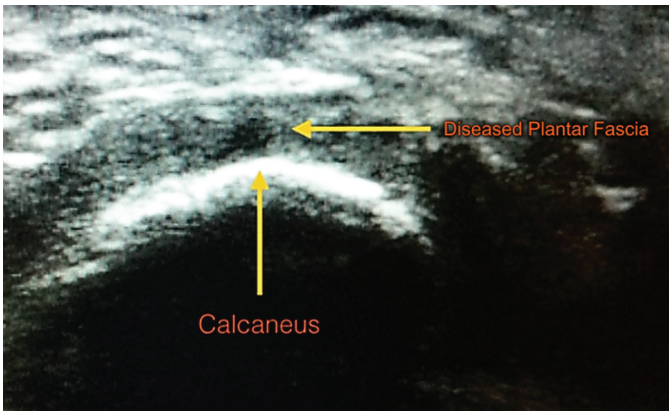

Figure 8. Diseased plantar fascia at insertion (short view).

My sample size of patients is admittedly small (less than 20), however I must say that I am cautiously impressed with the results thus far. My patients have also been pleasantly surprised at the ease of the procedure as well as their pain relief and ability to return to activity after months to years with heel pain. As mentioned earlier, time will tell whether this procedure will become the mainstay in foot and ankle practices, but for now it is at least hopeful that there is a viable option for treatment of chronic heel pain due to Achilles tendinosis and plantar fasciosis.

3 Keys To Success

The patient must have chronic pain of longer than 3 months. This is a diversion from the established 6 month rule because we have found that earlier intervention makes for better outcomes.

The patient must be able to locate one area that is most painful (point tenderness). This usually corresponds to the area of diseased ligament/tendon.

Diseased tissue must be confirmed via diagnostic ultrasound. Placement of the transducer on the area of point tenderness should identify a region of degenerative tissue visualized as hypoechoic. This is due to irregular and disorganized fibers and thickened ligament and tendon (Figures 7-9).

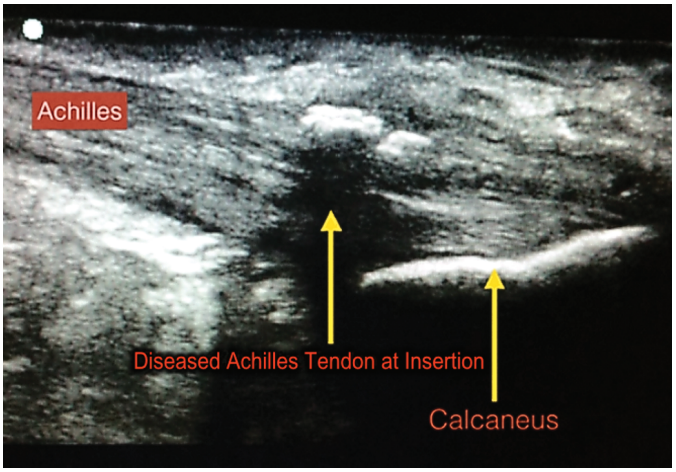

Figure 9. Diseased achilles tendon at insertion.

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