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Chapter 7

Plantar Fasciitis

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7.1 Introduction

Plantar fasciitis is one of the more common injuries in the general population and can be debilitating for an athlete. In a retrospective study of 2002 running injuries, it was found that 157 of the injuries were plantar fasciitis (7.8%) and another study found that there are more than one million patient visits per year to medical professionals.^{1,2} The plantar fascia is the main supporting structure of the foot and arch; it is vulnerable to injury.

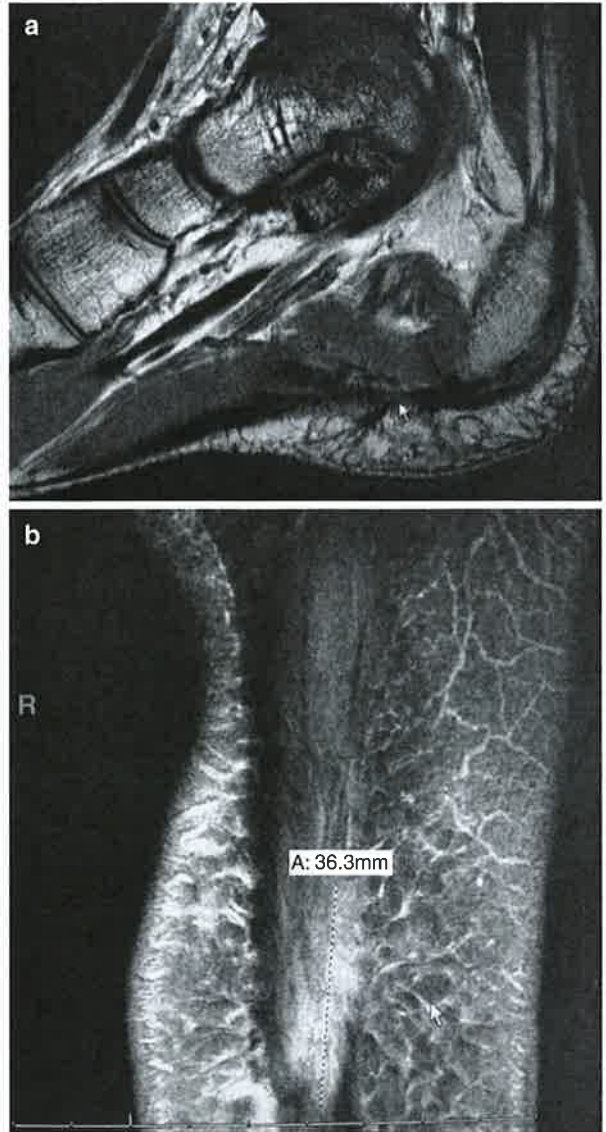
Plantar fascia injuries typically occur from overuse with an insidious onset, though they can happen acutely without prodromal symptoms. Patients may not seek treatment until the injury becomes more chronic in nature. It is commonly cited that the majority of the time fasciitis resolves with conservative treatment with studies showing relief of symptoms between 46% and almost 100%.³⁻⁶

Clinical examination is of utmost importance in the diagnosis and treatment of plantar fasciitis. Diagnostic testing may include plain radiographs, ultrasound and magnetic resonance imaging (MRI). Differential diagnoses may include stress fracture of the calcaneus; nerve-related injuries including tarsal tunnel syndrome, neuroma, and neuritis of the first branch of lateral calcaneal nerve; soft tissue mass; bursitis; fat pad atrophy; systemic arthritides; tumors; and ruptures of the fascia.

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Fig. 7.4 (a) MRI sagittal view showing plantar fascial rupture. (b) MRI transverse view showing medial plantar fascia and abductor rupture



The treatment of a rupture differs greatly from the treatment of plantar fasciitis. Initial treatment should be aimed at reducing pain and inflammation through the use of non-weight-bearing, a below-knee walking boot, ice, and nonsteroidal anti-inflammatory drugs (NSAIDs) and/or narcotics if needed. Within 1–3 weeks, the patient should be able to progress to full weight-bearing in a boot and in another 1–3 weeks progress out of the boot to full weight-bearing. An arch support or foot orthosis placed inside the boot may be helpful. Physical therapy can be started very early in the process and should focus initially on helping to relieve symptoms through the

use of electrical stimulation (for swelling and pain control), pulsed ultrasound, and soft tissue mobilization. It should then progress to strengthening the foot and leg to transition out of the boot and back to full activity.¹¹

7.5 Nonsurgical Treatment of Plantar Fasciitis

Since a majority of patients with plantar fasciitis get better with nonsurgical (conservative) treatment, it is worthwhile for presentation. There are no universal protocols to eliminate all the symptoms. Initial treatment, particularly in athletic patients, is to focus on stretching, reduce activity, and add arch support. Patient should perform a simple wall stretch concentrating on improving the flexibility of the gastrocnemius–soleus complex. The fascia does not have any elastic fibers and attempting to stretch the fascia by hanging off a step or putting your toes up against the wall may actually prolong the injury. However, DiGiovanni et al. presented an alternative method of non-weight-bearing specific stretching of the fascia which in their study worked better than the wall stretching.¹⁵

Ice can help control symptoms and is best performed by freezing water in a round smooth plastic bottle and rolling the foot over the bottle for at least 10 min, twice a day. Oral anti-inflammatories, both steroidal and nonsteroidal, can be utilized, though recent research has shown, as is the case with Achilles tendonosis, acute inflammatory pathological findings do not exist. If NSAIDs relieve symptoms, it is likely they are providing an analgesic effect. It may also be likely an arthridity is involved.

Avoidance of barefoot and adherence to wearing shoes with good arch support is also important in the initial treatment phase. Taping can be very effective at reducing symptoms and also may help aid in the diagnosis. Plantar fasciitis pain can be relieved the majority of the time through taping consisting of a low-dye with a Campbell's rest strap over the top of the low-dye. Patient can be instructed to perform the taping themselves before activity. Alternative taping can be variations of the "plantar figure-of-eight" method (Fig. 7.5). Immobilization can be recommended for chronic cases, though ideally this should be reserved for calcaneal stress fractures and plantar fascia ruptures.

Corticosteroid injection can be very effective at reducing symptoms but is not without risks. Plantar fascia ruptures have been associated with injections, and multiple injections in the same area can lead to fat pad atrophy.¹²⁻¹⁴ The associated ruptures could possibly be dose and type-of-steroid related. Higher doses of insoluble steroids may have a more deleterious effect. Acevedo and Beskin reported that 10% of their patients were injected for plantar fasciitis with 40 mg/mL of triamcinalone acetate.¹² One author (BF) prefers a mixture of 1.0 cc of 25% marcaine, 4 mg of Dexamethasone phosphate, and 5 mg of triamcinalone acetate with fewer than 10 post-injection fascial ruptures in 18 years of practice.

Over-the-counter arch supports should also be considered for the initial treatment phase. If symptoms persist, a custom orthotic device can be considered.

Fig. 7.5 Plantar “figure-of-8” taping. Additional reinforcement can be applied with traditional “low-Dye” taping



Fig. 7.6 Improper shoe flexibility predisposing plantar fascia or midfoot injury



A softer device should be used for the cavus/underpronated foot type while a more controlling device should typically be prescribed for the pes planus/overpronated foot type. Biomechanical examination and the patient’s past experience should be combined with the physician’s expertise to devise the best orthotic device. Examination of the athletic patient’s shoe type is also paramount. Often sport shoes with arch cut-outs can instigate or aggravate plantar fascia conditions by allowing improper flexibility in the wrong region (Fig. 7.6).

Extracorporeal shock wave therapy (ESWT) is generally offered as a last resort in the United States before considering surgical management. Shock wave therapy is purported to ultimately work by improving the vascularization to the injured area. The treatment induces micro-trauma to the area, and during the repair process, new blood vessels develop to deliver nutrients to the area and heal the tissue. There are virtually no long-lasting negative effect from the treatment: cost and availability being the main deterrent in the United States. There are both high-energy and

In the absence of any nerve involvement, one author (BF) prefers the instep fasciotomy. This technique avoids the neurovascular bundle and has the advantage of being technically simple to perform. Woelffer and colleagues performed a retrospective analysis of 33 patients that underwent the instep fasciotomy and found at 5-year follow-up that 30 had good-to-excellent results.²³

The instep fasciotomy procedure can be performed under local anesthesia. Boberg states "Proper placement of the incision is imperative to a satisfactory outcome".²⁴ The incision should be placed approximately 1 cm distal to the insertion at the heel, at the point where the arch begins to slope away from the calcaneus (Fig. 7.8). The central band can be identified in the arch and the incision should be placed over this portion of the fascia. A transverse incision is made and carried down to the level of the fascia. After identifying the medial and lateral border of the central band, the toes are dorsiflexed to place the fascia under tension and the fascia is severed. It is important to maintain the lateral band of the fascia to help avoid lateral column complications postoperatively. After irrigation, the wound is closed with a combination of simple and horizontal mattress sutures. The patient should be kept non-weight-bearing for a minimum of 2 weeks to facilitate proper healing of the skin incision and to allow the fascia to heal in an elongated state.

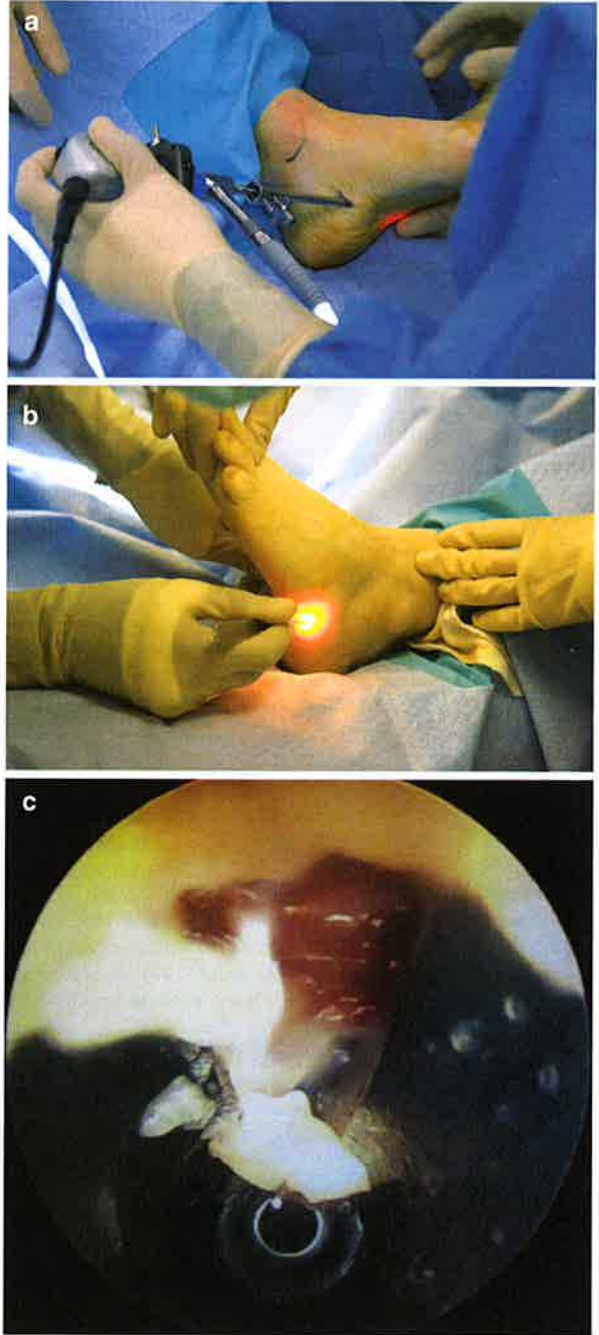
One can also perform a more traditional open approach which can incorporate a release of the first branch of the lateral calcaneal nerve, which is often implicated as a major cause of plantar heel pain. An oblique incision on the medial heel is placed from behind the medial malleolus near the junction of the medial skin and plantar fat pad, running into the plantar aspect of the foot. The fascia overlying the abductor hallucis muscle belly is incised and the septa in the porta pedis is also released allowing for a complete release of the first branch of the lateral calcaneal nerve. The fascia is then resected at the attachment and the plantar calcaneal spur is removed if present. It is advisable to keep deep closure to a minimum with emphasis on excellent skin closure technique with simple and interrupted mattress type sutures.²⁴

Unfortunately, there is scant literature on performing plantar fascia surgery in athletes whether open, percutaneously, or endoscopically. Saxena reported on an



Fig. 7.8 Instep fasciotomy incision

Fig. 7.9 (a) Medial endoscopic portal; (b) Lateral endoscopic portal; (c) Endoscopic view of medial portion of plantar fascia being cut



endoscopic approach on athletic patients in 2004. Overall, good and excellent results were obtained in over 90% of patients as long as their body-mass index (BMI) was <27.²² The endoscopic approach had been criticized for inducing lateral column pain and nerve entrapment.²⁵ One author's (AS) preferred technique is the endoscopic approach. However, some critical differences are adhered to as compared to historical endoscopic approaches. With the two-portal approach using a 4.0-mm endoscope, only the medial one half of the central band is transected. A longitudinal lateral incision is made; so, the cannula is not placing undue tension on the lateral structures (Fig. 7.9). Postoperatively, patients are kept in a boot, non-weight-bearing for 2 weeks when skin sutures are removed, and then weight-bearing occurs for additional 2 weeks or until pain-free. This is critical as early weight-bearing may induce lateral compensation. Usually an arch support is used as well. Physical therapy is initiated at 5 or more weeks post-plantar fascia surgery. Return to sports with endoscopic technique can occur as soon as 7 weeks, but typically ranges around 12 weeks.²²

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