

# Plantar Fasciitis: A Concise Review

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## Abstract

One challenge in the treatment of plantar fasciitis is that very few high-quality studies exist comparing different treatment modalities to guide evidence-based management. Current literature suggests a change to the way that plantar fasciitis is managed. This article reviews the most current literature on plantar fasciitis and showcases recommended treatment guidelines. This serves to assist physicians in diagnosing and treating heel pain with plantar fasciitis.

## Introduction

Plantar fasciitis is one of the most common causes of heel pain and has been estimated to affect about two million people in the US, resulting in more than one million visits to both primary care physicians and foot specialists.<sup>1,2</sup> Plantar fasciitis affects both sedentary and athletic people and is thought to result from chronic overload either from lifestyle or exercise.<sup>2</sup> Current literature suggests that plantar fasciitis is more correctly termed fasciosis because of the chronicity of the disease and the evidence of degeneration rather than inflammation.<sup>1,6</sup> Treatment is often difficult because of the poorly understood mechanism by which the body heals chronic degeneration as opposed to acute inflammation. This article lays out current recommendations for diagnosis and treatment so as to better guide any physician who encounters a patient with plantar pain.

## Case Report

A 48-year-old obese but otherwise healthy woman presents to her primary care physician complaining of bilateral foot pain. She states that she has had the pain daily for months. The pain is located on the bottom of her feet at the heel and is severe, especially on the first step out of bed in the morning and after a long day at work. She works at a warehouse handing out samples to customers and stands for approximately 7 hours a day. The pain does not radiate anywhere, and there is no associated numbness, tingling, leg swelling, or weakness. She denies any history of trauma or falls. She exercises by walking 3 times a week for 30 minutes and is able to

complete the walk without problems. In fact, the walking seems to make her feet feel better. She has tried changing shoes and ibuprofen but has had no relief.

On physical examination, her lower legs and feet have no apparent abnormalities. There is no edema, ecchymoses, skin changes, or evidence of cyanosis. She has no tenderness to palpation over the tibia, fibula, malleoli, tarsals, metatarsals, metacarpophalangeal joints, or digits. She has exquisite tenderness to palpation just medial to the midline of her heel just superior to the calcaneal bone. She also has tenderness, but less so, along the plantar aspect of the midfoot. She has normal strength of dorsiflexors and plantar flexors. She has normal range of motion with inversion, eversion, and plantar flexion. She is just able to get to neutral position on dorsiflexion. Sensation is intact and pedal pulses are present and equal bilaterally. When she is standing, it is apparent that she has pes planus. She is able to walk on her toes and heels and has a normal gait with mild pronation.

The patient receives a diagnosis of plantar fasciitis and instructions on conservative management to facilitate recovery, including appropriate footwear at work, stretching, and massage. She is encouraged to start a low-impact exercise program to aid in weight loss.

## Discussion

The plantar fascia is a thick fibrous aponeurosis that originates at the medial calcaneal tubercle and helps support the arch of the foot (Figure 1). It is thought

that repetitive tensile overload from standing for long periods of time or running causes changes in the aponeurosis that can be either acute or chronic. More recently, the term plantar fasciosis has

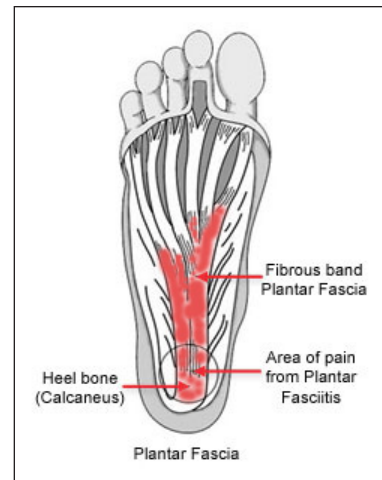


Figure 1. Anatomy of the foot.

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Intrinsic risk factors	
Anatomic	Obesity
	Pes planus (flat feet)
	Pes cavus (high-arched feet)
	Shortened Achilles tendon
Biomechanic	Overpronation (inward roll)
	Limited ankle dorsiflexion
	Weak intrinsic muscles of the foot
Extrinsic risk factors	
Environmental	Poor biomechanics or alignment
	Deconditioning
	Hard surface
	Walking barefoot
	Prolonged weight bearing
	Inadequate stretching
	Poor footwear

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been introduced to de-emphasize the idea that inflammation is the cause of pain.<sup>3</sup> Histopathologic studies have shown that patients with diagnosed plantar fasciitis have more disorganization of fibrous tissue similar to degenerative tendinosis rather than inflammation.<sup>4</sup>

Classic symptoms include severe pain in the morning or after a rest period that improves with movement but is aggravated by long periods of weight bearing. Physical examination findings are typically tenderness to palpation over the medial calcaneal tubercle and discomfort with passive dorsiflexion of the first toe.<sup>1</sup> Several risk factors, both intrinsic and extrinsic, are listed in Table 1.<sup>1-4</sup>

All of the risk factors can be assessed on the basis of history and physical alone and help to guide appropriate treatment. Imaging is typically not necessary for the diagnosis but may be helpful if there are other likely reasons for heel pain included in the differential diagnosis (Table 2).

Treatment mechanisms have been wide ranging, from ice, nonsteroi-

dal anti-inflammatory medications,<sup>1-5,7</sup> stretching,<sup>1-4,6-8</sup> formal physical therapy,<sup>1-4,7,9</sup> night splints,<sup>1-4,7,9-13</sup> custom orthotics,<sup>14</sup> over-the-counter heel cups,<sup>1-4,14,15</sup> LowDye taping,<sup>9,16,17</sup> corticosteroid injections,<sup>1-7,18</sup> platelet-rich plasma injections,<sup>1,18-21</sup> botulinum toxin injections,<sup>22-24</sup> iontophoresis,<sup>17</sup> extracorporeal shock wave therapy,<sup>24</sup> and fasciotomy.<sup>1-4,7,25</sup>

It is understood that in general practice, first-line treatment may include a corticosteroid injection. This may relieve symptoms, especially during an acute flare or even with chronic pain, but recent studies are suggesting that less-invasive techniques may be more effective at providing long-term relief.

A current treatment pathway is provided in Figure 2 to aid in the formulation of a treatment plan. All patients should be counseled that with any conservative treatment option, they should not expect to see significant improvement before six to eight weeks.

Results of a 2008 query of orthopedic surgeons who are foot-and-ankle specialists showed that for patients with more than 4 months of pain, 74 out of 116 surgeons

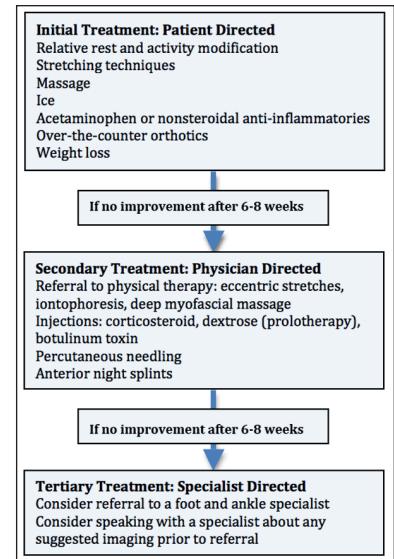


Figure 2. Treatment algorithm

preferred plantar fascia-specific stretching and supervised physical therapy over anti-inflammatories or corticosteroid injections.<sup>25</sup> A 2008 Cochrane Review showed that custom orthotics may not reduce foot pain any

Table 2: Differential diagnosis for heel pain.<sup>7</sup>

Type	Diagnosis	Common findings
Neurologic	Tarsal tunnel syndrome: posterior tibial nerve impingement	Burning sensation in the plantar region worsened by dorsiflexion
	Neuropathy such as from diabetes	Paresthesias in plantar region
Skeletal	Acute calcaneal fracture	Likely after hard landing on heel
	Calcaneal stress fracture	Most likely seen in runners
	Sever disease: calcaneal apophysitis	Seen in pediatric patients with open physes
	Systemic arthritides such as rheumatoid	Expect pain in multiple joints along with heel pain
Soft tissue	Fat pad atrophy	More common in elderly people
	Fat pad contusion	More likely associated with hard landing on heel
	Achilles tendinitis	Posterior calcaneal tenderness and tendon pain
	Retrocalcaneal bursitis	Pain in retrocalcaneal bursa
	Posterior tibial tendinitis	Pain along posterior tibial tendon and at insertion mid foot at the arch



Figure 3. Calf and arch stretch using a towel. Consider keeping the towel near the bedside and performing before going to sleep and before taking first steps in the morning. Pull back on foot for 30 seconds 3 times with 30 seconds of rest in between.



Figure 4. Manual plantar fascia stretch with cross-friction massage. Stretch and massage before taking first steps for 1 minute 3 times with 30 seconds of rest in between.



Figure 5. Roll plantar fascia with can or ball. Consider keeping at the bedside and performing before going to sleep and before taking first steps in the morning. Roll plantar fascia for 1 minute 3 times with 30 seconds of reset in between.

more than sham orthotics, over-the-counter orthotics, or night splints and were not any better than stretching alone.<sup>9</sup> Night splints are associated with statistically significant improvement, but the cumbersome splints limit patient adherence and, therefore, potential benefits.<sup>9,10-13</sup> Fasciotomy may be effective for recalcitrant plantar fasciitis that has not responded to any other conservative treatments. Less well-studied treatments, such as extracorporeal shock wave therapy, iontophoresis, botulinum toxin injections, and platelet-rich plasma injections, have had favorable outcomes but have not yet been tested with randomized, double-blind, placebo-controlled studies.<sup>18-25</sup>

In all of the literature reviewed, plantar fascia-specific stretching had the best statistically significant long-term results (Figures 3-5). The figures show some of the most widely used and evidence-supported stretches that patients can do at home. ❖

#### Disclosure Statement

The author(s) have no conflicts of interest to disclose.

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