Treating Heel Pain Conservatively

By Séamus Kennedy, BEng (Mech), CPed

Heel pain is one of the more common diagnoses of the foot and ankle, and in its advanced stages it can be debilitating. As a testament to its frequency, it regularly comes up in conversations outside of work when I explain what I do for a living. I am often told in great detail about the ongoing foot maladies of relatives and friends, including hobbling gait and heel spurs. Luckily, heel pain is one of the more treatable conditions, and numerous studies demonstrate the success of a variety of conservative measures including foot orthotics, physical therapy, taping, and prescription drugs.

Functional foot orthotics with semi-rigid shell, extrinsic heel post, and full-length shock absorbing top cover. *Photograph courtesy of Hersco Ortho Labs.*

Differential Diagnoses

A clear diagnosis is essential. Before treating a case of heel pain as traditional plantar fasciitis (PF), it is important to rule out other ailments, as the general term "heel pain" masks several conditions. Calcaneal stress fractures, tarsal tunnel syndrome (TTS), nerve entrapments, arthritis, tendinitis, and calcaneal apophysitis can all have a component of heel pain. The presence of a calcaneal fracture can be initially identified by the heel-squeeze test. Hold the medial-lateral heel in your cupped hands and gently apply compression to the calcaneus walls. The patient's reaction will quickly let you know if a fracture exists. Patients with stress fractures also will not report a lessening of symptoms as they continue walking during the day. TTS results from compression of the posterior tibial nerve, and frequently the pain increases with activity and worsens as the day progresses. A quick test for TTS is a positive Tinel's sign, which produces a shooting, tingling sensation in the distal limb when the skin is tapped with a finger along the course of the posterior tibial nerve. Various forms of arthritis and degenerative joint disease should all be considered in the diagnosis, and more extensive examination with radiographs and electromyogram (EMG) nerve-conduction tests may be required.

Plantar Fasciitis

Classic PF is usually seen as a deep, tender pain that sometimes radiates into the arch. There is often pain along the plantar fascia and in particular at the medial calcaneal insertion. The current thinking is that PF is a chronic degenerative-reparative process that is brought on by stress overloading, although the exact causes can be varied. Heel spur is another popular term used to describe the condition; however, not all patients develop spurs. Inflammation is frequently a component, and histologic examination may reveal micro-tearing of the fascia. One study noted that 100 percent of PF cases involved the medial band, with fewer reporting for the central band and the fewest for the lateral band. One of the common telltale signs is patients relating that "it is worst in the morning when I first step out of bed." They may also tell you that the pain is greater when they stand up after sitting down for an extended amount of time. This post-static dyskinesia occurs when the unloaded plantar fascia contracts and tightens, and then, upon standing, it is suddenly stretched. As weight bearing activities continue, and the fascia stretches, the pain usually lessens.

A history of well-documented cases indicates that particular segments of the population are more prone to developing PF. Among the more likely groups are those who stand on hard, unforgiving, flat surfaces; for example, traditional factory workers or restaurant servers. Athletes, and in particular distance runners, are at risk, especially if they have recently increased workout intensity or significantly changed training patterns. Weight gain, which adds to the incremental loading on the foot, can be another factor. Women suffer from PF at greater rates than men do, and it is more prevalent in middle age.

Mechanical Origin

It is widely believed that the development of PF is mechanical in origin, and any motion that puts excessive pull on the fascia is potentially a causative factor. Strain in the plantar aponeurosis (PA) occurs for many reasons, and PF is associated with several

different foot types. After initial heel contact, the normal foot pronates. This unlocks the subtalar joint (STJ), allowing for shock absorption and also for the transfer of tibial rotational forces. Later in the cycle, the foot resupinates as it prepares for heel lift and the propulsive phase of gait. Patients with obvious eversion and calcaneal valgus in the stance phase of gait are failing to resupinate the STJ and stabilize the midfoot in a timely manner. This can put excessive strain on the plantar fascia. Conversely, patients with high-arched foot types are unable to adequately evert. Maintaining a rigid or partially compensated foot structure can put undue strain on the fascia. In addition, a leg-length discrepancy or ankle equinus can exacerbate fascia-band tension.

It may seem somewhat contradictory that a high-arched, rigid foot and its opposite—a foot prone to eversion—would both develop symptoms of PF. In a *Podiatry Today* article from November 2006, Paul Scherer, DPM, presents the theory that inversion of the forefoot to rearfoot *(causing midtarsal joint supination)* may be "the primary biomechanical fault or primary etiology in mechanically induced heel pain." Thus, strain on the plantar fascia has more to do with the forefoot-to-rearfoot relationship than a specific foot type. Géza Kogler, PhD, CO, LO, LPed (IL), and colleagues have completed research indicating that forefoot valgus posting, using a lateral forefoot wedge *(causing midtarsal joint pronation)* helps reduce strain on the PA (*Journal of Bone & Joint Surgery,* 1999;81A:1403–13). Both of these ideas are supported by a 2009 paper from Singapore (*Annals of the Academy of Medicine, Singapore,* 2009;38(10):869–75/PMID:19890578) that proposes that "PF may result when the plantar fascia enthesis fail to adapt to compressive, bending, or shearing forces rather than tensile forces."

The good news is that heel pain that is mechanical in origin potentially has a mechanical solution. The Stepping Out article in the July 2011 issue of *The O&P EDGE,* "The Effectiveness of Foot Orthotics" (www.oandp.com/articles/2011-07_06.asp), lists six research papers that show the benefits of orthotic therapy in treating PF. If the etiology of the dysfunction can be determined from your examination, then a properly designed foot orthotic can alleviate the symptoms. The skill is in identifying and isolating the major contributing factor. For example, for patients with an everted heel you should consider some combination of medial-arch support, extrinsic rearfoot-varus posting, and intrinsic medial-heel skive.

Some patients respond well to the addition of heel cushions or heel-spur, U-shaped cutouts. Such pads may relieve some point pressure, and they can also help by raising the heel. Regardless of the specific prescription, a well-fitting and comfortable orthotic suitable to the patient's lifestyle is crucial to healing the condition. It is also important to consider the shoes that will be worn. Supportive shoes with removable inlays, firm counters, and pitched heels provide a good foundation for an orthotic device. In the case of runners, if there are signs of obvious wear or midsole compression you should recommend new running shoes.

Physical Therapy

Beyond orthotics, there are other approaches to address both the mechanical and soft-tissue aspects of heel pain. Tight muscle groups can directly limit joint range of motion putting excessive strain on adjoining structures. As a basic model, you could consider the leg as a single unit with simple joint components at the foot, ankle, knee, and hip. During ambulation, the limit of motion will be determined by the tightest joint. In such a case, the chain is not "as strong as its weakest link" but rather it is only as free as its tightest link. For example, a tight Achilles tendon causes a functional equinus, which in turn may result in calcaneal eversion leading to heel pain. A heel lift may be all that is necessary to resolve this.

Physical therapy targeted at specific muscle groups such as the gluteals, hamstrings, or triceps surae can help ensure adequate joint mobility. Home stretching exercises are often prescribed along with targeted icing techniques. Patients play a critical role in their own recovery based on how faithfully they follow the regimen. Stretching needs to be done correctly and consistently, several times a day, if it is to be effective. A gradual approach with stretches that are slow, long, and static is preferred as the patient recovers.

There is good evidence that low dye strapping helps reduce heel pain. Correct use of taping can be effective, and it is thought that it has both a mechanical and proprioceptive component. Other modalities, including night splints and extracorporeal shock wave therapy can be beneficial. More advanced cases may require cortisone injections, anti-inflammatory drugs, and, finally, surgery. The good news remains: Studies show up to 90 percent of instances of heel pain are resolved by conservative measures—when patients adhere to treatment protocols over several months. O&P EDGE

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