Plantar Fasciitis: Diagnosis and Conservative Management

Lowell H. Gill, MD

Abstract

Plantar fasciitis is a common cause of heel pain, which frustrates patients and practitioners alike because of its resistance to treatment. It has been associated with obesity, middle age, and biomechanical abnormalities in the foot, such as tight Achilles tendon, pes cavus, and pes planus. It is considered to be most often the result of a degenerative process at the origin of the plantar fascia at the calcaneus. However, neurogenic and other causes of subcalcaneal pain are frequently cited. A combination of causative factors may be present, or the true cause may remain obscure. Although normally managed with conservative treatment, plantar fasciitis is frequently resistant to the wide variety of treatments commonly used, such as nonsteroidal anti-inflammatory drugs, rest, pads, cups, splints, orthotics, corticosteroid injections, casts, physical therapy, ice, and heat. Although there is no consensus on the efficacy of any particular conservative treatment regimen, there is agreement that nonsurgical treatment is ultimately effective in approximately 90% of patients. Since the natural history of plantar fasciitis has not been established, it is unclear how much of symptom resolution is in fact due to the wide variety of commonly used treatments.

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Plantar fasciitis is a common clinical problem. Despite this, there has been remarkably little advancement in our understanding and treatment of this annoying condition. The old adage, "The more treatments available for a condition, the less effective any of them is," certainly applies to plantar fasciitis. Although there is consensus that conservative treatment is effective most of the time, there is no agreement as to which modality is the most effective. Furthermore, comparison of treatment regimens is difficult, as many publications deal with only a single method, which varies from study to study.[1-4]

Anatomy and Biomechanics

The plantar fascia extends longitudinally along the plantar surface of the foot deep to the fibrofatty subcutaneous tissue and covers the intrinsic musculature and neurovascular structures. It extends from the tubercles of the calcaneus proximally to the plantar aspect of the metatarsophalangeal joints and the bases of the toes distally (Fig. 1). When the metatarsophalangeal joints are passively dorsiflexed during the toe-off phase of gait, the inelastic plantar fascia is placed under tension, stabilizing and elevating the arch of the foot in a mechanism that has been compared to a windlass.

Most of the weight-bearing support in the foot occurs in the static structures.[5] The plantar fascia plays a dominant role, contributing a larger proportion of maintenance of the arch than the spring ligament or plantar ligaments.[6] The calcaneal attachment is subject to tensile stress with weight bearing and locomotion. The proximal attachment site at the calcaneus is in an area of specialized fibrocartilaginous tissue sometimes termed an "enthesis."[7,8] This tissue has longitudinal fibers that are strong in tension and have been described as vascular, innervated, and metabolically active.[9] Tensile forces are concentrated at this attachment site, particularly on the medial tubercle of the calcaneus.

Etiology

The term "plantar fasciitis" implies an inflammatory process. Wood

Dr. Gill is in private practice with Miller Orthopaedic Clinic, Charlotte, NC.

Reprint requests: Dr. Gill, Miller Orthopaedic Clinic, 1001 Blythe Boulevard, Suite 200, Charlotte, NC 28203.

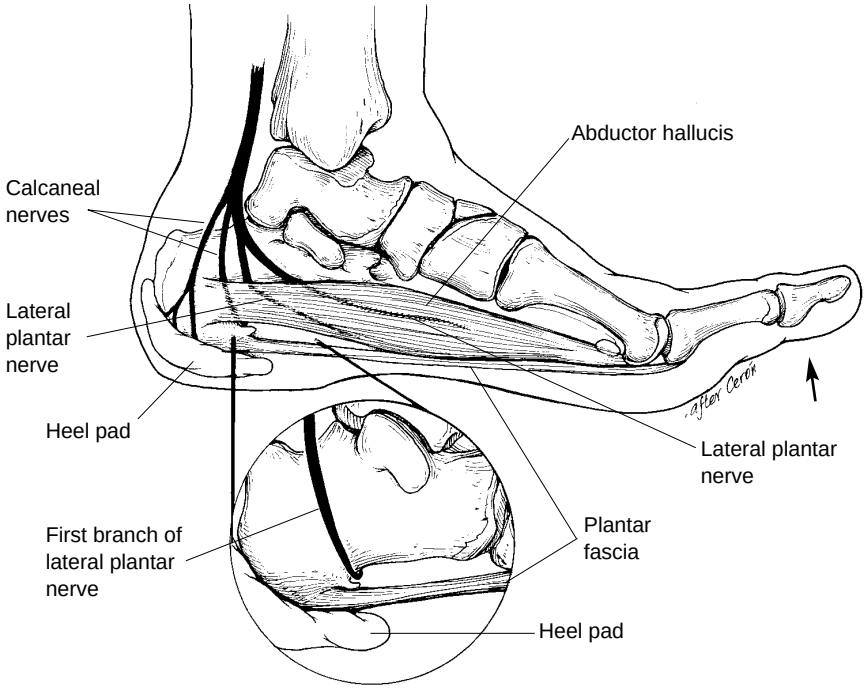


Fig. 1 Location of nerves in proximity to the heel. Arrow indicates force of dorsiflexion. Inset, Windlass mechanism involving fascial attachment at base of proximal phalanges.

originally described the entity in 1812, attributing the inflammation to tuberculosis.[10] Pathologic studies done more recently on surgically removed specimens demonstrate microtears of the fascia, collagen necrosis, angiofibroblastic hyperplasia, and chondroid metaplasia.[7] These changes are consistent with a chronic degenerative/reparative process secondary to repetitive stress. Positive bone scans of the calcaneus at the attachment site reflect this chronic stress pattern (Fig. 2).[11]

Differential Diagnosis

There are numerous causes of subcalcaneal heel pain.[8,12] Inflammatory arthropathies, tumors, infections, and stress fractures of the calcaneus may all be associated with pain beneath the heel. Although plantar fasciitis is bilateral in as many as 20% to 30% of patients,[5] this presentation raises the index of suspicion for a systemic cause, such as a seronegative spondyloarthropathy (e.g., ankylosing spondylitis) or Reiter's syndrome. A systemic arthritic disorder subsequently develops in up to 16% of patients who present with subcalcaneal pain syndrome.[8]

Neuropathies, such as those secondary to diabetes and alcoholism, and lumbar spine disorders occasionally cause pain in the foot, including the heel, as can vascular insufficiency. Metabolic conditions, such as osteomalacia, and other conditions, such as Paget's disease and sickle cell disease, may also be associated with inferior heel pain.[12]

Bordelon[8] considers calcaneal apophysitis to be a distinct cause of subcalcaneal pain, even in adults. Plantar fat pad pain has also been described as a separate entity.[13] The pain is said to be in the fat pad itself posterior to the plantar fascia insertion. Pacinian corpuscles have been noted in the plantar fat pad, lending credence to this less often considered cause of subcalcaneal pain.[12] However, the existence of these two entities, apophysitis and fat pad pain, as distinct from plantar fasciitis, is conjectural at present. Heel pain that is not subcalcaneal, such as that due to Achilles tendinitis, retrocalcaneal bursitis,

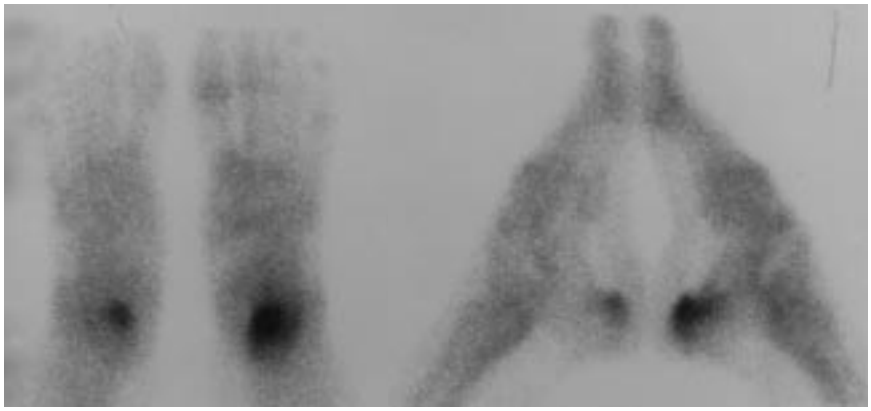


Fig. 2 Bone scans show bilateral plantar fasciitis. Increased uptake can be seen at the attachment site of the medial calcaneal tubercle and at the fascial enthesis attachment site.

subtalar arthritis, or posterior tibial and other tendinitis, should be less frequently confused because of the different location.

Differentiating between plantar fasciitis and calcaneal stress fracture is important. Calcaneal stress fractures usually present with calcaneal swelling, increased warmth, and tenderness to touch. There is often a positive "squeeze test" when the patient's calcaneus is squeezed between the volar surface of the examiner's fingers and the thenar eminence of his or her hand. These findings are commonly absent in the patient with plantar fasciitis.

Neurogenic causes of heel pain are so frequently cited in conjunction with plantar fasciitis that the distinction between them and the various possible causes of plantar fasciitis may be blurred. Some authors feel that neurogenic factors are part of the true etiology of the syndrome of subcalcaneal pain at the plantar fascia origin[8,14,15] and that the degenerative/inflammatory process at the origin of the plantar fascia may lead to secondary neuropathy.[8,15]

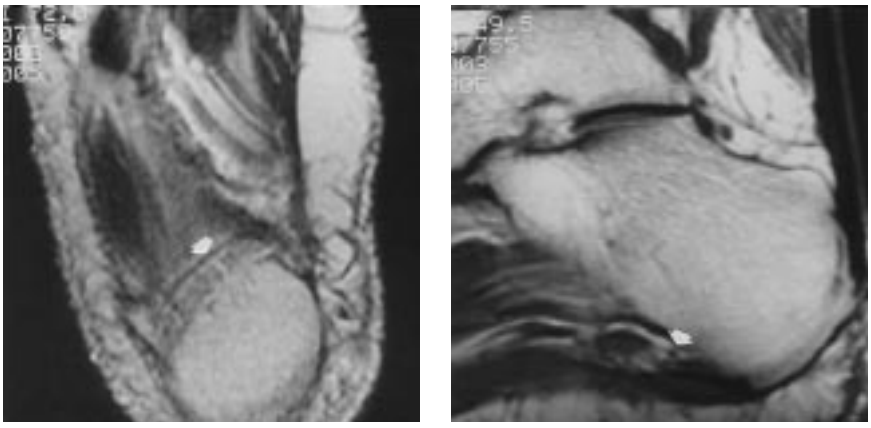
The first branch of the lateral plantar nerve is a mixed motor-sensory nerve to the abductor digiti quinti minimi, which passes superior to the attachment of the plantar fascia (Fig. 3). Several authors, particularly Baxter, have drawn attention to an impingement syndrome that can occur in several areas along the course of this nerve. On the medial hindfoot, after exiting the tarsal tunnel, the nerve runs deep to the abductor muscle fascia and through its fascial leash, where the inferior edge close to the plantar fascia attachment on the calcaneus can be thick and unyielding.[14,16] The nerve then turns laterally as it courses across the hindfoot superior to the attachment of the plantar fascia (Fig. 3). A heel spur just dorsal to the plantar fascia may add to the nerve impingement farther along the nerve distally (Fig. 4).[8,16,17] Unfortunately, it is difficult to obtain reliable electrodiagnostic studies to support this etiology.[15] Therefore, the best evidence at present remains the physical examination findings and the pain relief noted after decompression.

The medial calcaneal nerve is a sensory nerve that is considered by some authors to contribute to subcalcaneal pain.[8,18,19] Savastano[18] has described an operation for resection of this nerve in cases of intractable heel pain. Compression of the posterior tibial nerve, a tarsal tunnel syndrome, has also been associated with heel pain,[12] although this commonly causes a more widespread pain distribution radiating distally to the forefoot or proximally into the tunnel.

When evaluating for nerve compression, the precise location of pain should be assessed. The medial calcaneal nerve is the most posterior and the most superficial beneath the skin and subcutaneous tissue. The nerve to the abductor digiti quinti, which is the first branch of the lateral plantar nerve (Baxter's nerve), is deep to the abductor hallucis muscle and courses just superior and medial to the plantar fascia insertion. The lateral and medial plantar nerves are more anterior in the foot after leaving the tarsal tunnel.

Diagnosis

Despite some disagreement as to the true source of pain in subcalcaneal pain syndromes and a long list of possibilities in the differential diagnosis, the diagnosis of plantar fasciitis is usually straightforward. Several factors in the history and examination are so characteristic that in most cases the diagnosis is not difficult. Pain that is worse on first arising in the morning or after a period of rest is highly suggestive of plantar fasciitis specifically. The pain often improves after more ambulation but may recur after prolonged, continued, or more stressful activity. When severe, the pain may have a throbbing, searing quality. A delay



A B

Fig. 3 Axial **(A)** and sagittal **(B)** T1-weighted magnetic resonance images. Arrows indicate the first branch of the lateral plantar nerve.

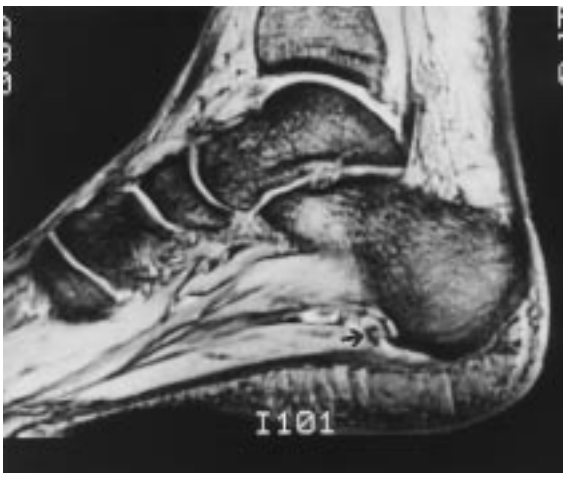


Fig. 4 Gradient-echo magnetic resonance image with 20-degree flip angle. Note relationship of spur in short toe flexors dorsal to the plantar fascia and in proximity to the neurovascular bundle (arrow), including the first branch of the lateral plantar nerve.

in the appearance of symptoms, such as when the pain occurs the morning after a day of increased activities, is common and may cause the patient and hence the physician to overlook a relationship to the increased activity.

The second highly characteristic feature is the location of the pain, which is usually at the origin of the plantar fascia from the medial tubercle of the calcaneus. The pain may be aggravated by passive dorsiflexion of the toes in more severe cases. Infrequently, the pain also radiates distally along the plantar fascia. The abductor hallucis origin from the calcaneus just superior and medial to the plantar fascia may also be tender. A bone scan frequently shows increased uptake in the area of the fascial attachment at the medial calcaneal tubercle (Fig. 2),[11] mirroring the pathologic changes in the nearby enthesis. Bone scanning can be of benefit in patients with an atypical clinical presentation.

Risk Factors

Specific risk factors are known to be clearly associated with plantar fasciitis. These include repetitive stress in athletes,[17,20,21] obesity,[3,4,9,19,22-26] and middle age[9-12,26] (the most common age for presentation).

Abnormal foot biomechanics may predispose to this condition. The cavus foot accommodates poorly to variable stresses. With less of the normal hindfoot and midfoot motion, especially pronation, to diffuse stress in the cavus foot, the fascia is subject to increased stress. The excessive laxity of an overly pronated pes planus foot also places excessive stress on the plantar fascia. With less ligamentous support in the flat foot, a greater burden is placed on the fascia. The association of plantar fasciitis with both cavus and pronated foot is supported by clinical observations.[17] A tight heel cord also contributes to excessive stress in the plantar fascia.[4,12,27,28]

Relationships have also been proposed, but not established, for other factors, such as acute injury, the presence of a heel spur, the shoe type, the walking surface, and employment or chronic repetitive activity other than athletics. Some studies suggest a correlation with prolonged standing or walking.[1,4,12,24] The British eponymous term "policeman's heel" implies a work-related overuse syndrome secondary to prolonged standing.[9] A correlation with acute injury is less clear; however, patients often mention stepping on a rock or another hard object as an initiating event, hence the common name "stone bruise."

The association of plantar fasciitis with a radiographically visualized heel spur has caused considerable confusion. It is well accepted that even though a spur may be seen coincidentally or even associated with the clinical condition, it is not by itself the etiologic factor. However, some studies suggest that there may be some association between the presence of a spur and the clinical syndrome.[9,11,19,23] Baxter indicates that the spur may add to neurogenic pain with compression of the first branch of the lateral plantar nerve.[7,16,17]

Heel spurs have been found in approximately 50% of patients with plantar fasciitis. This exceeds the 15% prevalence of radiographically visualized spurs in normal asymptomatic patients noted by Tanz.[19] However, middle age itself is a well-recognized risk factor, and spurs are more common as people age. Therefore, the association between spurs and plantar fasciitis may be coincidental. Furthermore, it has been shown that the spurs occur in the short toe flexors just superior to the fascia, rather than the plantar fascia itself (Fig. 4).[16,19] Some believe the spur is the result, not the cause, of plantar fasciitis[11]; others believe the spur is unrelated.[4,12,22]

Treatment

Treatment regimens for plantar fasciitis vary widely. With the possible exception of casting, no single method stands out as clearly superior. Moreover, the orthopaedic liter-

ature offers little guidance. Comparison of results is difficult because most reports reflect only a single method of treatment or because several treatments are used simultaneously. Furthermore, statistical analysis of treatments is problematic because patient numbers are often small, and there are many different treatments to be considered.

Physical Therapy

Physical therapy modalities are frequently employed. Baxter and Thigpen[17] have noted, however, that ultrasound and whirlpool are not helpful. In another study,[24] application of ice provided moderate benefit to 23% of patients but excellent results to only 4.5%. Likewise, heat provided some benefit to 15.1% of patients but excellent results to only 1.7%.

Stretching exercises are preferred by many practitioners. Wolgin et al[26] had successful results in 83% of their patients, and Davis et al[27] reported that stretching was their most effective conservative treatment. Stretching exercises may also benefit patients with a tight Achilles tendon, a group who are known to be at risk for plantar fasciitis. The advantages of these modalities are relative ease and minimal expense when self-administered by the patient.

Nonsteroidal Anti-inflammatory Drugs

Furey[25] reported a 71% success rate for phenylbutazone treatment of 78 patients. Wolgin et al[26] found that 39 (76%) of 51 patients who used nonsteroidal anti-inflammatory drugs (NSAIDs) had a successful outcome. In contrast, Williams[9] found NSAIDs generally ineffective. In a study of 283 patients treated with NSAIDs, 202 patients (71%) reported positive results, but the improvement was most often rated as being only slight.[24] Although 17 (6%) of the patients thought the results with NSAIDs were excellent and 75 (27%) reported considerable improvement, 81 patients (28%) thought the NSAIDs were ineffective.

Heel Cups

In theory, plastic heel cups offer protection by supporting the fibrofatty tissue beneath the heel, providing a better cushion. These cups are available in only two sizes: adult and pediatric. Snook and Chrisman[23] reported that the cups dramatically relieved pain in 13 of 22 patients and considered plastic cups their most successful treatment. Leach et al[10] noted that in their clinical experience many patients obtained relief with heel cups. Schepsis et al[5] reported that heel cups were sometimes helpful.

With the exception of the report by Snook and Chrisman,[23] however, there appear to be no data in the orthopaedic literature to verify the benefit of these devices. In an outcome study of the use of heel cups in 131 patients,[24] 8 patients (6%) ranked the treatment as excellent, and 59 (45%) ranked it as poor. Furthermore, Katoh et al[13] showed worsening of an abnormal gait pattern with use of heel cups. Using force plates, these authors studied vertical reaction force and time spent during gait for the hind-, mid-, and forefoot. In patients with plantar fasciitis, heel cups actually aggravated an abnormal gait pattern by decreasing the amount of time spent on the heel and increasing the amount of time spent on the midfoot and forefoot.

Tuli Cups

Tuli cups are made of natural latex rubber and have a ribbed design. The ribs are crushed on impact and then rebound, which dissipates the force of heel strike. Thus, the cup acts like both a cushion and a cup, which is an attractive concept. Leach and Schepsis[21] noted that the Tuli cup is particularly helpful for patients who wish to continue their athletic activities. However, the only study presently available in the orthopaedic literature shows that no patients ranked it as excellent, and 21 of 38 ranked it as poor.[24] Therefore, despite claims of benefit, there are no reports to date documenting the success of Tuli cups.

Pads

Wolgin et al[26] compared various conservative modalities in 100 patients and found that pads were successful in 83%. Davis et al[27] reported that viscoelastic polymer heel cushions were often helpful. Another study,[24] however, found that only 4 (2%) of 184 patients ranked foam pads as excellent, and 62 (34%) reported no improvement.

Orthotics

Orthotics are more frequently used for subcalcaneal heel pain when there is a coexistent biomechanical variation, such as pes planus or pes cavus. In pes planus, a medial arch support or medial wedge may be employed. In pes cavus, an attempt is made to dissipate stress over a broad area, as with a diabetic foot insert. Bordelon[8] prefers an orthotic designed to cushion the heel while relieving pressure on the tender area. A molded Plastazote insert with a medial elevation may be employed in resistant cases. Baxter and Thigpen[17] note that heel pain in an athlete with a cavus foot can usually be controlled with a flexible support or orthosis. Campbell and Inman[2] have reported success in 31 of 33 cases with use of a UC-BL orthosis. With the exception of their study, however, there has been no orthopaedic study that evaluates the benefits of any orthotic in the treatment of plantar fasciitis.

Corticosteroid Injections

Plantar fascia ruptures after corticosteroid injections have been reported,[28] which can lead to gait abnormalities.[29] Many practitioners have reported using injections occasionally.[1,4,5,9,11,12,19,24,25,27] Injections are generally limited to two per side; in very rare instances a third may be given if a long time has passed since the last injection, and the first one or two were of benefit. If three have not been successful, it seems fruitless to continue this form of treatment.

The use of an injection was found by Blockey[1] to have cured 10 of 13 painful heels, but he also noted that pain was relieved in 5 of 9 heels with placebo saline injections alone. Davis et al[27] found injections to be effective in 26 (52%) of 50 symptomatic heels in 41 patients. Wolgin et al[26] cited a 35% success rate (11 of 31 patients). Miller et al[30] noted that pain relief was rated good or better in 27 heels in 24 patients; however, the effect was only temporary for most patients. In a study in which patients ranked treatments,[24] the group of 171 patients who received an injection rated that form of treatment higher than ten nonsurgical treatments other than casting. Of the 171 patients, 41 reported no benefit from the injections, 31 rated their results excellent, and the remaining 99 ranked the treatment between those extremes.

Night Splints

Wapner and Sharkey[3] have reported success with use of a 5-degree dorsiflexion night splint, which holds the plantar fascia in a continuously tensed state. This is postulated to minimize the change of tension that occurs with each new day's activities and thereby to minimize the chronic repetitive microtrauma seen in plantar fasciitis. Night splints may also be used conveniently as an adjunct when discontinuing cast treatment. The posterior half of the bivalve cast is saved and reapplied by the patient on a nightly basis after discontinuation of casting. This method does not incorporate the 5 degrees of dorsiflexion recommended by Wapner.[3]

Miscellaneous Treatments

The use of special types of footwear (e.g., running shoes or soft-soled shoes) may be beneficial in some cases.[24] Taping is mentioned in the podiatry literature but has not been evaluated scientifically with regard to plantar fasciitis. Shoe modification, such as use of a steel shank to limit metatarsophalangeal dorsiflexion during toe-off or a heel lift, and a change to wearing high-heel shoes to decrease heel impact have also been tried. Radiation therapy has been reported to provide disappointing results.[12]

Combination Treatment

Many patients receive various combinations of nonsurgical treatments. All 323 patients (364 heels) of Lapidus and Guidotti[4] were cured with the combination of phenylbutazone, corticosteroid injection, and rest. Furey[25] reported that the use of phenylbutazone in conjunction with mechanical aids, such as heel pads and arch supports, yielded good results in 71% of 78 patients at 5 years. Davis et al[27] reported an 89.5% success rate for the combination of NSAIDs, relative rest, heel cushions, Achilles-stretching exercises, and occasional injections. Clancy[31] reported on the use of a medial heel wedge, flexible leather support, heel-cord stretching, and rest for 6 to 12 weeks. Unfortunately, there are no studies comparing different conservative treatments used independently, which makes it difficult to ascertain which of the many available treatments really make a difference.

Rest

Rest helps ameliorate symptoms.[24,27] However, the recommendation to rest is often poorly accepted by patients, particularly as resolution of symptoms may take months or longer. Poor patient compliance, especially by patients who consider their problem a minor one, may account for the high percentage of failures with the various conservative treatment regimens.

Casting

Schepsis et al[5] reported that casting is not helpful. Other studies, however, suggest that a cast can be effective even in recalcitrant cases.[19,24,32] McBryde[20] recommends casting in long-standing cases. Tisdel and Harper[32] found casting to be satisfactory in over 50% of their most recalcitrant cases, in which numerous treatments for an average of 1 year had failed to provide relief (the 13 patients would therefore be considered surgical candidates). In another study,[24] casting was also used in the most difficult cases and was found to be the most successful of 11 nonsurgical treatments assessed.

A cast may work by providing continuous unchanging tension on the plantar fascia, thus minimizing microtrauma with each new day's stretching (similar to the mechanism postulated by Wapner and Sharkey[3] for use of a night splint). A cast may also relieve tension on the plantar arch in much the same way that Campbell and Inman[2] postulated for the UC-BL insert. Cast immobilization also undoubtedly enforces rest. A combination of all three mechanisms may be the reason for the apparent success of casting. Campbell and Inman have even conjectured that surgeons who used operative treatment of plantar fasciitis might "have been equally successful if they had omit-

ted the surgical procedure and simply used the walking cast."

Author's Preferred Method of Treatment

If the clinical condition is relatively mild, as in the athlete who is able to run through the first few painful steps and then continue training with minimal discomfort, the more convenient therapies (e.g., stretching, ice, heat, NSAIDs, or use of a foam or viscoelastic pad, athletic shoe, or crepe-soled shoe with soft heel pad) are acceptable. However, patients should be warned that plantar fasciitis is often a recalcitrant condition, due to repetitive stress, and that decreased activity is essential. It is important to point out that increased pain may not occur until the morning after a particularly long run or active day. With the time delay in onset of symptoms, many patients will overlook the correlation with increased activity.

If the clinical condition is of moderate severity and the initial treatments have failed, which is common, an injection is recommended because of its convenience. Patients are warned, however, that not more than two or, in rare instances, three injections will be given and that rest must accompany the treatment. A night splint is an alternative to an injection at this stage. Patients are also advised that if they want to do the most to help their problem, a cast is recommended.

If the injection and/or numerous other treatments have failed or the patient is very obese or has had prolonged symptoms (6 to 12 months or longer), the patient is strongly urged to consider casting. A period of rest from work may be added if the situation warrants or the cast precludes work. The cast is left in place for 5 to 6 weeks. If the patient is intolerant of casting, a zipper cast (Neofrakt-Motion Medical Distributors, Birmingham, Ala) or a night splint is offered. It should be explained that zipper casts may be less effective and are subject to cracking. If casting is ineffective, there is increased suspicion of other diagnoses in the differential, such as nerve entrapment and systemic disease.

Surgery

With the increased popularity of endoscopic plantar fascia release, there is concern regarding the overzealous and inappropriate use of a technique with known risks for nerve damage. For this reason, the American Orthopaedic Foot and Ankle Society has recently developed a position statement regarding heel surgery (Table 1).

At the time of planning surgery, the differential diagnosis is reviewed, looking for other possible causes for subcalcaneal pain masquerading as plantar fasciitis. Appropriate laboratory tests are ordered, and medical evaluation is done if indicated. A bone scan is frequently obtained before surgery to substantiate the diagnosis. In my practice, patients are also required to have a period of casting before consideration of surgery; on occasion, this is repeated.

A large number of surgical techniques have been described,[29] but there is as yet little consensus regarding the optimal procedure. In

Table 1
American Orthopaedic Foot and Ankle Society Position Statement on Endoscopic and Open Heel Surgery*

1. Nonsurgical treatment is recommended for a minimum of 6 months and preferably 12 months.
2. More than 90% of patients respond to nonsurgical treatment within 6 to 10 months.
3. When surgery is considered for the remaining patients, then a medical evaluation should be considered prior to surgery.
4. Patients should be advised of complications and risks if an endoscopic or open procedure is not indicated.
5. If nerve compression is coexistent with fascial or bone pain, then an endoscopic or closed procedure should not be attempted.
6. The AOFAS does not recommend surgical procedures before nonoperative methods have been utilized.
7. The AOFAS supports responsible, carefully planned surgical intervention when nonsurgical treatment fails and workup is complete.
8. The AOFAS supports cost constraints in the treatment of heel pain when the outcome is not altered.
9. The AOFAS recommends heel padding, medications, and stretching prior to prescribing custom orthoses and extended physical therapy.
10. This position statement is intended as a guide to the orthopaedist and is not intended to dictate a treatment plan.

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most cases, I perform subtotal plantar fascia release. Decompression of the first branch of the lateral plantar nerve as reported by Baxter and Thigpen[17] has merit in appropriate cases.

These procedures are not without risk. Sellman[28] has reported midfoot pain after plantar fascia rupture. Foot biomechanics are known to be altered after release.[29] There have been an increasing number of reports, as yet unpublished, of lateral foot pain after overzealous plantar fascia release. This observation may be the clinical result of the biomechanical changes that follow plantar fascia release.

Summary

The plantar fascia plays an important role in support and is subject to chronic repetitive tensile stress at its calcaneal origin. There are a number of potential causes of subcalcaneal heel pain. Plantar fasciitis, which is a degenerative process in the fascial enthesis, is one of the most common. There has also been considerable interest in the role of neurogenic causes of heel pain in conjunction with plantar fasciitis. The first branch of the lateral plantar nerve, in particular, lies close to the plantar fascial origin as well as to a spur, if present, and may be affected by localized tissue changes and swelling or by tethering and tight fascial structures.

The diagnosis is most often made on the basis of the location of pain at the medial tubercle of the calcaneus and the typical history of pain after a period of rest. Risk factors include biomechanical abnormalities of the foot, increased body weight, middle age, and repetitive stress. A heel spur seen on radiographs is most commonly considered to be unrelated, although in some cases it may contribute to nerve impingement.

Conservative treatment regimens vary, and there is no clear consensus on the most effective modalities. Recent reports indicate that a trial of casting is worthwhile before consideration of surgery. There is a consensus that nonsurgical treatment is effective approximately 90% of the time.

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