

The Diagnosis and Treatment of Heel Pain

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This clinical practice guideline (CPG) is based upon consensus of current clinical practice and review of the clinical literature. The guideline was developed by the Clinical Practice Guideline Heel Pain Panel of the American College of Foot and Ankle Surgeons. The guideline and references annotate each node of the corresponding pathways.

Heel Pain (Pathway 1)

Mechanical factors are the most common etiology of heel pain. Other causes include traumatic, neurologic, arthritic, infectious, neoplastic, autoimmune, and other systemic conditions. Diagnostic testing and treatment must be directed at the correct causative factors.

Mechanical Plantar Heel Pain (Pathway 2)

Mechanical heel pain is one of the most frequent conditions presented to foot and ankle specialists. Plantar heel pain is responsible for the majority of mechanical heel pain cases. Plantar heel pain is defined as insertional heel pain of the plantar fascia with or without a heel spur (Fig. 1).

The most common cause cited for plantar heel pain is biomechanical abnormalities that lead to pathologic stress to the plantar soft tissues (1–7). Localized nerve entrapment of the medial calcaneal or muscular branch off the lateral plantar nerve may be a contributing factor (8–11).

Patients usually present with isolated plantar heel pain upon initiation of weightbearing, either in the morning upon arising or after sitting for a period of rest. The pain tends to decrease after a few minutes, then returns as the day proceeds and time on the feet increases. Associated significant findings may include high body mass index, tightness of the Achilles tendon, pain upon palpation of the inferior heel, and inappropriate shoe wear (12–14).

Many patients will have attempted self-remedies before seeking medical advice. A careful history is important, including time(s) of day when pain occurs, current shoe wear, activity level both at work and at leisure, and history of trauma. An appropriate physical examination of the lower extremity includes range of motion of the ankle with special attention to decreased range of motion of dorsiflexion of the ankle, palpation of the inferior medial aspect of the heel, palpation of the medial aspect of the heel, the occurrence of bilateral symptoms, and angle and base of gait evaluation.

Following physical evaluation, appropriate radiographs may be considered. Radiographic identification of a plantar heel spur indicates that the condition has been present for at least 6–12 months, whether having been symptomatic or not (Fig. 2). As a rule, the longer the duration of heel pain symptoms, the longer the period to final resolution of the condition.

Initial treatment options may include nonsteroidal anti-inflammatory drugs (NSAIDs), padding and strapping of the foot, and corticosteroid injections for appropriate patients. Patient-directed treatments seem to be as important in resolving symptoms. They include regular stretching of the calf muscles, avoidance of flat shoes and barefoot walking, use of cryotherapy directly to the affected part, over-the-counter arch supports and heel cushions, and limitation of extended physical activities.

Patients usually have a clinical response within 6 weeks of initiation of treatment. If improvement is noted, the initial therapy program is continued until symptoms are resolved. If no improvement is noted, the patient should be referred to a podiatric foot and ankle surgeon.

The second phase of treatment for the referred patient includes continuation of the initial treatment options with considerations for additional therapy: the use of custom orthotic devices, especially in the biomechanically malaligned patient, the use of night splints to

Pathway 1

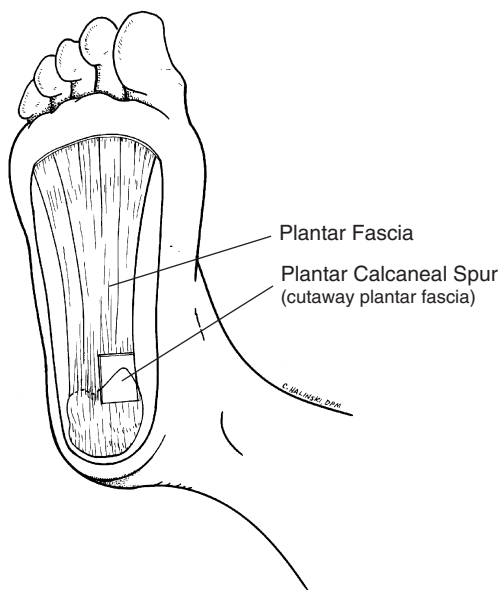
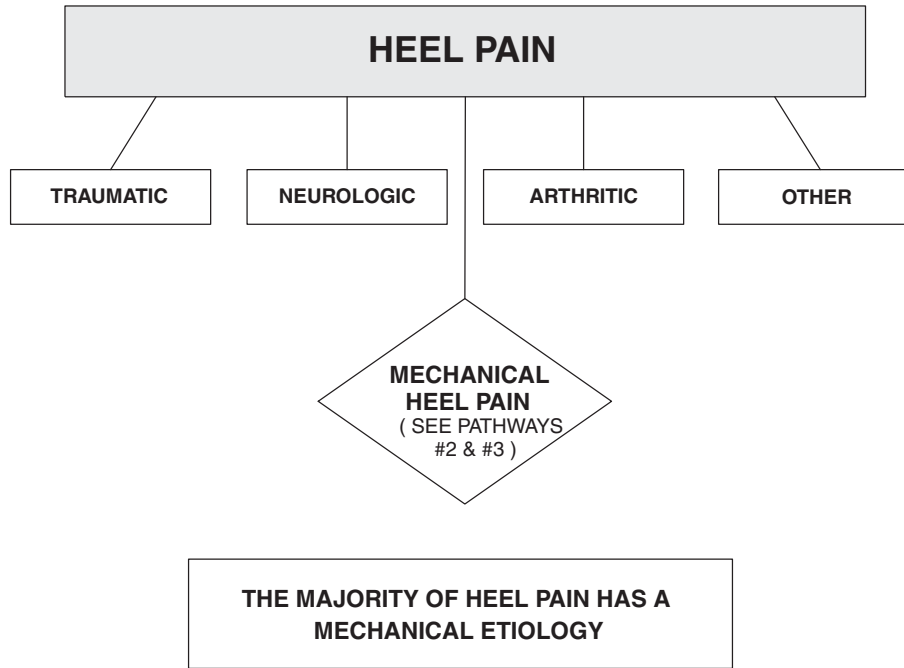


FIGURE 1 Diagrammatic view of plantar fascia and the infracalcaneal or heel spur.

maintain an extended length of the plantar fascia during sleep (15–22), a limited number of corticosteroid injections (23, 24), and cast immobilization for 4–6 weeks or the use of a fixed ankle walker-type device to immobilize the foot during activity (25). In patients with a high body mass index, a consultation and referral for an appropriate weight-loss program should be considered. Clinical response to this second phase of treatment will usually occur within 2–3 months in 85–90% of patients (26–30). For those who have shown improvement, phase 1 and

phase 2 therapy should be continued until resolution of symptoms. When no improvement is noted, other systemic diseases should be considered (31–37).

The third phase of treatment continues phase 1 and/or 2 programs with the addition of cast immobilization in patients who may not have undergone that treatment in phase 1 or 2. Treatments that may be considered at this time include surgical plantar fasciotomy using a recognized technique (38–53) and extracorporeal shock wave therapy (ESWT) has shown promise (54–58). In the majority of cases, removal of the plantar heel spur does not seem to add to the success of the outcome in the surgical treatment of plantar heel pain (48, 59–61).

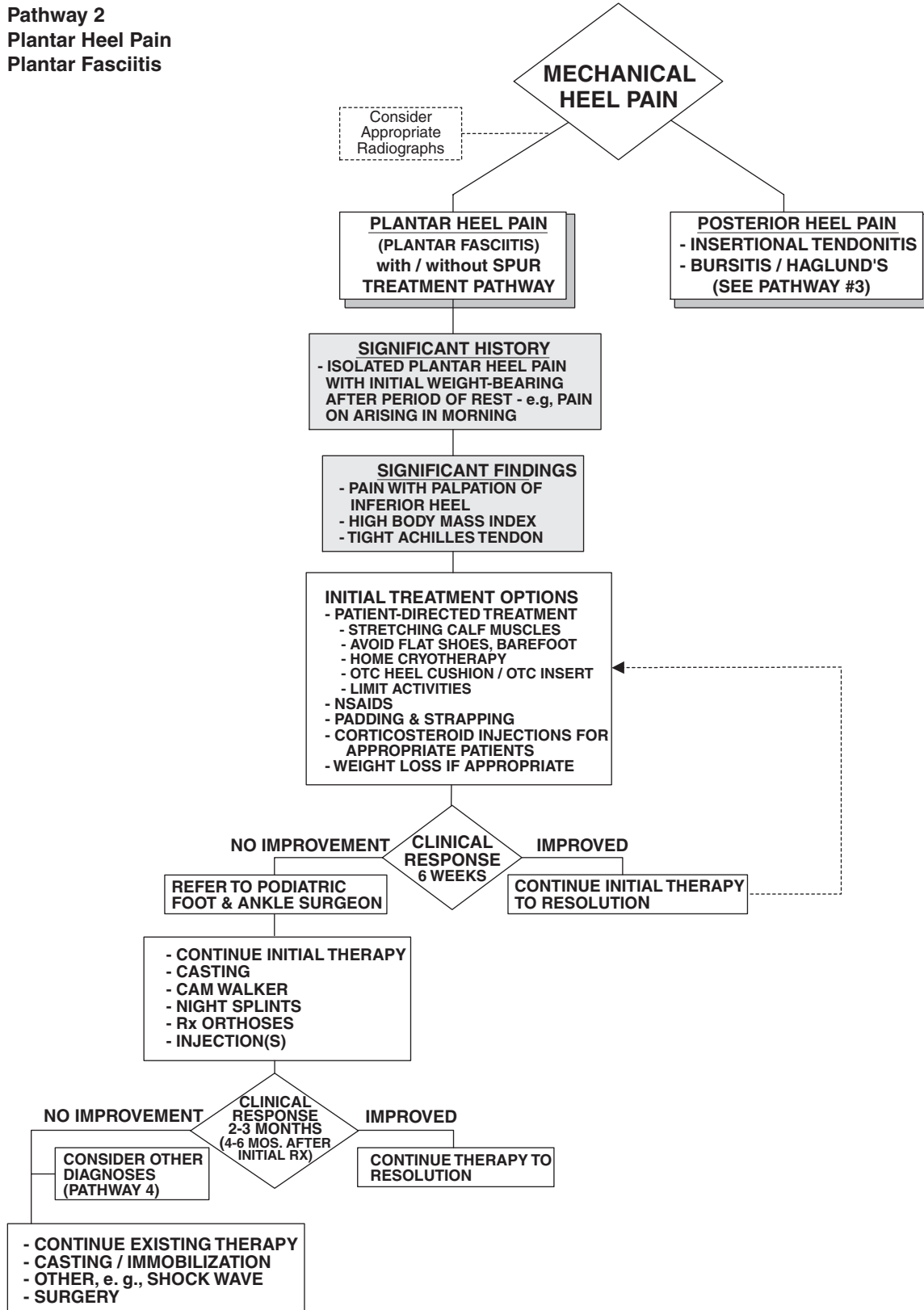
Following a therapeutic regimen as outlined in the pathways, 90–95% of patients will experience resolution of symptoms within 1 year. A subset of patients will have continued problems; additional research is needed to allow these patients to achieve symptom resolution.

Mechanical Posterior Heel Pain (Pathway 3)

The posterior heel is the second most common location of mechanically induced symptoms. Pathology is categorized as 1) insertional Achilles tendinitis, and 2) bursitis often associated with Haglund’s deformity (“pump bumps”).

Insertional Achilles tendinitis most commonly presents with an insidious onset often leading to chronic posterior heel pain and swelling (62–64). Pain is aggravated by increased activity (e.g., walking and/or running), and pressure caused by shoe gear. A palpable prominence may

**Pathway 2
Plantar Heel Pain
Plantar Fasciitis**



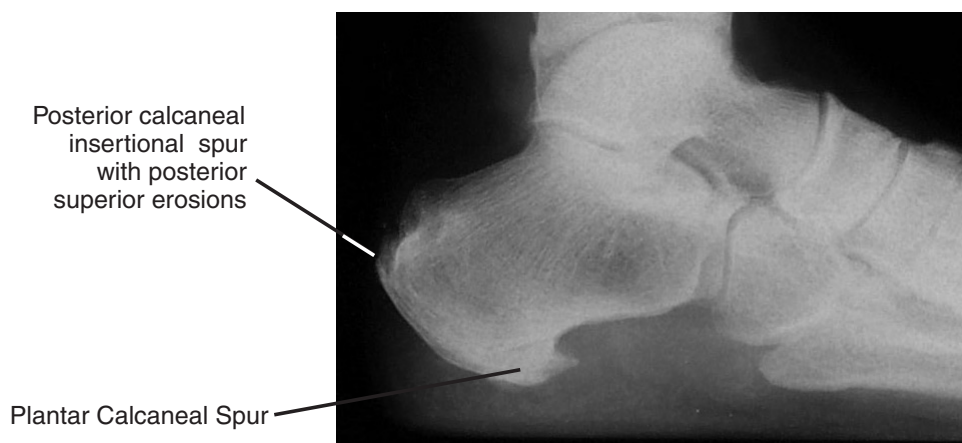
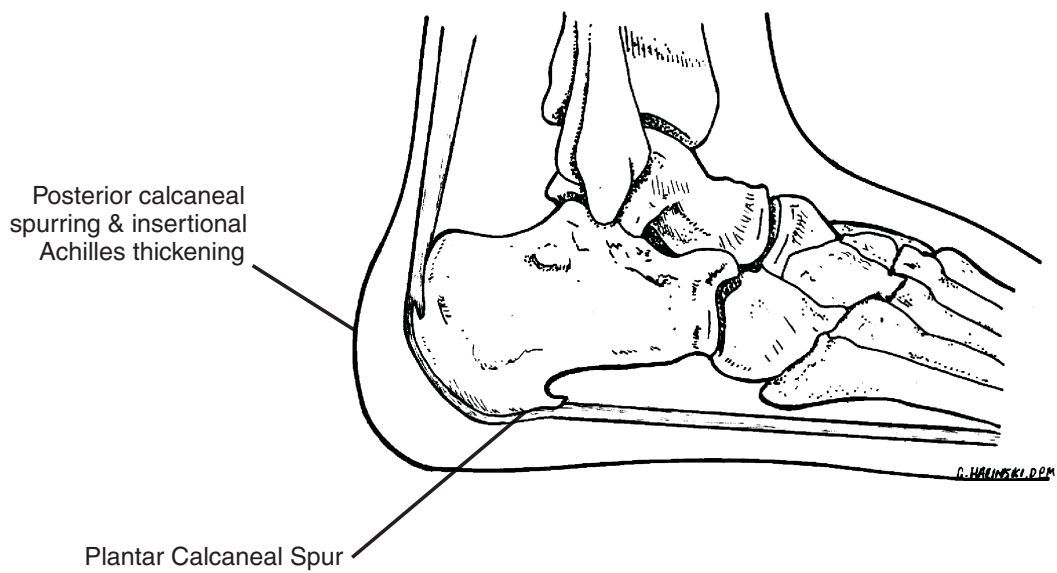
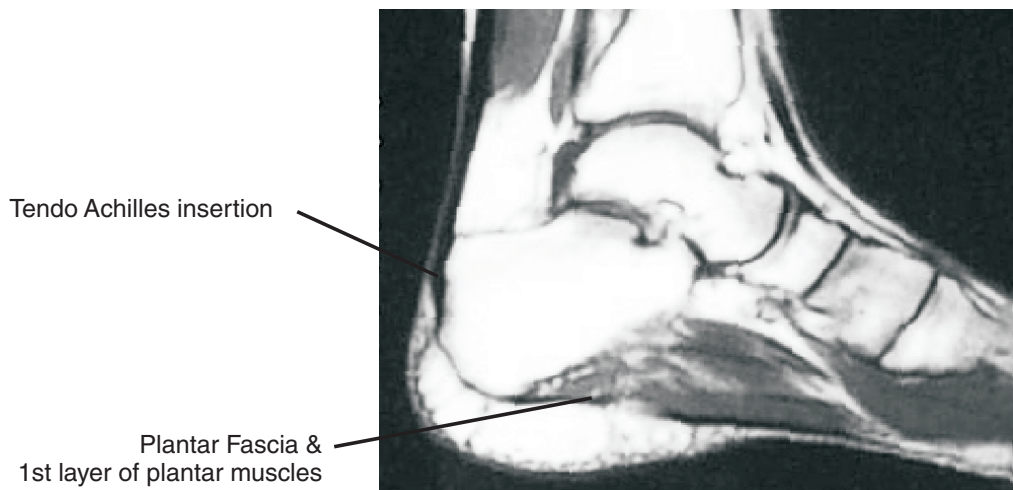
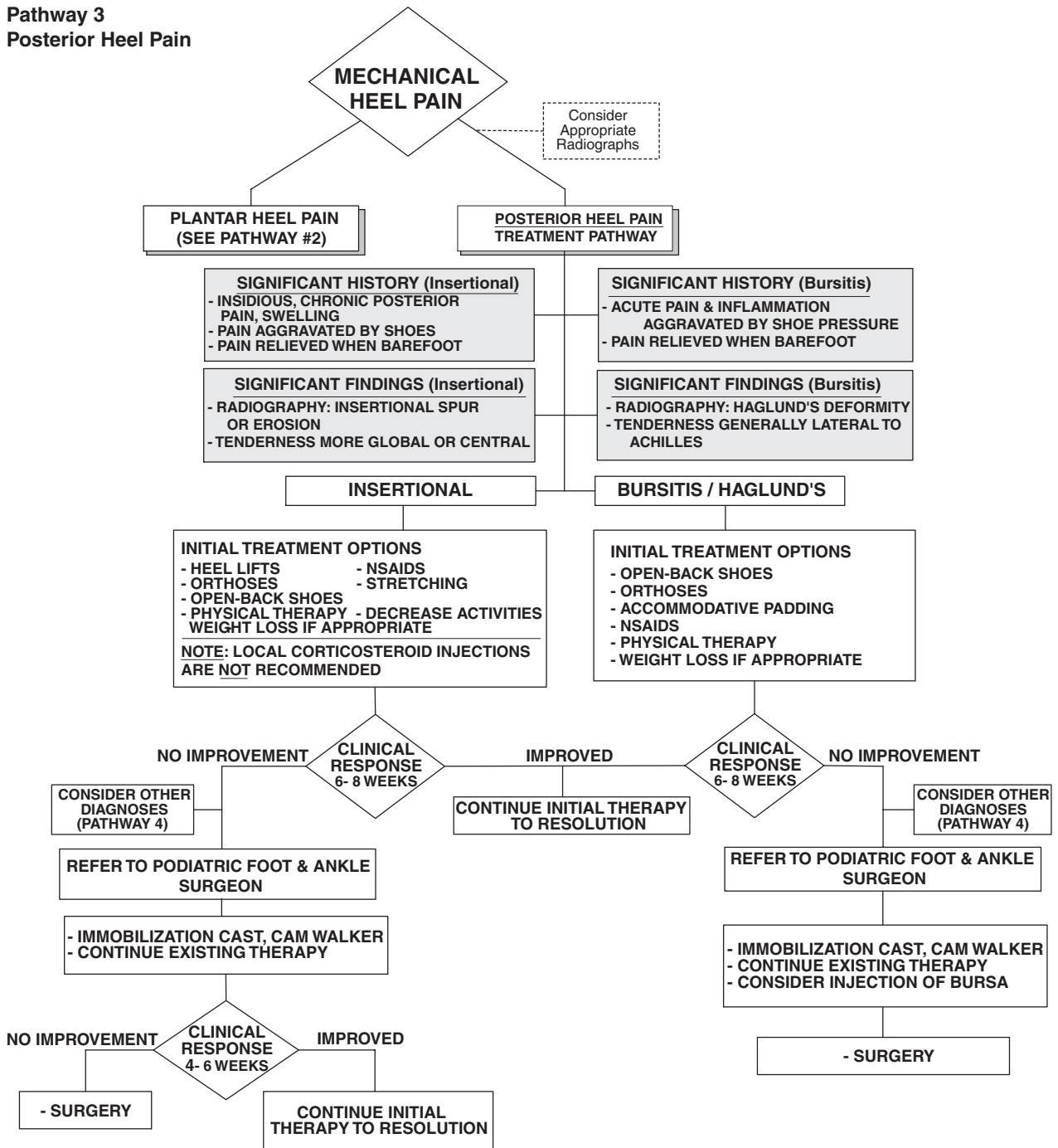


FIGURE 2 MR image, line diagram, and radiograph of the heel, lateral views, illustrating association of plantar fascia and tendo Achilles to the proliferative inferior and posterior calcaneal spurs.

**Pathway 3
Posterior Heel Pain**



be appreciated both medially and laterally to the insertion of the Achilles tendon. Tenderness can be central or more globally located posteriorly on physical examination. Radiographic findings commonly show insertional spurring or erosion (Fig. 2).

Initial treatment centers around reducing pressure to the area (e.g., open-backed shoes), heel lifts/orthotics, NSAID therapy, and various physical therapy modalities, including stretching. Primary treatment with immobilization may be

considered in particularly acute cases, although this is more commonly used if the previously described treatments are unsuccessful. Local corticosteroid injections are not recommended (65).

Resistant cases should be referred to a podiatric foot and ankle surgeon. Surgery may be indicated (e.g., resection of the posterior spur along with pathologic soft tissue — inflamed bursa, diseased tendon). Various degrees of detachment with subsequent reattachment of

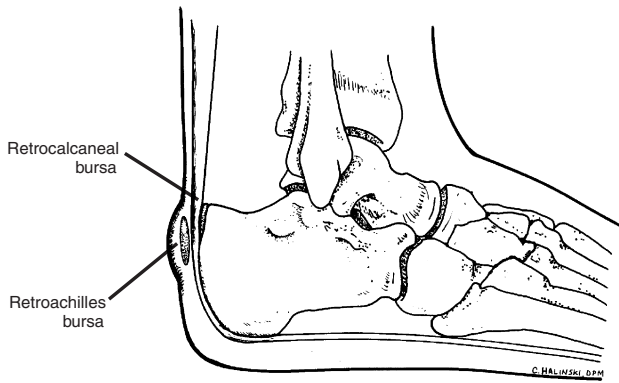


FIGURE 3 Line diagram of the relationship of the retroachilles and retrocalcaneal bursae to the tendo Achilles and posterior calcaneus.

the Achilles tendon may be needed to assure complete resection of the spur.

Bursitis associated with Haglund's deformity may occur in both sexes and at any age, although studies have shown that females aged 20–30 years are most commonly affected (66–69) (Fig. 3). Symptoms include acute pain and inflammation significantly aggravated by shoe gear. Pain is relieved with barefoot walking. On physical examination there is tenderness lateral to the Achilles tendon, usually associated with a palpable posterior lateral prominence. Radiographs commonly demonstrate prominence of the posterior superior surface of the calcaneus. The degree of prominence may be quantified by documenting specific radiographic angles.

Initial treatment, such as open-backed shoes, NSAID therapy, injections (with care taken not to inject the Achilles tendon), is always directed toward eliminating pressure and inflammation to the symptomatic area. Physical therapy also may be helpful.

If symptoms are not improved after an adequate period of nonoperative treatment, the patient should be referred to a podiatric foot and ankle surgeon, and surgery may be required. Resection of the prominent posterior superior aspect of the calcaneus and inflamed bursa is the indicated surgical procedure (64, 70). Although not commonly performed, calcaneal osteotomy may also be required to correct abnormal calcaneal alignment (e.g., calcaneal varus).

Neurologic Heel Pain (Pathway 4)

Neurologic heel pain is defined as pain in the heel as a result of an entrapment or irritation of one or more of the nerves which innervate this region. The nerves (Figs. 4 and 5) specifically considered are:

- Posterior tibial (tarsal tunnel syndrome)
- Medial calcaneal (heel neuroma)

Medial plantar

Lateral plantar, including branch to abductor digiti minimi

Sural, including lateral calcaneal

Neurologic pain in the heel or the absence of sensation in the foot and/or heel can also be due to more proximal nerve impingement syndromes (71). Patients describing pain that originates in the low back and radiates down the leg and into the foot must be assessed for radiculopathy secondary to proximal nerve root pathology.

If neurologic heel pain is suspected, appropriate referral for diagnostic studies and/or assessment by a specialist should be considered. Diagnostic studies may include:

Electromyography (EMG)

Nerve conduction velocity (NCV)

Magnetic resonance imaging (MRI)

After consultation reports and diagnostic studies are reviewed, accurate diagnosis and treatment protocol can be developed. In some instances, the podiatric foot and ankle surgeon will manage local conditions in the foot and ankle, while referral to appropriate specialists may be required if the pathology is found to be originating from the lumbar area.

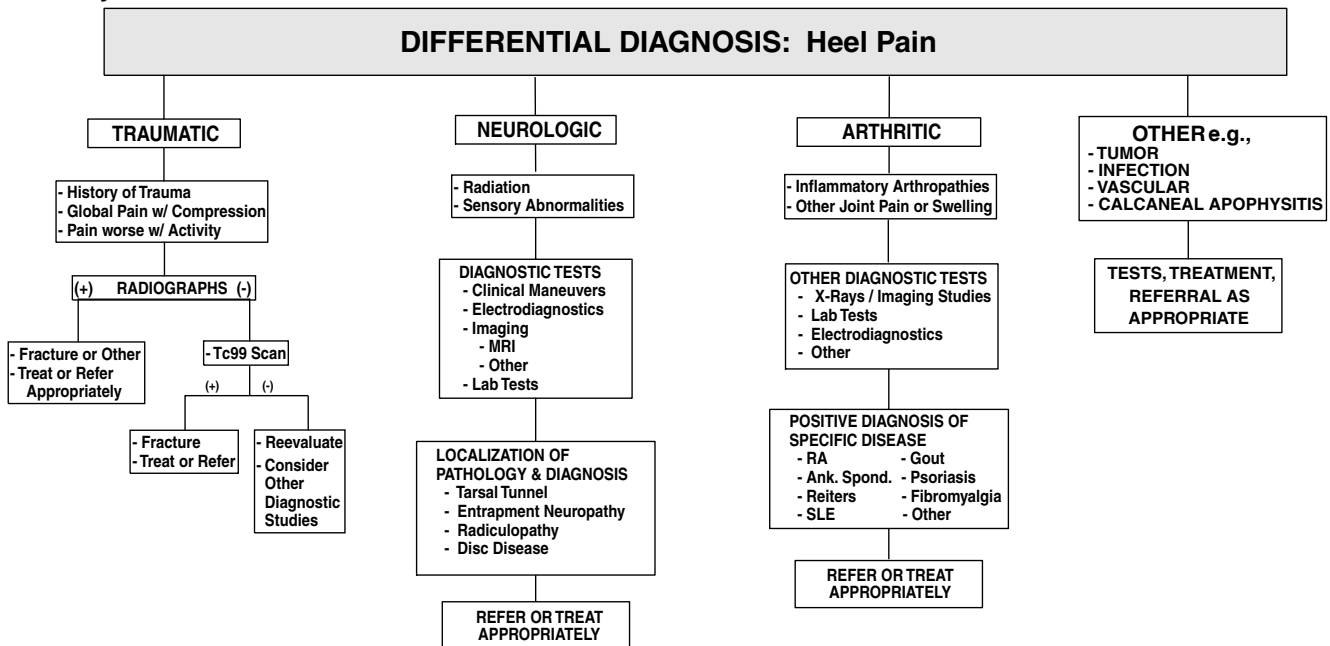
The exact prevalence of heel pain secondary to neurologic causes in the general population is unknown (8, 11, 72, 73). Obesity, venous insufficiency, trauma, and space-occupying lesions may be factors because they can put pressure on the involved nerve (71, 74). Most causes of neurologic heel pain are unilateral. However, bilateral cases of entrapment neuropathy causing symptoms have been reported (75). In suspected neurologic heel pain, especially in bilateral presentations, an underlying systemic disease process must be ruled out.

Arthritides in Heel Pain (Pathway 4)

Most cases of heel pain encountered in clinical practice are likely to have a biomechanical etiology and respond to recommended therapy. In the process of taking a history and conducting a physical examination, a physician should consider that various systemic arthritides are also capable of presentation as heel pain. These include the seronegative arthritides, psoriatic arthritis, Reiter's disease, diffuse idiopathic skeletal hyperostosis (DISH), rheumatoid arthritis, fibromyalgia, and gout (14, 31, 35, 36, 76–115).

These patients may have other joint symptoms and should be questioned regarding concomitant arthralgias. This, in conjunction with careful radiographic evaluation and laboratory testing, may provide help in proper diagnosis and treatment of these unresponsive patients.

Pathway 4



Occasionally, scintigraphy may be useful in diagnosis, as a pattern of joint involvement will be evidenced (38, 116–127). Radiographs of the heel may show erosions or proliferative changes specific to one of these diseases. Rheumatologic consultation may be helpful for diagnosis and treatment.

Traumatic Heel Pain (Pathway 4)

Acute trauma to the calcaneus is the most common osseous cause of heel pain. In almost all cases, the mechanism of injury is a fall from a height onto the heel. Intra-articular fractures involving the subtalar joint result in diffuse pain in the rearfoot that is poorly localized to the heel itself. In less severe injuries, more focal symptoms are found corresponding to the anatomic area of the fracture. These include isolated injuries to the sustentaculum tali, the plantar calcaneal tubercles, and avulsion of the posterior aspect of the tuber (128–135). Diagnosis is made by a history of trauma, focal pain on palpation, and radiographic confirmation of the fracture. Treatment is most often surgical when significant functional units are violated. In those cases where the fracture fragments are small, nonarticular, or minimally displaced, treatment is typically simple immobilization.

Stress fractures of the calcaneus occur as a consequence of repetitive load to the heel (122, 124, 130, 136–145). The most common site of stress fracture is just posterior and inferior to the posterior facet of the

subtalar joint. Although the exact mechanism is unknown, historically many patients report an antecedent increase in walking activity just prior to the onset of symptoms. The diagnosis should be entertained upon clinical suspicion and elicitation of such a history. The physical findings include tenderness to the lateral wall of the calcaneus, just posterior to the facet. There may be swelling and warmth. Pain elicited with compression of the calcaneus is highly suspicious of a stress fracture. Often the onset of symptoms precedes the radiographic findings and ancillary measures can assist in early diagnosis. Technetium bone scans are highly sensitive for stress fractures of the calcaneus in this setting. Radiographic features include an area of linear sclerosis corresponding to the fracture site. Treatment is conservative and involves protection and immobilization of the involved foot (131, 137). Progression to an acute fracture is uncommon.

Soft-tissue trauma (e.g., acute plantar fascia rupture) can also cause heel pain and be present in patients with negative radiographic and bone-scan findings (146–148). Clinical examination and appropriate diagnostic imaging can lead to establishing a diagnosis and treatment plan.

Other Causes of Heel Pain (Pathway 4)

Although rare, conditions such as benign and malignant tumors, infection (soft tissue and bone), and vascular compromise must be considered as etiologies for a

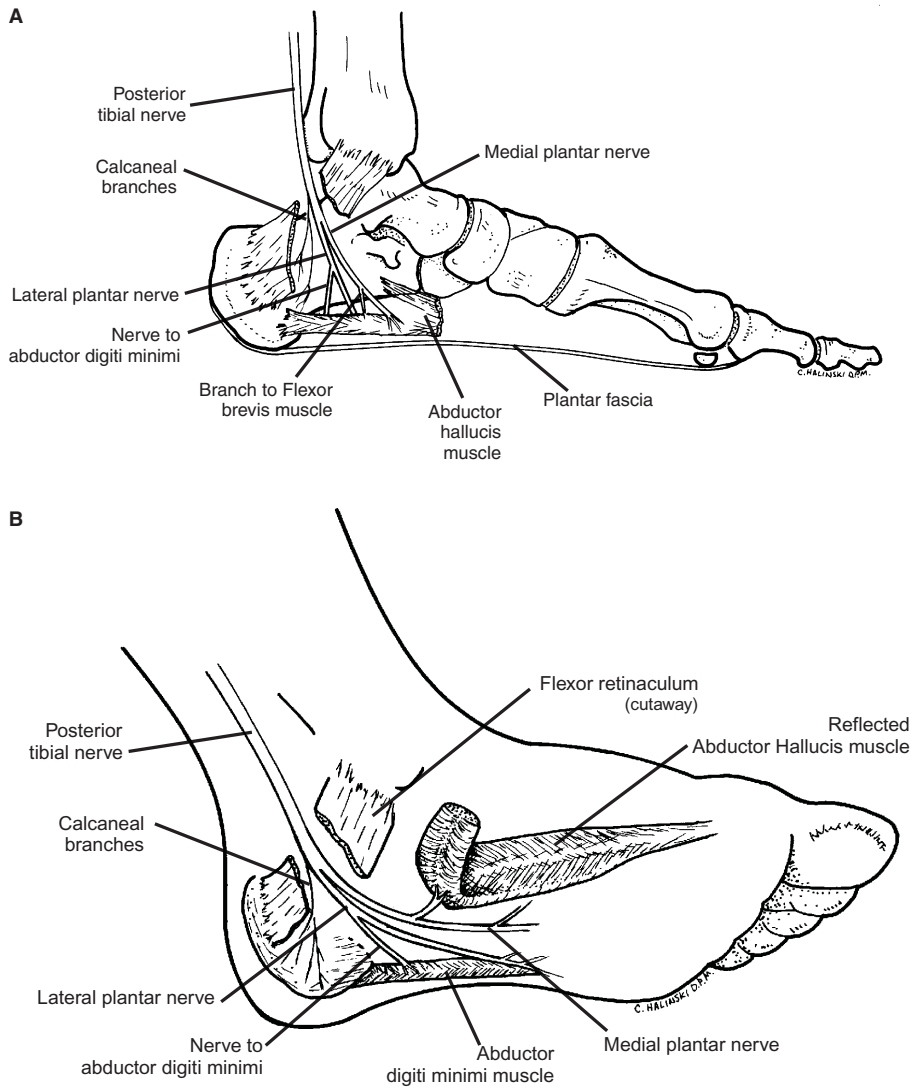


FIGURE 4 Nerves on the medial side of the heel with (A) tibial nerve and its branches and (B) cut-away view illustrating nerve branching that may be involved with heel pain.

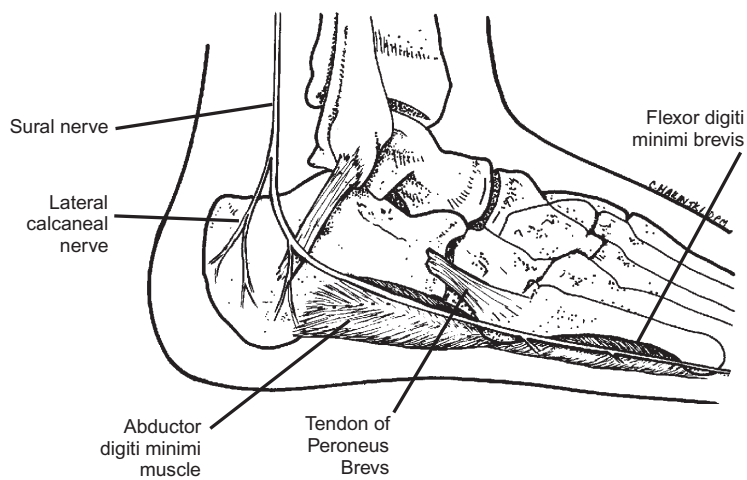


FIGURE 5 Nerve anatomy on the lateral side of the foot and heel.

patient's heel pain (34, 77, 149–158). The potential morbidity of these conditions is substantial. Proper diagnostic testing along with consultation or referral to the appropriate specialist are paramount in these individuals. In adolescents, calcaneal apophysitis is probably the most frequent etiology of heel pain. Palliative treatment is successful in almost all cases.

2001 Clinical Practice Guideline Core Committee

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