

Inferior heel pain

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Abstract

Inferior heel pain is a common complaint. Multiple differing pathologies may account for inferior heel pain. These may be classified by the anatomical structure affected: bone, nerve, plantar fascia and other soft tissues.

Bony pathologies include calcaneal stress fracture, calcaneal bone marrow oedema, tumours and osteomyelitis. Neurological causes include tarsal tunnel syndrome, nerve to abductor digiti quinti neuropathy, medial calcaneal neuropathy and lumbo-sacral radiculopathy. The plantar fascia may be degenerate (fasciosis), torn or enthesopathic, or there may be peri-fascial oedema. Soft tissue conditions include heel pad bruising and atrophy and tumours.

The presenting features of each of these conditions are discussed, followed by the treatment options. The multitude of modalities used to treat plantar fascia-related pain are discussed in greater detail.

The management of inferior heel pain involves a careful history and clinical examination. Not all heel pain is simply related to the plantar fascia. Without considering the other potential sources of pathology for which treatments may be markedly different, the clinician may easily unwittingly discount these. It is therefore incumbent to be clinically prudent, having a logical approach to assessment and diagnosis, prior to embarking on an appropriate course of treatment.

Keywords calcaneus; entrapment neuropathy; foot; heel; plantar fasciitis

Introduction

Inferior heel pain is a common complaint in both primary and secondary practice. It can be debilitating, and affect a large part of the population. The complete differential diagnosis is often not fully considered, resulting in mis-diagnosis and potentially inappropriate management. Many patients' symptoms are simply attributed to plantar fasciitis, which is but one of a wide number of potential diagnoses for inferior heel pain, without consideration of other pathologies. An understanding of these will enable the clinician to evaluate patients on an individual basis, investigate accordingly and make an informed diagnosis with appropriate ensuing treatment. This review focuses solely on inferior heel pain, and therefore does not discuss Achilles tendinopathy, which presents most commonly with posterior heel pain, and is discussed elsewhere.

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The range of differential diagnoses can be sub-classified anatomically by the tissue most affected. This includes conditions affecting bone, nerve, plantar fascia and other soft tissues (Figure 1).

Bone

Calcaneal stress fracture

Stress fractures of the calcaneus present with pain whilst walking or running as opposed to the typical pain associated with the first step in the morning classically attributed to pain originating from the plantar fascia. The pain diminishes at rest. Risk factors include osteopenia, osteoporosis and vitamin D deficiency. They are typically the result of a repetitive activity or overuse. Patients may have recently increased their activity levels, or changed their exercise shoe-wear. The onset of pain is acute.

On examination, the pain is reproducible by medio-lateral compression of the calcaneus (squeeze test, Figure 2). Plain radiographs may show a line perpendicular to the trabeculae (Figure 3). The diagnosis can be confirmed on MRI if plain radiographs are unremarkable. If indicated blood tests should be taken to exclude pathological fracture.

Treatment involves rest for 6–8 weeks with possible immobilization depending on symptoms. It is important to adapt the individual's regular activity, such as by running on softer ground or changing activity to a lower impact exercise. If relevant, new softer shoe-wear may be needed. Any underlying cause identified should be addressed. A return to normal activities and increasing exercise regime should then be gradually undertaken.

Calcaneal bone marrow oedema

Oedema at the site of insertion of the plantar aponeurosis may be seen in the absence of fracture or enthesopathy. The cause may be unclear, or may relate to minor repetitive trauma. This is often characterized by night pain and is identified on MRI. Management is rest and cushioning orthotics although there is some limited evidence for the use of extracorporeal shockwave therapy in this situation.¹

Bone tumour

Tumours whilst rare in the calcaneus, must be included in the differential, especially in patients with red flag symptoms such as unremitting night pain, unexplained weight loss and general malaise. An MRI is critical if a bone tumour is being considered. Benign pathologies seen in the calcaneus include unicameral bone cyst, aneurysmal bone cyst, enchondroma, osteoid osteoma, osteblastoma, fibrous dysplasia and intraosseous lipoma. Malignant pathologies include chondrosarcoma, Ewing's sarcoma, osteosarcoma and secondary metastases. If identified, onward referral to a specialist bone tumour unit is recommended.

Osteomyelitis

Infection should be included in the differential diagnosis of all pain potentially originating in bone. Patients may have risk factors, both systemic (e.g. diabetes) or local (e.g. trauma). A careful history may give clues. Investigations include blood inflammatory markers, plain radiographs, bone scan and MRI.

It is critical to obtain a tissue diagnosis to institute appropriate focused antibiotic therapy. This may take the form of an image

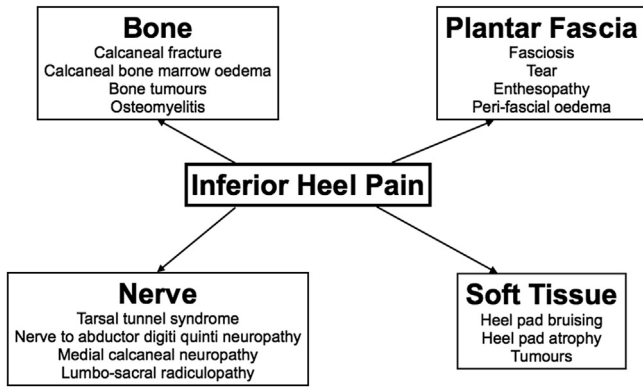


Figure 1 The differential diagnosis of inferior heel pain.



Figure 2 Squeeze test for calcaneal stress fracture: side to side compression of the calcaneus causes pain.

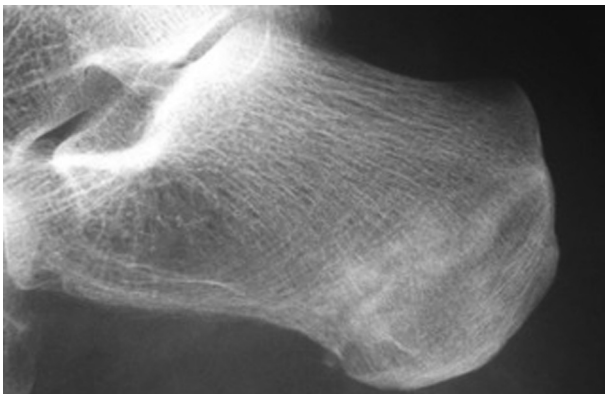


Figure 3 Radiograph demonstrating calcaneal stress fracture.

guided biopsy or open surgical debridement prior to the commencement of antibiotics. Multiple samples (at least five) should be sent to improve the accuracy of diagnosis and treatment. Microbiological advice should be sought on the basis of the cultures and sensitivities to plan an antibiotic regime. This may involve intravenous medication for many weeks, necessitating the placement of central venous access.

Failed conservative management of chronic calcaneal osteomyelitis can be addressed surgically by sub-total or total calcaneectomy, which have a variable outcome, or below knee amputation.

Nerve

Heel pain described as tingling, electric shocks or rest pain should alert the clinician to a potential neurological cause. Typically the nerve supply to the heel originates from terminal branches of the tibial nerve. Examination may reveal a positive Tinel’s test or altered sensation.

Tarsal tunnel syndrome

The tibial nerve passes posterior to the medial malleolus under the flexor retinaculum, which forms the roof of the tarsal tunnel. The tunnel also contains the tendons of tibialis posterior, flexor digitorum longus and flexor hallucis longus, as well as the posterior tibial artery. The nerve divides into the medial and lateral plantar nerves within the tunnel in the majority of cases, which enter the foot deep to abductor hallucis. Within the tunnel the nerve may become entrapped, producing symptoms related to its sensory distribution.

The syndrome may be secondary to systemic conditions such as diabetes or other causes of neuropathy. Alternatively, local factors may be causative, with space-occupying lesions such as a ganglion, most commonly compressing the nerve. Other local predisposing factors may include trauma (e.g. calcaneal fractures) or hindfoot deformity (e.g. extreme hindfoot valgus).

Classically patients may describe a burning pain or numbness in the sole of the foot or inferior heel. The symptoms may be specifically located within the distribution of the whole nerve or either of its medial or lateral plantar divisions. There may be a history of non-specific or vague pain on the sole of the foot or heel. A positive Tinel’s test directly over the nerve is present in many cases. Objective sensory deficit may be identified. However, the history and examination is notoriously variable and often underwhelming, often making diagnosis difficult. Frequently, tarsal tunnel syndrome is considered a diagnosis of exclusion. Nerve conduction studies may provide assistance in confirming the diagnosis. MRI or ultrasound should be performed to identify any space-occupying lesion.

Non-operative measures, including neuropathic analgesic agents, orthoses and injections may prove helpful, but there is no clear evidence to support this. Failure to improve is an indication for surgical intervention, particularly if a surgical target is identified, such as a space-occupying lesion that can be excised. In cases without a lesion, the nerve is decompressed within the tarsal tunnel, as are the two plantar nerves as they exit deep to abductor hallucis, where the two fascia may be the cause of compression. Results of surgery are highly variable, unpredictable and may only give partial symptomatic relief.² Recurrence of symptoms is a significant concern.

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