Heel Pain

Most cases of heel pain have a mechanical cause. Other causes include trauma; neurological, arthritic, infectious, neoplastic and autoimmune conditions, and other systemic conditions.

Differential diagnosis[^1]

- **Plantar fasciitis** - the most common cause in adults - tenderness at the origin of the plantar fascia (the medial tubercle of the os calcis).[^2] See separate [Plantar Fasciitis](patient.info/doctor/heel-pain) article.
- **Achilles tendonitis, Achilles tendon rupture.** Achilles tendonitis is an acute condition and painful because of acute minor tears and associated inflammatory change. Achilles tendinosis is thought to be a chronic process which weakens the tendon and predisposes to tendon rupture. There is often overlap of the two conditions (the term 'tendinopathy' encompasses both conditions). See separate [Achilles Tendonitis and Rupture](patient.info/doctor/heel-pain) article.
- **Calcaneal apophysitis (Sever's disease),** which occurs most often in adolescents.
- **Subcalcaneal bursitis.**
- **Neurological:**
  - **Tarsal tunnel syndrome.**
  - Trapped abductor digiti quinti nerve.
  - Sciatica (S1 dermatome).

- **Trauma:**
  - Fat pad trauma: symptoms may last well over six months.
  - Calcaneal stress fracture.[^2]
  - Acute fracture.
  - Soft tissue contusion/repetitive trauma.
  - Puncture wound.

- Heel pad atrophy may present with diffuse plantar heel pain, especially in patients who are older and obese.[^2]
- **Systemic syndromes:** eg, gout and pseudogout, diabetes, Paget's disease of bone, inflammatory arthritides (rheumatoid arthritis, Reiter's syndrome, ankylosing spondylitis, psoriatic arthritis).
- **Infection:** of soft tissue, bone, joint.
- **Neoplastic:** benign and malignant (primary and secondary) tumours.

Assessment

- **Always consider trauma in an acute presentation:**
  - Talar injuries often follow falls on to the feet or after violent dorsiflexion of the ankle.
  - Calcaneal fractures usually follow a fall from height on to the heel. Fractures are often bilateral. There is swelling, bruising and tenderness over the calcaneum. There may be associated injuries to the knees, hips, pelvis, lumbar spine or cervical spine.
  - Talar and calcaneal fractures should be referred for urgent orthopaedic assessment.

- Patients with plantar fasciitis often have increased heel pain with their first steps in the morning or when they stand up after prolonged sitting. There is usually tenderness at the calcaneal tuberosity and pain is increased with passive dorsiflexion of the toes.
- **Achilles tendonitis** is associated with posterior heel pain. There is often increased pain with running, jumping, or making quick turns. There is pain and tenderness over the insertion of the Achilles tendon. There is often an increase in pain with dorsiflexion of the foot.
- **Calcaneal stress fractures** are more likely to occur in athletes who participate in sports that require running and jumping.
Tarsal tunnel syndrome may present with plantar heel pain accompanied by tingling, burning or numbness. Symptoms are often initiated by percussion of the tarsal tunnel or dorsiflexion and eversion of the foot.

Heel pad atrophy may present with diffuse plantar heel pain, especially in older patients who are obese.

Less common causes of heel pain, which should be considered when symptoms are prolonged or unexplained - eg, osteomyelitis or bone tumour.

A systemic cause should be considered in patients with bilateral heel pain, pain in other joints, or known inflammatory arthritic conditions.

Always consider a proximal neurological cause - eg, sciatica.

Investigations

- Often no investigations are required, as diagnosis is clinical.
- X-ray:
  - Following trauma (see separate Ankle Injuries article):
    - The decision whether to X-ray should follow the Ottawa rules, ie X-ray the ankle/foot if:
      - Not weight-bearing immediately and unable to walk four steps at the time of assessment.
      - Either malleolus tender at tip or just posterior; or
      - Proximal fibula tender; or
      - Calcaneus tender; or
      - Base of 5th metatarsal tender; or
      - Navicular bone tender.
      - Age >55 years (adopt a lower threshold if appropriate).
  - X-ray if there is bone tenderness.
  - There should be a lower threshold to X-ray in the very young, the elderly and in patients who are difficult to assess (eg, reduced consciousness, alcohol intoxication).
  - Often unhelpful with causes of heel pain other than trauma.
  - May demonstrate heel spurs, which are found in the origin of the short flexors; they are present in 16% of the normal population.

- ESR, CRP, uric acid, rheumatoid factor, HLA-B27 may be useful.
- Nerve conduction tests if there is clinical suspicion of tarsal tunnel syndrome but not enough confidence to inject.
- Ultrasound, MRI scan and bone scan may be required.
- Technetium bone scans are very sensitive for stress fractures of the calcaneus.

Management

- Initial management options will depend on the diagnosis but include rest, non-steroidal anti-inflammatory drugs (NSAIDs), local steroid injection, orthotics (eg, a cushioned heel insert) and referral to a podiatrist and/or orthopaedic foot specialist.
- Plantar fascia specific stretching exercises improve outcomes in patients with chronic plantar fasciitis.

Mechanical plantar heel pain

- Plantar heel pain causes the majority of mechanical heel pain cases.
- Usually, it presents with isolated plantar heel pain when weight-bearing, especially when first getting up after a period of rest. The pain tends to decrease after a few minutes, then returns as the time on the feet increases.
- Associated significant findings may include obesity, tightness of the Achilles tendon, tenderness on palpation of the inferior heel, and inappropriate shoes.
- X-ray finding of a plantar heel spur suggests that the condition has been present for at least 6-12 months.
- The longer the duration of heel pain symptoms, the longer it takes to treat and resolve the symptoms.
Initial treatment includes NSAIDs, padding and strapping of the foot. Corticosteroid injections may be useful.
Patient advice includes regular stretching of the calf muscles, avoidance of flat shoes and barefoot walking, over-the-counter arch supports and heel cushions, and limiting extended physical activities.
Symptoms usually improve within six weeks of initiation of treatment. If no improvement occurs, referral to a podiatrist and or orthopaedic specialist clinic should be considered.
Additional therapy may be required - eg, orthotic devices, night splints to maintain an extended length of the plantar fascia during sleep, a limited number of corticosteroid injections, cast immobilisation for 4-6 weeks, or the use of a fixed ankle walker-type device to immobilise the foot during activity.
If necessary, further treatment, such as surgical plantar fasciotomy, may be required.
In most cases, removal of a plantar heel spur does not provide any benefit.\[4\]

**Mechanical posterior heel pain**

- The posterior heel is the second most common location of mechanically induced symptoms.
- It may be due to insertional Achilles tendonitis or bursitis (often associated with Haglund's deformity).
- Insertional Achilles tendonitis:
  - This most often presents with chronic posterior heel pain and swelling. Pain is aggravated by increased activity (eg, walking or running) and pressure caused by shoe gear.
  - A palpable prominence may be appreciated both medially and laterally to the insertion of the Achilles tendon. Tenderness may be localised and central or more diffuse over the posterior heel.
  - X-rays often show insertional spurring or erosion.
  - Initial treatment involves reducing pressure to the area (eg, wearing open-backed shoes), heel lifts/orthotics, NSAID therapy and various physiotherapy modalities, including stretching.
  - Immobilisation may be considered if initial treatment is unsuccessful.
  - Local corticosteroid injections are not recommended.
  - Surgery may be indicated (eg, resection of the posterior spur, inflamed bursa and/or diseased tendon). Various degrees of detachment with subsequent re-attachment of the Achilles tendon may be required.

- Bursitis associated with Haglund's deformity:
  - Haglund's deformity is a prominence of the upper posterolateral aspect of the calcaneum. There is generally an underlying bony prominence, which may be quite small compared to the overall size of the swelling. The cause of the deformity is unknown.
  - This may occur in both sexes and at any age but females aged 20-30 years are most commonly affected.
  - Symptoms include acute pain and inflammation significantly aggravated by shoes.
  - 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.
  - X-rays often show prominence of the posterior superior surface of the calcaneus.
  - Initial treatment includes wearing open-backed shoes, NSAID therapy, and injections (with care taken not to inject the Achilles tendon). Physiotherapy may be helpful.
  - If symptoms are not improved then surgery may be required - eg, resection of the prominent posterior superior aspect of the calcaneus and inflamed bursa. Calcaneal osteotomy may occasionally be required to correct abnormal calcaneal alignment (eg, calcaneal varus).\[4\]

**Neurological heel pain**

- Neurological heel pain is caused by entrapment or irritation of one or more of the nerves which innervate the region, ie posterior tibial (tarsal tunnel syndrome), medial calcaneal (heel neuroma), medial plantar, lateral plantar, including branch to abductor digiti minimi, and sural, including lateral calcaneal.
- Obesity, venous insufficiency, trauma, and space-occupying lesions may increase pressure on the involved nerve.
- Most causes of neurological heel pain are unilateral. In suspected neurological heel pain, especially in bilateral presentations, an underlying systemic disease process must be ruled out.
- Neurological 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 - eg, from the lower back.
Diagnostic studies for neurological heel pain include electromyography, nerve conduction studies and MRI scan. Management will depend on the exact cause of heel pain and any underlying causes of aggravation - eg, obesity.

**Arthritic causes of heel pain**

- Systemic arthritic diseases may present with heel pain. These include the seronegative arthritides, psoriatic arthritis, Reiter's disease, diffuse idiopathic skeletal hyperostosis (DISH), rheumatoid arthritis, fibromyalgia and gout.
- There are likely to be other joint symptoms.
- Any suspicion of an arthritic cause should prompt appropriate investigation (starting with FBC, CRP, uric acid, rheumatoid factor) and referral.

**Trauma**

- Acute trauma to the calcaneus is the most common bone cause of heel pain. This usually occurs following a fall from a height on to the heel.
- Intra-articular fractures involving the subtalar joint result in diffuse pain in the hindfoot that is poorly localised to the heel itself. In less severe injuries, more focal symptoms occur, corresponding to the area of the fracture.
- Diagnosis is made by a history of trauma, focal pain on palpation, and X-ray confirmation of the fracture.
- Treatment is usually surgical when there is significant functional impairment. In cases when the fracture is localised and small, non-articular, or minimally displaced, treatment is conservative with simple immobilisation.
- Stress fractures of the calcaneus:
  - These occur as a consequence of repetitive load to the heel.
  - The most common site of stress fracture is just posterior and inferior to the posterior facet of the subtalar joint.
  - Many patients report a preceding increase in walking activity just prior to the onset of symptoms.
  - The physical findings include tenderness to the lateral wall of the calcaneus, just posterior to the facet.
  - There may be swelling and warmth.
  - Pain on compression of the calcaneus is indicative of a likely stress fracture.
  - Often the onset of symptoms precedes the X-ray findings. Technetium bone scans are very sensitive for stress fractures of the calcaneus.\(^4\)
  - Treatment is conservative and involves protection and immobilisation of the involved foot.
  - Progression to an acute fracture is uncommon.

- Soft tissue trauma (eg, acute plantar fascia rupture) can also cause heel pain and be present in patients with normal X-ray and bone scan findings.

**Other causes of heel pain**

- Although rare, benign and malignant tumours, infection (soft tissue and bone) and vascular disease must be considered.
- In adolescents, calcaneal apophysitis is probably the most frequent aetiology of heel pain. Conservative treatment is successful in almost all cases.

**Further reading & references**

1. Heel Pain; Wheeless' Textbook of Orthopaedics

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