Plantar fascia

Plantar Fasciitis (pain in the heel of the foot)

Plantar Fasciitis is the most common foot problem seen in runners and is often associated with an increase in running mileage. Typically pain is noticed under the heel which increases during running or following long periods of standing. In more chronic cases increased stiffness can be experienced after long periods of rest causing difficulty in getting your heel to floor in standing.

The plantar fascia (PF) is situated on the sole of the foot and forms a strong mechanical linkage between the calcaneus (heel bone) and the toes. It consists of medial, lateral and central bands. The medial band is the band most commonly implicated in Plantar Fasciitis.

Risk factors involved in causing PF injury:
Research has suggested several risk factors associated with developing plantar fasciitis:

- Increased body-mass index in an athletic population
- increased age
- reduced ankle dorsi flexion
- 1st MTP (big toe) extension
- non athletic population spending the majority of the working day on their feet and a body-mass index of greater than 30 kg/m2

Calcaneal spur (According to McMillan at al (2009), “subcalcaneal spur formation is strongly associated with pain beneath the heel’. A recent meta analysis undertaken by Jill Cook and Craig Purdham (2011) demonstrated that chronic plantar heel pain (CPHP) participants are over 8 times more likely to show evidence of spur than the control group. A recent study by Johal and Milnar (2012) demonstrated that 89% of a symptomatic CPHP cohort had associated calcaneal spur.)

Radiograph demonstrating a Calcanea spur

Foot posture, in particular pronation moments (lowering of the arch on the inside of the foot) has been demonstrated to contribute to plantar facia pain.
Pronating too hard, leads to the foot being unable to re-supinate
Pronating too far indicates poor lower limb functional alignment, places increased stress in the plantar fascia and leads to a reduced ability to pivot over the 1st MTPJ (big toe)

In mid-stance the foot should supinate allowing the hip to externally rotate if this does not occur the likelihood is the hip internally rotates, the knee position becomes valgus and the runner attempts to compensate by rotating their trunk.

The lack of the “windlass effect” (in the weight bearing foot if you lift up the big toe you pull on the plantar fascia and the medial arch is lifted up, activating the windlass mechanism). due to a pronated foot will result in decreased ability to supinate the foot during the latter portion of the stance phase.
As the arch lowers it becomes longer and the plantar structures (the plantar fascia, but also the plantar ligaments) become more taut. This in turn applies a compressive force longitudinally. Too much pronation limits big toe to dorsiflexion via the reverse windlass and as the heel tries to lift so tension in the plantar fascia increases and may cause trauma/pain.

Treatment:

Obtaining the correct diagnosis allows you to get back to running as soon as possible. The **HEALTH ROOMS** Physiotherapy staff have the experience and expertise to correctly diagnose your plantar fascia pain and the skills to get you back running as quickly as possible. Assessment and correction of any biomechanical/lower limb alignment issues should form part of your treatment plan.

Acute phase.
Correct diagnosis is essential (Other potential causes of heel pain include Calcaneal stress fracture, bone bruise, fat pad atrophy, Tarsal tunnel syndrome, soft tissue primary or metastatic bone tumour, Paget’s disease, Severs disease or referred pain from S1 radiculopathy)

Modifying activity as required.
Avoid barefoot walking
Inflammation may be present (e.g. if there is stiffness after rest) therefore anti inflammatory medication may help.
Ensure full flexibility of all posterior chain muscles such as hamstrings, gastrocnemius and soleus.
Stretch plantar fascia
Temporary orthotic may be beneficial
Address any lower limb biomechanical issues which may have led to the development of plantar fascial pain.
Review running style/footwear
Review training plan

Chronic phase:
Despite it’s name plantar fasciitis (“itis" suggesting an inflammatory element) the histopathology reveals the condition is not primarily inflammatory.

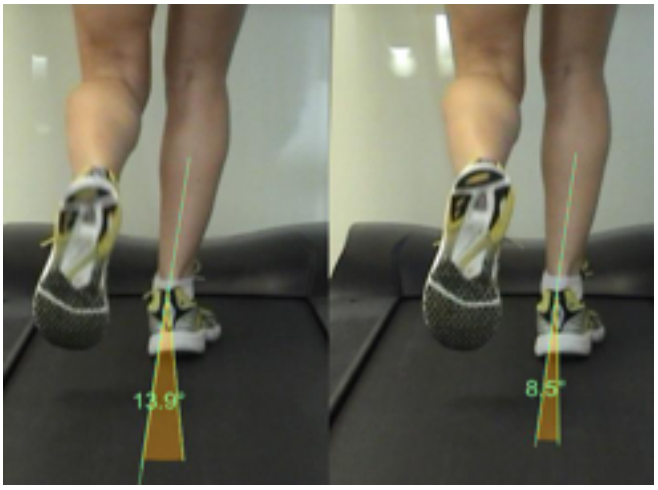
Ultrasound **scan** to confirm diagnosis (available at The Health Rooms)

Use of resting **night splint**
According to Bekler et al (2007) first time sufferers of plantar fasciitis obtain significant relief of heel pain in the short term with the use of a night splint, however, this application does not have a significant effect on prevention of recurrences after a two-year follow-up.

Attard and Singh (2012) compared the effectiveness of a posterior Ankle Foot Orthosis (AFO), which dorsiflexes the foot, with an anterior AFO, which maintains the foot in a plantigrade position, and came to the conclusion that Plantar fasciitis night AFOs are poorly tolerated but their use can be justified in that the pain levels are reduced. The anterior AFOs proved more comfortable and more effective than posterior AFOs.

Correct any biomechanical lower limb issues
Biomechanical assessment of the foot
Gradual loading programme
Video analysis of running is useful to identify contributing biomechanics contributing factors.
Electro corporeal shock wave therapy
Injection therapy if conservative treatment fails
Surgical release

Anything that reduces pronation moments will reduce the strain in the plantar fascia and by doing so decrease plantar fascia insult, reduce associated gait dysfunction (this includes controlling trunk balance and lower limb alignment and control).
Noting an improvement in gait dysfunction can be seen as a predictor of a successful outcome in treating plantar fasciitis.



Fitting of an orthotic device can reduce equinus calcaneum and reduce compensatory pronation

Stretching the plantar fascia has been shown to be superior to traditional weight bearing GSAT (gastrocnemius soleus Achilles tendon) stretches of calf muscles and Achilles tendon (GSAT).

Aim to strengthen lateral rotators of the hip and so reduce pronation (Snyder et al, 2008)

Aim to reduce Ankle Equinus and reduce compensatory pronation(Radford et al, 2006)

Aim to strengthen the Tibialis Anterior and reduce pronation

Consider Calcaneal taping as this has been shown to be a more effective tool for the relief of plantar heel pain than stretching, sham taping, or no treatment (Radford et al 2006, Hyland et al 2006).

The presence of a calcaneal spur is important and strongly linked to Plantar fascial pain. Therefore better results may be obtained if we combine an orthotics device WITH heel pad cushioning…

If conservative methods of treatment fail to resolve symptoms (90% of plantar fascial pains resolve with conservative treatment) then a surgical opinion is often sought especially if symptoms have been present for 6-12 months (Neufeld SK et al. Plantar fasciitis: evaluation and treatment. J Am Academy of Orth Surgeons. 2008 Jun;16(6):338-46).

Contact the **HEALTH ROOMS** for expert assessment and evidence based treatment.