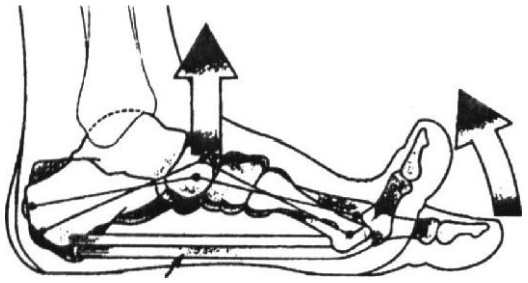

Figure 3: The "windlass" mechanism. As the hallux dorsiflexes, the plantar fascia tightens to maintain arch integrity and invert the calcaneus.

Thus its role as a rigid lever at this time of the gait cycle is fulfilled.

The mechanical functioning of the plantar fascia, its role in medial longitudinal arch support and subtalar joint resupination are pivotal in the use of taping as a treatment method.

Pathomechanics/pathophysiology Bone ligament and tendon respond to mechanical forces by remodelling their structure in order to withstand mechanical demands placed upon these tissues better. This is known as Wolff's Law when applied to bone. A common manifestation of this axiom is the development of an osteophyte where ligaments or tendons exert a traction force on their attachment to bone. In this way plantar fasciitis is a true enthesopathy in that osteophyte formation often (and usually does) occur at the plantar fascial enthesis. The larger picture is the response to overuse or overstress with microtears of the fascia of the fascia-bone interface. With continued activity, the ability of the tissue to repair is outweighed by the destructive microtrauma. This sets up the pattern of hypercellular chronic inflammatory response with reactive fibrosis and degenerative areas.

After many years of surgical excision of calcaneal spurs, the condition is now considered to be a secondary product of low grade plantar fascial inflammation and enthesial traction. A bony matrix is laid down fora period of time (often many years) and its presence is considered secondary to the main condition of plantar fasciitis.

The major pa thomechanics of plantar fasciitis are twofold.

1. Prolonged abnormal subtalar or midtarsal joint pronation has been implicated as a major etiological factor for plantar fasciitis by numerous authors.
2. Direct repetitive microtrauma with heel strike to the ligamentous and neural structures in the medial portion of the heel.

This presents very commonly in the middle aged, overweight, non-athlete individual who stands on hard unyielding surfaces.

It is very important to understand that the aetiology contributing to the pathomechanics is multifactorial. Anatomical factors such as abnormal subtalar or midtarsal joint pronation, pes cavus, limb length inequality or ankle equinus, and environmental effects like increased mileage, shoes, and hill running will all increase the likelihood of tensile loading of the plantar fascia.

The relation of plantar fasciitis and plantar heel fat pad thickness

A recent article in the *Australian Podiatrist* (Dec 1995) describes a pilot study by the author Evelyn Green on the above. The purpose of this pilot study was to investigate the relationship between heel pad thickness in asymptomatic and symptomatic subjects with plantar fasciitis. Eight patients with plantar fasciitis and six normal subjects were taken. The mean heel pad thickness was greater in the subjects with plantar fasciitis but the difference was not statistically significant, using a two sample separate variants test.

Other studies have also shown that patients with plantar fasciitis tend to have increased heel pad thickness. This is despite findings which suggest that thin heel pads have an increased tendency to develop plantar heel pain due to higher peak stresses.

Treatment

Most treatments developed for plantar fasciitis are based on the concept of overload. Non-steroidal anti-inflammatory medication, rest and various physical therapy modalities *are* used in the first 48 to 72 hours. After the initial inflammatory phase, friction techniques, heel lifts, subtalar joint mobilisation and stretching are all necessary to allow return to activity. However, plantar fasciitis is predominantly a mechanical injury and the basis of treatment revolves around the elimination of the inflammatory process by reducing tension of the plantar fascia and associated structures. Subtalar neutral cast functional orthotics are an effective way of achieving this objective.

Another technique of reducing tension on the plantar fascia is to tape the foot in a "low dye" fashion.

Bartold in the *Australian Podiatrist* (June 1993) developed a method of taping a foot in the management of the acute phase of plantar fasciitis and this plays an excellent role in terms of treatment regime selection, i.e. if orthotic therapy is being considered. The taping method can be utilised to predict the success of potentially costly orthotic therapy.

The rationale of this taping technique is based on reinforcing the plantar fascia, facilitating the action of peroneus longus, providing compression, plantarflexing the forefoot on the rearfoot, inverting the calcaneus beyond vertical, and reducing the midtarsal joint obliquely. However, this taping technique is not effective in a rigid forefoot valgus foot type. Plantar fasciitis in these foot types is usually caused by repetitive shock-based trauma and making the foot even more rigid will be of no help.

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