



Review of plantar fasciitis

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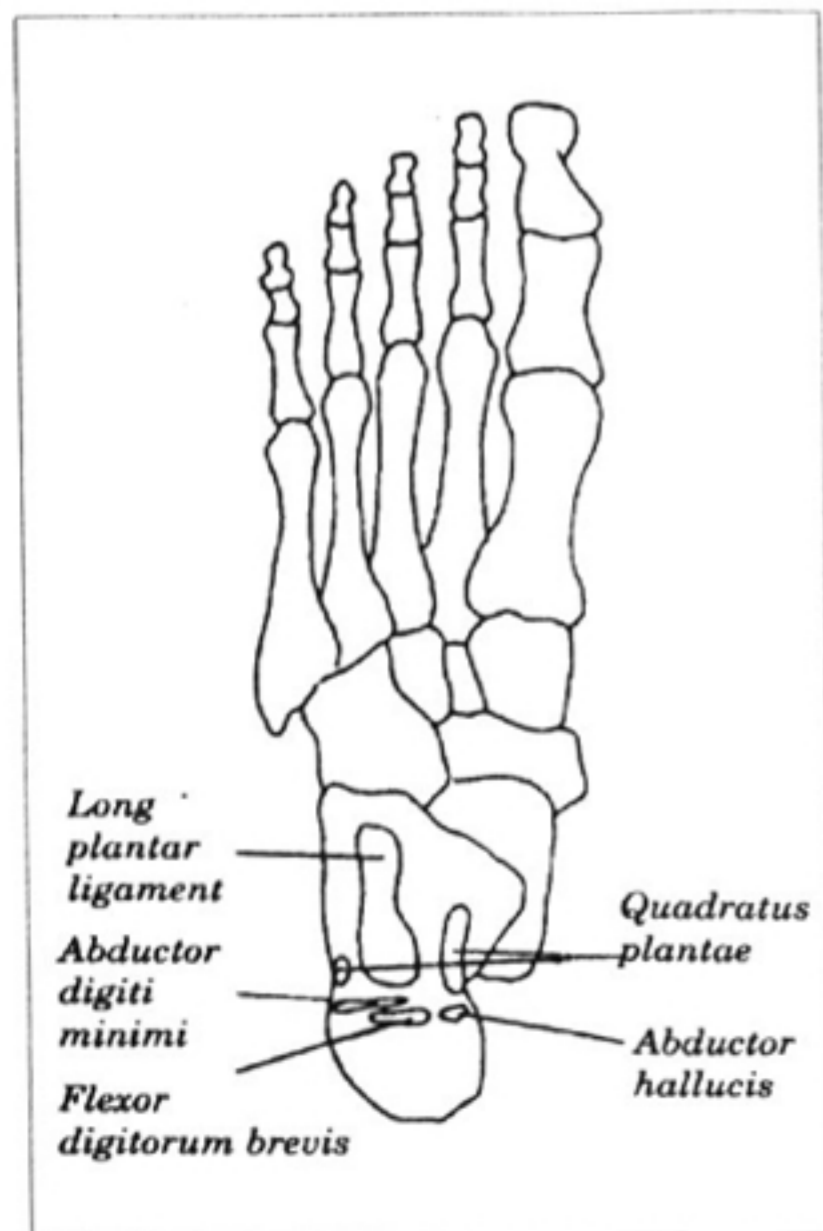
Of all biomechanical injuries in podiatry practice, plantar fasciitis is the most common and certainly one of the most troublesome: it accounts for a large number of running injuries.

As with all injuries, differential diagnosis of the condition is critical. This is the most important with respect to plantar fasciitis as many conditions, including calcaneal stress fracture, medial calcaneal nerve entrapment, ruptured plantar fat pad septum, seronegative disorders, rheumatoid arthritis and tumours can give rise to plantar fasciitis like symptoms.

Anatomy (Fig 1)

The plantar surface of the calcaneus has a transverse elevation. The calcaneal

Figure 1: Plantar calcaneal attachments of the long plantar ligament, the abductor hallucis, flexor digitorum brevis, abductor digiti minimi, and the quadratus plantar muscles.



tuberosity is depressed centrally and has medial and lateral projections called the medial and lateral processes or tubercles. The larger medial tubercle gives rise to the plantar fascia, flexor digitorum brevis and abductor hallucis.

The plantar fascia itself can be divided into central, medial and lateral portions with the central portion being the thickest and strongest. This central portion divides distally with five slips (one for each digit) and inserts into the sides of the sheath of the flexor tendons for each toe (Fig. 2). The three muscles of the superficial layer all attach to the calcaneal tuberosity and may become involved with pain in and around the plantar fascia. Other structures of great importance with relation to the general syndrome of plantar fasciitis are:

1. The medial branch of the posterior tibial nerve (sometimes called the medial calcaneal nerve). This is a pure sensory nerve and supplies the plantar and medial aspects of the heel. Entrapment or irritation of the nerve has been postulated as a cause of pain in this region. Numerous cases of plantar fasciitis of a neurogenic origin have been cited with palpation of the tarsal tunnel reproducing pain and a positive Tinel's Sign being present.
2. The subcalcaneal bursa which is interposed subcutaneously in the fibro areolar tissue overlying the calcaneal tubercle. Both the bursa and nerve may become involved in the long term inflammatory powers of chronic plantar fasciitis.

Actions of the plantar fascia

It is useful to view the action of the plantar fascia as that of a bow string. Anecdotally the plantar fascia acts as a bow string to the bow structure of the foot's medial longitudinal arch. Any force causing the medial longitudinal

arch to "flatten", will "straighten" the bow and therefore "tighten the bowstring". On a more scientific level the plantar fascia maintains the integrity of the medial longitudinal arch of the foot. Electromyograph studies to determine the role of muscles on the arch support of the foot were performed and concluded that most of the support for the longitudinal arch of the foot is applied by the static structures, i.e. the ligaments and bone, and the muscles only come into play when excessive loads are applied. This gives an indication of the worth of exercise program for the intrinsic muscles of the foot "strengthen the arch" in the absence of any frank neuromuscular disorder.

The other important function of the plantar fascia is its ability to invert the calcaneus in the propulsive phase of gait. During propulsion (i.e. immediately after heel lift) the plantar fascia tightens, secondary to dorsiflexion of the hallux (the so called windlass mechanism - see Fig. 3).

Due to its predominately medial insertion, the plantar fascia will facilitate inversion of the calcaneus and so play an important role in resupination of the foot during propulsion.

Figure 2: The slips of the plantar fascia.

