

## General View about Plantar fasciitis Treatment Lines: Review Article

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### ABSTRACT

**Background:** One of the most frequent reasons of heel discomfort is plantar fasciitis. A thick band of tissue from the heel bone to the toes on the bottom of each foot experiences degeneration and, to a lesser extent, inflammation. Though it can also be brought on by prolonged standing or rising from a chair, the discomfort is typically at its greatest when taking the first few steps after waking up. It tends to occur more often in women, middle-aged, athletes, and the obese.

**Objective:** To have overview about treatment lines of Plantar fasciitis.

**Methods:** We looked for data on Plantar fasciitis and treatment in medical journals and databases like PubMed, Google Scholar, and Science Direct. However, only the most recent or extensive study was taken into account between 2000 and 2013. References from related works were also evaluated by the writers. There are not enough resources to translate documents into languages other than English, hence those documents have been ignored. It was generally agreed that documents such as unpublished manuscripts, oral presentations, conference abstracts, and dissertations did not qualify as legitimate scientific study

**Conclusion:** It can be treated either by conservative treatment such as rest, analgesics and stretching exercises that are successful in majority of cases. However, cases not responding to conservative treatments for more than 3 months, they can be treated with minimal invasive treatment such as corticosteroids, botulinum toxin or platelet-rich plasma (PRP) injections. Surgical intervention is often considered after failure of conservative treatments for more than 6 months. The most popular surgical procedures for refractory fasciitis are gastrocnemius recession and plantar fasciotomy.

**Keywords:** Plantar fasciitis, Platelet-rich plasma, Treatment lines.

### INTRODUCTION

The majority of adults who experienced heel pain attributed it to plantar fasciitis. More than a million people a year reportedly seek treatment for this disease, with the majority (66% in one study) visiting a primary care physician. In the past, it was thought that prolonged periods of standing or running caused plantar fasciitis by causing microtears in the fascia at the calcaneal entheses. Some doctors have given this disorder the label "plantar fasciosis," implying that it is caused by a degenerative process rather than acute inflammation<sup>(1,2)</sup>.

Plantar fasciitis can be diagnosed using the patient's history, potential risk factors, and findings from a physical examination. Getting out of bed in the morning or getting comfortable for a long period of time causes heel pain and tightness for most individuals. Heel pain typically improves with walking but can worsen later in the day if the patient stays on walking or stands for long periods of time<sup>(1,2)</sup>.

Patients with painful impact points may walk with the affected foot in an equestrian stance during a physical examination. The plantar calcaneal region is typically quite sensitive to touch and can cause a severe piercing pain in most people. Lower leg/first toe dorsiflexion inactivity is associated with proximal plantar fascia discomfort and Achilles tendon entrapment. If the patient's history and physical exam findings don't fit the conventional profile for plantar fasciitis, then it's best to check elsewhere for the source of the discomfort in their heels<sup>(1)</sup>.

### Epidemiology:

Heel pain is a common complaint at the podiatry office. The most common cause of heel pain was plantar fasciitis<sup>(3,4)</sup>, as well as being the most prevalent plantar fascia

injury. Women, those in their middle years, athletes, and the overweight are at increased risk<sup>(5)</sup>. Plantar fasciitis affects around 10% of the population at some point<sup>(6)</sup>. The peak age for occurrence is between 40 and 60<sup>(7)</sup>. About one and two million annual doctor's visits were attributed to pain from plantar fasciitis<sup>(5)</sup>.

### Anatomy & Function of the Plantar Fascia:

You have a thick band of connective tissue called plantar fascia that wraps around the soles of your feet<sup>(8)</sup>. It's triangular, with the medial process of the calcaneal tuberosity serving as the starting point for the growth of the central band, the lateral band, and the medial band<sup>(9)</sup>. It originates on the plantar surface of the foot, the proximal phalangeal bases, and the metatarsophalangeal (MTP) joints, and then divides distally into five distinct strands at the mid-metatarsal level<sup>(10)</sup>.

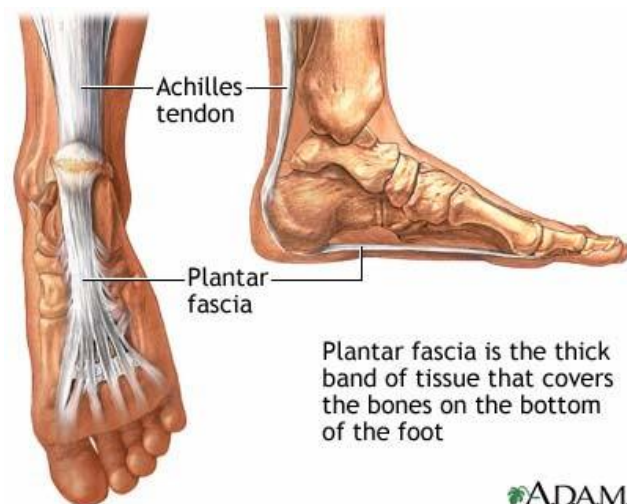
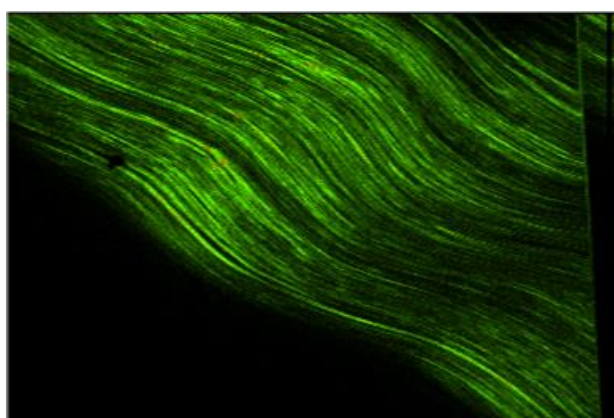


Figure (1): Anatomy of plantar fascia<sup>(10)</sup>.

Fascia was composed of collagen fibres that provided great tensile strength and elastin that provided elasticity, making it structurally comparable to tendinous tissue. In a normal tendon or fascia, the collagen fibres are arranged in wavy bundles parallel to the direction of pull<sup>(11)</sup> (**figure 2**).

The undulating pattern of the tissue acts as a sort of shock absorber, limiting the length of time that individual fibrils can extend in one direction without causing damage to the surrounding tissue. One theory suggests that these undulating patterns allow for a tissue to extend by 1–3% under tension, making them an excellent safety measure against potentially harmful yet unexpected tension<sup>(12)</sup>. Additionally, the bones, muscles, tendons, arteries, and nerves of the foot's bottom are shielded<sup>(13-15)</sup>.



**Figure (2):** Wavy pattern of the bundles of the plantar fascia<sup>(11)</sup>.

#### **Mechanism of injury:**

When collagen strands are stretched beyond their elastic limit, fibre tearing can occur. Mild tears in fascia or tendons can weaken the tissue's structure and make it more vulnerable to further injury. New collagen fibres were deposited to replace the old ones that had been damaged during the healing process. Scar tissue forms when new collagen fibres are destroyed when they develop during tissue regeneration due to stress (such as when a patient returns to work before fully recovering)<sup>(16)</sup>. Scar tissue was problematic because it was rigid, preventing the normal stretching that helps prevent rips in the plantar fascia and other tissues during activities like walking and running, which led to additional wear and tear and eventual tears<sup>(17)</sup>.

#### **Pathophysiology:**

Histological changes observed in other research indicate that plantar fasciitis is caused by a non-inflammatory structural degradation of the plantar fascia, contrary to the original hypothesis that plantar fasciitis was an inflammatory condition of the plantar fascia<sup>(18)</sup>. In light of these new understandings of plantar fasciitis's underlying mechanisms, many experts have proposed renaming the ailment "plantar fasciosis."<sup>(19)</sup> It was formerly believed that repetitive micro trauma was to

blame for the structural deterioration of the plantar fascia<sup>(5)</sup>.

#### **Attributing Factors:**

Several factors tend to elevate the danger of plantar fasciitis<sup>(20)</sup>:

- 1. Age:** Age-related anatomical changes, such as a diminishing fat pad in the heel and a falling arch, may account for this correlation.
- 2. Physical exercise:** Low-impact aerobics like swimming and cycling are preferable than high-impact ones like running and excessive walking.
- 3. Anatomical factors:** Conditions including flat feet, high arches, tight achilles tendons, overpronation, decreased ankle dorsiflexion, and heel spurs can be caused by these issues..
- 4. Faulty footwear:** Low-arched or loose-fitting shoes.
- 5. Medical conditions:** Common causes of foot pain include diabetes, being overweight, being pregnant, and inflammatory foot diseases like arthritis.

Despite their common association with plantar fasciitis, bony spurs rarely cause any actual pain. Heel spurs can be painful, can be broken from stepping on something sharp, and can be an indicator of a more serious underlying medical condition. In addition to being more prevalent in the obese population, they have also been found to be quite common in the asymptomatic population (10-30%). Subcutaneous infiltration of corticosteroid may cause fat pad atrophy<sup>(21)</sup>.

#### **Diagnosis of plantar fasciitis:**

Plantar fasciitis was typically diagnosed by doctors after they looked at the patient's medical history, risk factors, and performed a physical exam, imaging, and laboratory testing<sup>(22)</sup>.

**A –History:** The classical presentation of plantar fasciitis was sharp pain<sup>(23)</sup> which usually unilateral (one third of patients were bilateral)<sup>(18)</sup>. Excessive weight-bearing or intervals of relaxation made heel discomfort worse<sup>(8)</sup>. People who suffer with plantar fasciitis generally say their pain is at its worst when they get up from a sitting or lying position, and that it eases the longer they walk<sup>(19)</sup>.

**B-Physical examination:** The typical plantar calcaneal region hurts like a knife when palpated (1). Dorsiflexion of the lower leg and first toe that is not used can irritate the proximal plantar fascia and reveal Achilles tendon tightness<sup>(2)</sup>.

**C-Imaging:** Plantar fasciitis was typically diagnosed without the aid of diagnostic imaging<sup>(18)</sup>, Whether plantar fasciitis pain responds well to conservative medicinal therapies or not, To rule out more serious conditions like fractures, tumours, or systemic sickness that could be causing the patient's foot pain, imaging tests like x-ray, diagnostic ultrasound (US), or magnetic resonance imaging (MRI) may be necessary for some patients<sup>(8)</sup>.

**D-Laboratory investigation:** Only in cases where a seronegative spondyloarthropathy or other systemic illness, such as rheumatoid arthritis <sup>(24)</sup>, was suspected was laboratory examination warranted: Complete blood count (C.B.C), Erythrocyte sedimentation rate (ESR), Rheumatoid factor (RF), Antinuclear antibodies (ANA), and uric acid.

#### **Complications:**

Continued usage can cause the plantar fascia to rupture, which is characterised by a clicking or cracking sound, substantial local oedema, and intense discomfort in the plantar fascia area <sup>(22)</sup>.

#### **Treatment for plantar fasciitis:**

The majority of specialists think that a shorter course of conservative therapy increases the likelihood of success for patients with PF when they are diagnosed and treated early <sup>(10)</sup>.

Plantar fasciitis treatment options ranged from non-invasive to surgical. Drugs like ibuprofen and naproxen, as well as stretches and foot orthotics, local steroid injections, extra corporeal shock wave therapy, laser therapy, and autologous blood injections, can all be used to treat the condition without resorting to surgery <sup>(25)</sup>. Conservative treatment was the mainstay of management and was successful in 80-90% of cases, it may take 6-12 months for symptoms to subside <sup>(20)</sup>.

#### **A-Conservative treatments<sup>(25)</sup>:**

##### **I. Rest and analgesic treatments:**

Despite the lack of evidence supporting their efficacy, non-steroidal anti-inflammatory medicines (NSAIDs) were frequently given to treat plantar fasciitis. When used in conjunction with other conservative treatments, they showed short-term improvements in pain alleviation and impairment.

##### **II. Stretching and strengthening exercises:**

Plantar fasciitis treatment has always focused on extending the Achilles and soleus muscles and the plantar fascia (PFSS) <sup>(25)</sup>.

##### **III. Physical Modalities:**

- 1- Ultrasound.
- 2-Iontophoresis.
- 3-Extra-corporeal shock wave therapy.
- 4-Low-level laser therapy (LLLT).

##### **IV. Local Injections:**

###### **I- Corticosteroid injections:**

Corticosteroid injections (CSI) were used for refractory cases of plantar fasciitis with high efficacy in pain relief <sup>(21)</sup>.

Different fields choose different corticosteroids for local injection <sup>(26)</sup>. Systematic analyses of data from randomised trials have revealed no differences in the therapeutic effectiveness of various corticosteroid types in terms of therapeutic outcomes <sup>(27)</sup>.

Since corticosteroids have a potent anti-inflammatory impact, they help hasten the pain-relieving process.

Injectable corticosteroids work by inhibiting fibroblast growth and the production of ground substance proteins, both of which were seen in the clinical signs of plantar fasciitis <sup>(27)</sup>.

Post-injection pain was the most common CSI adverse event, although other potential risks include plantar fascia rupture, skin infection, nerve or muscle injury, and plantar fat pad atrophy <sup>(8)</sup>.

###### **2- Botulinum Toxin-A (BTX-A):**

Is a new method of therapy for plantar fasciitis that has lately been employed. There are anti-nociceptive and anti-allodynia effects of botulinum toxin <sup>(27)</sup>.

###### **3-Platelet-rich plasma therapy:**

PRP was created by centrifuging a portion of whole blood to a concentrated condition, treating it with an activator, and injecting it directly into the injured region. The release of reparative growth factors is increased by PRP injections, which should speed up the healing process. PRP also reduces the thickness of the plantar fascia and raises pain thresholds and functional capacity <sup>(28)</sup>.

###### **B- Surgical treatment:**

Surgery was frequently chosen as a last option when conservative methods failed for at least six months. The most popular surgical treatment for recalcitrant fasciitis was a plantar fasciotomy <sup>(29)</sup>.

#### **CONCLUSION**

Plantar fasciitis can be treated either by conservative treatment such as rest, analgesics and stretching exercises that are successful in majority of cases. However, cases not responding to conservative treatments for more than 3 months, they can be treated with minimal invasive treatment such as corticosteroids, botulinum toxin or PRP injections. Surgical intervention is often considered after failure of conservative treatments for more than 6 months. The most popular surgical procedures for refractory fasciitis are gastrocnemius recession and plantar fasciotomy.

**Supporting and sponsoring financially:** Nil.

**Competing interests:** Nil.

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