International Journal of Advanced Scientific Research
ISSN: 2456-0421; Impact Factor: RJIF 5.32
Received: 08-01-2019; Accepted: 11-02-2019
www.allscientificjournal.com
Volume 4; Issue 2; March 2019; Page No. 11-14

Management of plantar fascitis: A differential non-surgical treatment review

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Abstract
Plantar fascitis is the most common cause of heel pain. An inflammation of a thick band of tissue that connects the heel bone to the toes. In this article it was discussed causes and different treatment protocols in management of plantar fascitis.
Aim and Objective: The aim and objective was to analyse various pathologies cause of plantar fascitis and to find out differential treatment beneficial in management of plantar fascitis.
Conclusion: Plantar fascitis is caused by tissue fatigue in the arch of the foot due to excessive strain, plus probably vulnerability due to biological factors. We found that combo therapy is more effective. Overall plantar fascitis carries a good prognosis when patients use a combination of several conservative treatment modalities.

Keywords: plantar fascitis, heel pain, conservative treatment

Introduction
Plantar fascitis is the most common cause of heel pain. It may have several different presentations [2, 3, 4, 5]. Although pain may occur along the entire course of plantar fascia. It is usually limited to the inferior medial aspect as the point of origin of the anatomic central band of plantar fascia and the abductor hallucis, flexor digitorum brevis and abductor digiti minimi muscle [2, 3, 4, 5, 6]. Plantar fascitis has been classified as an overuse syndrome resulting in micro tears of the plantar fascitis and its origin causing inflammation and form scar tissues with contraction [2, 3, 22, 5].

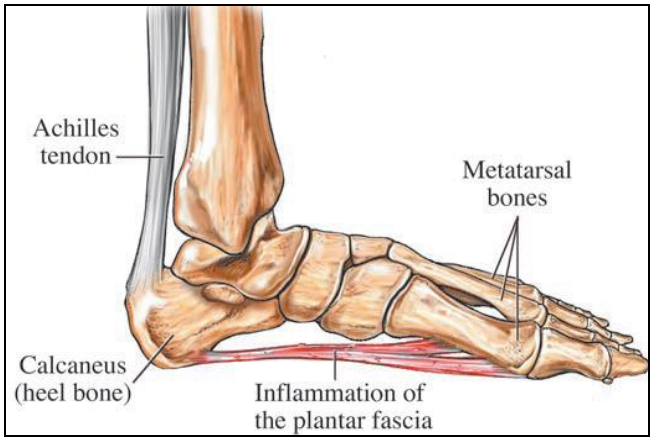

Fig 1: Lateral view of plantar fasciitis, an inflammation of the plantar fascia ligament, on the sole of the left foot.

Anatomy
The plantar fascia comprises three bands of dense connective tissue, which originate at the medial tubercle of the calcaneus and fan distally to insert into the base of each proximal pharynx first described by Hicks in 1954 as the windlass mechanism, the plantar fascia tenses during the terminal stance to toe off phases of gait [8, 9]. This tension elevates and reinforces the medial longitudinal arch, which is turn allows the foot to function as a rigid lever for forward propulsion **[10].** Plantar fasciitis is primarily a clinical diagnosis. Patients classify describe medial heel pain on weight bearing, which is often most intense during their first few steps in the morning but tends to improve with rest.[8, 11]. This pain may progress over the course of the day, especially after prolonged standing. Acute exacerbations may occur at any time when rising from a seated position [8, 11].

Although musculoskeletal examination of both lower extremities should be performed. Classic physical examination findings suggestive of plantar fascitis include reproducible pain with palpation of the plantar medial aspect of the heel and pain with passive dorsiflexion of the ankle and toes (windlass test) [11]. A contributing planus or cavus foot deformity may be noted [8, 11]. Ankle range of motion should also be assessed. Active dorsiflexion less than 10^0 beyond netural is indicative of an equinus contracture.

Case Report
A 46 year old woman came in OPD with two year history of heel pain in both foot which has gone worst in last three months. On taking history it was found that she was not under treatment before, the pain was intermittent for past one year but now the pain was consistent in past three months. According to her the pain was sharp and she also feel burning sensation. The pain was intense from a seated position or during the first few steps in the morning. She was self-treated by diclofenac and leukwarm water fomentation, she got minimal relief.

Clinical Examination
On clinical examination it was found there is tenderness on palpation with medial band of planter fascia and at its origin on the medial calcaneal tuber cule as well as it was also found Meta tarsalgia on the greator toe of right foot. Classical physical examination findings suggestive of plantar fascitis include reproducible pain with palpation of the plantar medial aspect of the ankle and toes (wind land test) **[11]**. A contributing planus or cavus foot deformity may

be noted [8, 11] Ankle range of motion should also be assessed. Active range of motion should be assessed. Active dorsiflexion less than 10^0 beyongd neutral is indicative of an equinus contracture [12].

Imaging
On bilateral radiography it was found calcaneal spur at the origin of the plantar fascia on right foot.

Diagnosis
The patient was diagnosed with plantar fascitis in right foot with bilateral flat feet and calcaneal spur on right foot including Meta tarsalgia on right greator toe.

Differential Conservative Non – Surgical Treatment –
Patient was given non – surgical treatment. The study was conducted for two months. In this case we design the treatment protocol in an experimental way. We divided the treatment into 15 -15 days for one month and alternated the treatment for next month. In first 15 days we kept the patient on RICE, NSAIDS, and Stretching exercise. On other side in last fifteen days we kept the patient on Ultrasound, Low Dye Tapping and stretching exercise. In stretching exercise we include.

1. **Wall push:** With the heel on the ground and a ball of foot on the base of wall, the patient lean into the wall to stretch the plantar fascia for at least 2 minutes at 10 second intervals on the affected side at least 2 times daily. (The condition will improve much more rapidly if the patient can do 3 sets of wall pushes every hour on the hour).
2. **Towel pick up:** With the toes of the affected foot, the patient pick up a dry paper towel, drop it and repeat: for 2 minutes twice daily in the morning and evening.
3. **Ice Roll:** The patient rolls the foot over the top of a frozen water bottle for 2 minutes twice daily in morning and evening.

After 1 month we altered the treatment by giving Low dye taping, Ultrasound and night splint on the first 15 days of next month and in last 15 days of the same month we give RICE, NSAIDS, Stretching exercise.
Approximately, 85% -90% of the patients with planter fasciitis can be successfully treated without surgery.[13] Methods include rest, over the counter (OTC) non-steroidal anti -inflammatory drugs (NSAIDS), stretching, counterstrain technique, orthosis, corticosteroid injections, extracorporeal shockwave therapy (ESWT) and ultra sound therapy. Although treatment may be required for 6 months or longer 80% of patients treated conservatively have no long term recurrence of pain [4, 13].
Initial treatment should include sufficient foot rest with conservative analgesic use. Over the counter NSAIDS have been shown to be adequate means of control when used in combination with other forms of treatment [16, 26]. The intermittent application of ice seems to provide some benefit to the patients with plantar fascitis when compared with heat application. [26]The plantar fascia should maintain for approximately 90 seconds while monitoring the tendon point, which is the most common located at the plant arfascial insertion on the medial calcaneus [17]. The foot should then be returned to a neutral position and reassessed. [17]A wide variety of orthosis options are available for the management of plantar fascitis. The use of shoe insert (eg- Silicon heel pads, felt pads and rubber heel cups) in combination with stretching exercise has been shown to provide superior short – term improvement in heel pain compared with stretching alone [18].

Ultrasound
Ultrasound is a high frequency sound wave with an affinity for tendons and tendon ligament [26].Ultrasound heat tissue and the tissue absorb the energy, resulting in an increase in temperature and metabolism, tissue softening and an increase in circulation [19].Ultrasound has also been reported to increase chemical activity in tissue temperature and metabolism, tissue softening, and an increase cell membrane permeability, deform molecular structures, and alter diffusion and protein synthesis rates, all potentially affecting the speed of the tissue repair [19].

Orthosis
The aim of the orthotics is to reduce strain on the plantar fascia by cushioning and elevating the heel and /or providing medial arch support [19] (thesis). Orthosis may also be useful for overweight plantar fascitis patients, as they help to reduce shock and cause more even weight distribution over the plantar fascitis and its insertion on the calcaneus [19].

Night split
Night splint usually designed to keep a person's ankle in a neutral position overnight. Most individual naturally sleep with the feet plantar flexed, apposition that cause the plantar fascia to be in a fore shortened position [20]. A night dorsiflexion splint allows passive stretching of calf and the plantar fascia during sleep [20].

Taping
Taping of foot provides medial arch support for fascitis and potentially strain from the plantar fascia [19].

Low Dye Taping
Low dye taping is common conservative treatment for plantar fascitis, particularly in the short term, while patients wait for orthosis to be manufactured [2]. (Thesis). Dr. Ralph Dye is a podiatrist who has developed classical taping methods in corpo rating functional mechanical support of the foot and ankle. This technique in taping is used predominantly for injuries or pain attributed to excess pronation in stance or during gait.

Result
After giving differential treatment to the patient within the duration of two months i.e., first 15 days different treatment and last 15 days different treatment and then interchange the treatment on the same patient by giving first 15 days that the treatment which given in last 15 days that treatment which was given in first 15 days.
It was found that Low dye taping, Ultrasound and Night splint is more effective on patient. The patient was much relieved by it. The patient was at last also advised that she should limit activity by level of tolerance and modify foot ware (example – avoid flip-flop and sandals, use OTC shoe inserts) and also make her understand self-home care program.

Conclusion

The name plantar fascitis suggests a specific problem with a specific problem with a specific tissue inflammation of plantar fascia but that is so uncertain and potentially misleading that the condition should probably just be called plantar heel pain [21]. In the following case it was found the on give differential treatment to the same patient the combination of Low dye taping, Ultrasound and might spint was found more effective.

Discussion

Plantar fascitis is caused by tissue in the arch of the foot due to excessive strain, plus probably vulnerability due to biological factors. Plantar fascitis is typically characterized by pain in the inferior heel region, which is aggravated by weight after long period of non -weight bearing and prolonged weight bearing [2, 5, 22, 4, 23, 24]. In plantar fascia, the degeneration is similar to the chronic necrosis of tendosis.[25]. In plantar fascitis," the plantar fascia is hurting because it's dying-eroding like a rotten plank. And its is' nt just to make you squeamish. Inflammation and "necrosis" are not the same medical situation, and understanding the difference in crucial for effective treatment.

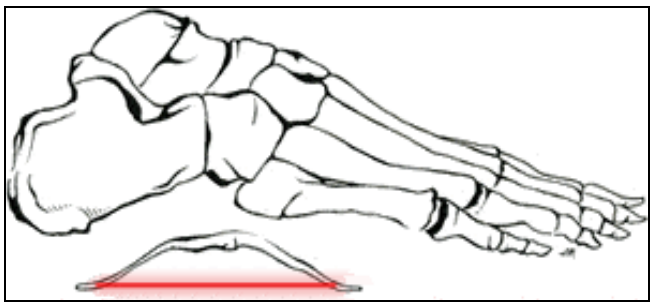

Fig 2: Foot arch-ery

The arch of the foot functions like a bow & the plantar fascia is like the string of the bow. The tension in the "bow string" stretches & when stretched too hard & too often, it gets irrated & then it's like a bow shooting in the foot!

Bone spur on the heel (aka heel spurs are calcaneal spur) seems like they must be a smoking gun -simple and obvious cause of plantar fascitis. They are common about 10-20% of the population. High heels are often vilified, but this carefully done 2010 study showed that the body adapts effectively and minimally, producing quite similar functional result.

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