

Medical Rehabilitation In Patient With Right Plantar Fasciitis

A 48-year-old male presented to our clinic with a primary complaint of intense right heel pain. The pain was localized to the anatomical area corresponding to the medial calcaneal tubercle. The patient described that the pain is most intense while engaging in walking (especially in the first arise in the morning and get to his feet). Some of the aggravating factors described include pain upon compression activity of the heels, i.e., standing up after rest, prolonged walking. Relieving factors include unloading the affected foot (via sitting or elevation). There was no history of direct trauma. He rated the pain as 7/10 on a visual analogue scale.

Upon physical examination the right foot revealed a normal longitudinal arch in the weight bearing position. Static palpation reveals a focal tenderness in the region of the anteromedial calcaneal tubercle. Ankle range of movement and muscle power was within normal limits. Windlass test, both weight and non-weight bearing, was positive in reproducing pain. This test has an excellent specificity of 99%, but a poor sensitivity of 32% for plantar fasciitis.¹¹ Tinel's test over medial calcaneal and lateral plantar nerves was negative. Radiographic evaluation revealed a small boney growth representative of a calcaneal spur at the insertion site of the plantar fascia of the right foot.

In order to understand the underlying factors that can contribute to plantar fasciitis one must first take into account the anatomical structure of the area. The central part of the plantar fascia is greatly thickened to form the plantar aponeurosis. It consists of a strong, thick central part and weaker and thinner medial and lateral portions. The plantar aponeurosis consists of longitudinally arranged bands of dense fibrous connective tissue. These bands split to enclose the digital tendons and are attached to the margins of the fibrous digital sheaths and to the sesamoid bones in the great toe.¹

The plantar aponeurosis ultimately attaches to the bases of the proximal phalanges. The primary function of plantar aponeurosis is to support the longitudinal arch of the foot to help prevent over- pronation, and to hold the flexor tendons under the metatarsal heads during weight bearing. It takes up 60% of the stresses of weight bearing. A continually

increased tension or pull of the plantar fascia on the calcaneus causes the periosteum to become inflamed (periostitis) and tear away from the enthesis. It is the inflammation that causes the pain. Over-pronation at the subtalar joint unlocks the midtarsal joint causing the arch to sag and the foot to elongate. This stretches the plantar fascia at the center of the arch or at the origin on the heel eventually leading to inflammation and pain. In older people, the plantar fascia tends to lose much of the elasticity placing excessive strain on its calcaneal enthesis. A high arched, semiflexible or rigid foot also increases tension placed on the plantar fascia. ¹

Heel spurs form as a reaction to the increased stress at the calcaneal enthesis. These heel spurs themselves are not the cause of the pain. Severe pain on weight bearing after rest is due to inflammatory edema which accumulates during rest in a site where there is very little space due to the tight compartmentalization of the tissues by strong connective tissue septa. That is, the increased fluid increases the pressure on the nerve endings within the tissue on weight bearing. The pain on weight bearing decreases rapidly within half an hour of weight bearing activity due to the improvement in drainage of both the venous and lymph systems servicing the area. ¹

It is generally considered that history and examination alone is sufficient to diagnose plantar fasciitis.^{7,13} From this assessment other differential diagnoses were unlikely, such as achilles pathology, nerve compression, fat pad pathology and enthesopathies. Plain radiograph of the right foot and ankle was revealed a calcaneal spur which is frequently associated with plantar fasciitis. His symptoms were limiting his occupation and quality of life.

Treatment and rehabilitation began immediately. Patient was advised rest, icing and prescribed an anti-inflammatory medication if the pain come or worsening. He was taught a series of stretching exercises, targeting both the plantar fascia and Achilles tendon/triceps surae complex. A programme of strengthening to improve the load bearing capacity of the foot was shown. This consisted of strengthening Tibialis Posterior, the plantar-flexors of the ankle, the intrinsic muscles of the foot and the proximal hip musculature, including the hip abductors. He was given ultrasound on heel of right foot. Heel cushion was made for him by orthotist.

Plantar fasciitis is typically self-limiting with spontaneous resolution in more than 90% of cases by 1 year. Traditional treatment regimens are predominantly non operative.

They involve patient education, ensuring correct footwear and anti-inflammatory drugs (both systemic and topical) with adequate analgesia. Rest and modification of daily activities in relation to weight bearing also need to be addressed along with other physical therapies.⁴

The initial therapy employed is icing, by either rubbing/ massaging an ice cube or ice pack directly onto the heel and sole of the foot or by soaking the heel and plantar aspect of the foot in an ice bath, taking care to avoid cold injury. The second aspect of physical therapy is stretching exercises of the plantar fascia, calf muscles and Achilles tendon. Stretching of the plantar fascia is achieved by deep massage of the fascia with the toes dorsiflexed. Rolling a can (ideally frozen to provide the additional benefit of icing) or golf ball with the foot also allows stretching of the fascia. Toe curls can also be performed to strengthen foot musculature. Calf and Achilles stretching is achieved by performing asymmetrical stretching exercises.⁴

Initial treatment options may include padding and strapping of the foot, therapeutic orthotic insoles, oral anti-inflammatories, and a corticosteroid injection localized to the area of maximum tenderness. Patient-directed treatments appear to be as important as these approaches in resolving symptoms. Such treatments include avoidance of flat shoes and barefoot walking, over-the-counter arch supports and heel cups, and limitation of extended (high-impact) physical activities. Patients usually have a clinical response within 6 weeks of initiation of treatment. If improvement is noted, the initial therapy program is continued until symptoms are resolved. If little or no improvement is noted, the patient should be referred to a foot and ankle surgeon if not already under this specialist's care.¹⁴

The goal established early in the treatment phase is to reduce the surrounding inflammation. Once the inflammatory process has been arrested, resorption of fluid will occur around the site and therefore the patient will begin to experience various degrees of pain relief. In order to reduce the inflammation, the practitioner must apply ice and ultrasound therapy very intensely for a 1–2 week period. Stabilizing the area is important and therefore taping of the foot may be beneficial in order to prevent further stress on the enthesis. Heel support in the form of a heel cushion and/or orthotic arch support may be used. In the second stage of rehabilitation Achilles tendons stretches and ice massage is recommended. In most cases the support for orthotics and arch support are maintained so as to redistribute the pressure of the weight bearing activity.¹

The second tier of the treatment ladder includes continuation of the initial (tier 1) treatment options with considerations for additional therapies: orthotic devices, night splints

to maintain an extended length of the plantar fascia and gastroc-soleus complex during sleep, repeat corticosteroid injection or injection of botulinum toxin, a course of physical therapy, and cast immobilization for 4 to 6 weeks or use of a short-leg walking boot to immobilize or off load the foot during activity. Inpatients with a high BMI, a consultation and referral for an appropriate weight-loss program may be considered. Clinical response to this second tier of treatment will usually occur within 2 to 3 months in 85% to 90% of patients. For those who have shown improvement, continuation of tier 1 and tier 2 therapies should be continued until resolution of symptoms.¹⁴

The literature describes approximately twenty individual interventions, ranging from rest to the use of autologous blood injections.¹⁵ The evidence for the majority of these interventions is limited with few controlled trials supporting their efficacy. All aspects of this patient treatment are included in published guidelines¹⁶ for the treatment of the general public, as well as reviews looking at the management of elite athletes. This is some of the review of the aspects of the management referring to the literature, to show what evidence there is for this.

Rest is often advocated. Wolgin found that 25% of sufferers found rest gave them their greatest relief of symptoms. This study was based on subjective opinion, however there are no controlled trials analysing the affect of rest, absolute or relative, in isolation.¹⁷ Non Steroidal Anti-inflammatory Drugs (NSAIDS) are effective in reducing inflammation.

29% state that stretching the plantar fascia improves symptoms.¹⁷ Stretching is commonly recommended, but the majority of studies have combined stretching programmes with other interventions, like taping, night splints and orthotics. DiGiovanni¹⁸ compared stretching of the plantar fascia against stretching the Achilles tendon. After eight weeks, both programmes improved pain, but the plantar stretch was significantly beneficial as compared to Achilles stretch. This study has formed the basis of recommendations, where both the plantar fascia and Achilles are stretched. However this study was limited by a high “drop out” rate of 28% in the Achilles stretching group and lack of blinding.

Kibler's¹⁹ analysis of Plantar fasciitis' patients concluded that plantar flexor strength deficits were noted in the majority of subjects. Kibler's work is cited as indirect evidence of the potential effectiveness of planter flexor strengthening. The use of intrinsic muscle strengthening of the foot is also commonly used. Logically they may improve the function of the medial longitudinal arch. The evidence for strengthening is indirect at best.

It is recommended that ultrasound be applied in a pulsed mode at low intensity (0.5 to 1.0 W/cm²) during the acute phase of tendon inflammation to minimize the risk of aggravating the condition and to accelerate recovery, and that continuous ultrasound at high enough intensity to increase tissue temperature be applied in combination with stretching to assist in the resolution of chronic tendinitis, if the problem is accompanied by soft tissue shortening due to scarring.²⁰

Injection of corticosteroid, with or without local anaesthetic, is a convenient intervention for clinicians. Crawford compared a local anaesthetic injection against corticosteroid and local anaesthetic. After a month the corticosteroid group had significantly improved pain, but after three months and a year, no difference was noted between the groups. Two recent control trials have reinforced that corticosteroids have short term benefits and appear to be superior to autologous blood injections. Indeed the use of iontophoresis, an electrical current to administer the steroid which is in solution, can improve symptoms six-fold in 2 weeks. There is evidence to support the use of steroid injections short term which may be useful to athletes, however concerns exist that steroids are associated with plantar fascia rupture. There is no evidence that they facilitate long term recovery.¹⁹

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