

Plantar Fasciitis

OVERVIEW

Plantar fasciitis is a commonly encountered clinical entity generating nearly two million outpatient visits per year. It affects both active and sedentary patient populations with the most common presenting age demographic being 40-60 year olds. The diagnosis of plantar fasciitis is one of patient history and clinical examination. In the setting of an atypical presentation, a more thorough diagnostic evaluation may be warranted. The morbidity associated with plantar fasciitis can be significant. Knowledge of the diagnosis and treatment is critical in appropriately managing plantar fasciitis and optimal outcomes can be achieved with non-invasive procedures in up to 90-95% of patients.

ANATOMY

The plantar fascia is a dense fibrous aponeurosis originating from the plantar-medial aspect of the calcaneal tuberosity. Three distinct bands have been described - medial, central and lateral - with the central band being the strongest, thickest, and also most commonly involved in plantar fasciitis. Distally, the plantar fascia divides into five slips onto the proximal phalanges terminating as the flexor sheaths of the toes. Small sensory nerves are invested throughout the plantar fascia and have been implicated as potential pain generators in plantar fasciitis.

BIOMECHANICS

The cellular makeup of the plantar fascia contributes to its inelasticity. This rigidity allows for the plantar fascia to function as a windlass mechanism in the foot. When relaxed, the foot becomes pliable with increased mobility. As the plantar fascia is tensioned, it forms a tension bridge responsible for increased stability and both static and dynamic shock absorption.

PATHOGENESIS

The most common etiology of plantar fasciitis is a biomechanical dysfunction with excessive stress leading to repeated microtrauma. In rare instances other potential causes include infection, neoplastic conditions, neurologic disorders, and acute traumatic injuries.

With biomechanical dysfunction, there is a cycle of healing and degeneration seen most frequently at the calcaneal-fascial interface. Loading at this interface during weight-bearing activity has been implicated as the predominant pain generator.

The term fasciitis is thought to be a misnomer. The pathology seen tends to be a degenerative condition that may or may not have an inflammatory component. As such, microscopic evaluation tends to mimic that in other areas of the body (i.e. lateral epicondylitis) with a fibroblastic proliferation and disorganized collagen matrix.

RISK FACTORS

Risk factors for the development of plantar fasciitis can be divided into extrinsic and intrinsic factors. Extrinsic factors are typically related to training patterns in athletes (e.g. a recent increase in activity, intensity, or duration), poorly cushioned running surfaces, or patients who spend a prolonged time on their feet. Intrinsic factors include high BMI, diminished dorsiflexion, and structural abnormalities including pes planus, pes cavus, limb length discrepancy and over-pronation of the foot. It is imperative for the clinician to rule out systemic disorders as a potential cause for heel pain (e.g. Reiter's, Lupus, ankylosing spondylitis).

CLINICAL PRESENTATION

The classic presentation of a patient suffering from plantar fasciitis is one of startup pain in the plantar medial heel. It is described as being "the first steps in morning" and is typically sharp in nature without radiation. The pain gradually resolves after the first few steps and slowly increases as day progresses. The onset of symptoms is usually described as gradual. In athletes, the pain may initially only occur with intense activities but slowly starts to occur with any weight-bearing activity.

EXAM

On examination, patients will have tenderness to palpation over the plantar fascia insertion on the medial calcaneal tuberosity. The pain may extend over the course of the plantar fascia. Stretching of the plantar fascia may exacerbate the patient's pain. In the course of the physical examination, it is imperative to check for isolated gastrocnemius tightness versus triceps surae tightness. Using the Silfverskiöld test, ankle dorsiflexion is tested with the knee in both extension and flexion. If dorsiflexion is restricted irrespective of knee position, the triceps surae is tight. Restricted dorsiflexion solely with the knee in extension is indicative of isolated gastrocnemius tightness.

IMAGING STUDIES

Plantar fasciitis is usually a diagnosis of patient history and physical exam and typically does not require imaging studies. However, in patients with prolonged symptoms or with an atypical presentation, it may be warranted to obtain a weight-bearing lateral roentgenogram. This is still a source of debate as the classic heel spur that is seen may not be related to the plantar fascia. Cadaveric studies have demonstrated the spur occurs at the origin of the flexor digitorum brevis rather than the plantar fascia. Nevertheless, for patients with prolonged symptomatology or those who fail to respond to conservative measures, this is the first-line imaging study to obtain. In the setting of plantar fasciitis that fails to respond to numerous treatment modalities, magnetic resonance imaging (MRI) is used to rule out other pathologic conditions as a source of pain. In the setting of plantar fasciitis, an MRI will demonstrate thickening of the plantar fascia with or without edema in the calcaneal tuberosity.

TREATMENT

The treatment of plantar fasciitis should be conducted in a step-wise algorithmic manner. In up to 90% of cases, patients will respond to non-operative interventions. Non-operative management begins with rest, structured physical therapy, plantar fascia specific stretching, heel cushions, ice, anti-inflammatory pain medicines, limiting barefoot activity, and encouraging appropriate footwear. If these fail to alleviate the symptoms, night splints can be utilized which work by stretching the plantar fascia and tight triceps surae, and orthotics can be used (prefabricated shoes have been shown to be superior to costly custom orthoses).

The next step in treatment involves injections and extra corporeal shock wave treatment (ESWT). While corticosteroid injections have been shown to improve pain and symptomatology, the unacceptable risk of plantar fascia rupture has led to most foot and ankle specialists abandoning this treatment modality. Enthusiasm exists for the use of platelet-rich plasma (PRP) in the treatment of plantar fasciitis. While a number of studies have demonstrated its safety in treating plantar fasciitis, the evidence is limited in its efficacy and further studies are needed to prove its success. Extracorporeal shock wave therapy (ESWT) is also a modality employed in the treatment of plantar fasciitis. Its efficacy in relieving short-term pain and improving patient satisfaction scores is evident with continued improvement seen for up to 12 months. For patients who have plantar fasciitis recalcitrant to other non-operative modalities, ESWT is an effective treatment.

In cases where patients fail to respond to non-operative interventions, surgery remains the last option on the stepwise treatment algorithm. Surgery involves an isolated release of plantar fascia or plantar fascia release combined with other procedures (gastrocnemius recession, nerve decompression). Caution must be taken when releasing the plantar fascia as its role in foot and ankle biomechanics is well documented. A number of reports have attributed over-aggressive plantar fascia release with forefoot fractures, and medial and lateral column pain. Additionally, surgical release of the plantar fascia is associated with a prolonged recovery time. Newer techniques including endoscopic plantar fascia release are being explored as an option to reduce the potential morbidity associated with open plantar fascia release.

CONCLUSION

Plantar fasciitis is a common clinical entity that can result in significant patient morbidity. Knowledge of the underlying pathophysiology can aid in its accurate diagnosis and successful treatment. Patient education about the condition and treatment strategies is imperative in achieving successful outcomes. The majority of patients achieve a satisfactory treatment without invasive interventions. More investigation is necessary to elucidate the outcomes after different surgical techniques for plantar fascia release. In patients with recalcitrant plantar fasciitis surgery can result in a high rate of resolution of symptoms albeit with a higher risk profile than non-operative treatment modalities.

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