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Update Article

Talalgia: plantar fasciitis[☆]

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ABSTRACT

Plantar fasciitis is a very common painful syndrome, but its exact etiology still remains obscure. The diagnosis is essentially clinical, based on history-taking and physical examination. Complementary laboratory tests and imaging examinations may be useful for differential diagnoses. The treatment is essentially conservative, with a high success rate (around 90%). The essence of the conservative treatment is the home-based program of exercises to stretch the plantar fascia. Indications for surgical treatment are only made when the symptoms persist without significant improvement, after at least six months of conservative treatment supervised directly by the doctor.

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Talalgias: fascite plantar

RESUMO

A fascite plantar é uma síndrome dolorosa muito frequente, mas sua exata etiologia ainda permanece obscura. O diagnóstico é essencialmente clínico e tem como base a história e o exame físico. Exames complementares laboratoriais e de imagem podem ser úteis no diagnóstico diferencial. O tratamento é essencialmente conservador, com elevada taxa de sucesso (ao redor de 90%). A essência do tratamento conservador é o programa domiciliar com exercícios para alongamento da fásia plantar. A indicação do tratamento cirúrgico somente é feita quando os sintomas persistem sem melhoria significativa, após pelo menos seis meses de tratamento conservador supervisionado diretamente pelo médico.

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Introduction

Subcalcaneal pain syndrome, better known as plantar fasciitis or heel spurs, was first described in 1812.¹ It is a very common orthopedic problem and mainly affects men between the

ages of 40 and 70 years. Plantar fasciitis also affects athletes, especially runners.

The exact cause of this syndrome is unknown. However, several factors may be involved: inflammation of the plantar fascia due to traumatic events that involve traction or shearing forces,² avulsion of the plantar fascia, stress fractures of

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the calcaneus, compressive neuropathy of the plantar nerves,³ plantar spurs of the calcaneus and senile atrophy of the plantar fatty pads.

Etiology

Plantar fasciitis is the commonest cause of pain in the plantar region of the heel. It has been estimated that one in every ten people experiences pain in the subcalcaneal region over the course of their lives.⁴ The peculiar anatomy of the plantar fascia gives it little elasticity.⁵ During the weight-bearing phase of gait, the sole of the foot is compressed and a traction force is generated along the fascia. During walking movements, the fascia is subjected to repeated traction forces with each step. When these forces are applied successively, with increased frequency and intensity, progressive degeneration may occur at the origin of the plantar fascia, at the medial portion of the calcaneal tuberosity. The repetitive microtraumas at the origin of the plantar fascia correlate with the development of periostitis due to traction and microtears of the fascia itself, which result in inflammation and chronic pain. The inflammatory process may occur specifically at the origin of the plantar fascia and in the medial tubercle of the calcaneus, or it may involve other structures such as the medial nerve of the calcaneus and the nerve of the abductor muscle of the fifth toe.⁶ Incarceration of the posterior tibial nerve may also occur.

Heel spurs, which are located at the origin of the short flexor muscles of the feet, were first correlated as a cause of subcalcaneal pain in 1915. However, this association was never firmly established. Heel spurs are present in approximately 50% of the patients with subcalcaneal pain syndrome.^{7,8} Only 5.2% of the patients with heel spurs report having symptoms relating to pain in the calcaneus.⁹ Although heel spurs are present in some patients with chronic pain in the calcaneus, they are not considered to be the causative agent of the painful syndrome. Heel spurs are probably consequences of chronic inflammation due to repeated traumatic traction at the origin of the plantar fascia and short flexor muscle of the toes.

Some authors believe that the cause of heel pain is associated with the fatty pad of the calcaneus, which is an important structure responsible for shock absorption when the heel bears weight on the ground. With aging, degenerative alterations associated with gradual reduction of collagen and fluid cause reduction of the elasticity of the fatty pad. After approximately 40 years, the plantar fatty pad starts to deteriorate, with loss of collagen, elastic tissue and water, which gives rise to diminished pad thickness and height. These changes result in softening and thinning of the plantar fatty pad, thereby reducing its capacity to absorb impacts and its ability to protect the plantar tuberosity of the calcaneus.¹⁰

Several studies have correlated body weight as the cause of subcalcaneal pain, and high incidence of such pain has been observed among obese or overweight patients.^{11,12}

In patients with subcalcaneal pain, the possibility of other causal factors needs to be investigated, such as rheumatoid arthritis, osteoarthritis, ankylosing spondylitis, Reiter's syndrome and stress fractures of the calcaneus. Among diabetic patients, the possibility of deep soft-tissue abscesses should be investigated. In younger children, the commonest cause of

subcalcaneal pain is calcaneal apophysitis (Sever's disease). Other causes, such as neuropraxia of the medial calcaneal branch or of the abductor nerve of the fifth toe, should be investigated in cases that are resistant to treatment.⁶

Clinical condition

These patients usually complain of pain that starts insidiously on the internal face of the calcaneus. On rare occasions, intense pain that starts abruptly may occur, caused by traumatic avulsion of the plantar fascia at its insertion into the calcaneal tuberosity. Local infiltration of corticosteroids may precipitate this type of tear.^{13,14} Independent of the way in which the symptoms start, the clinical course is generally similar. The pain is worst early in the morning, when first placing weight on the feet, on the ground, and it becomes less intense after taking the first steps. At the end of the day, it becomes more intense and is alleviated by resting the feet. When the pain becomes more intense, the patient is incapable of bearing the body weight on the heels. Mild edema and erythema may be present. The symptoms may persist for a few weeks or even some years. In cases in which there is incarceration of the first branch of the lateral plantar nerve (the nerve going to the abductor muscle of the fifth toe), the pain also irradiates proximally and distally along the foot and follows the path of the nerve.

Physical examination of the foot reveals a painful sensation along the medial tuberosity of the calcaneus. The pain may originate from the central portion of the plantar fascia or may be deeper and represent inflammation of the abductor nerve of the fifth toe. The plantar fascia should be palpated in order to determine the area where the pain is located and the possible presence of nodulations. Sometimes, the fascia becomes more intensely painful when subjected to tension and should be palpated with the toes and ankle in dorsiflexion. The tarsal tunnel should also be palpated in order to investigate Tinel's sign or an inflammatory process that involves the tibial nerve, lateral or medial plantar nerves and calcaneal nerves. The ankle and subtalar joints should be examined actively and passively with regard to mobility. The active strength of the muscles that cross the area where the patient reports pain should be investigated to find out whether the symptoms are reproduced with muscle contraction. Neurological examination of the remaining portions of the limb, along with the lumbar spine, should also form part of the examiner's routine.

Complementary examinations

Radiographs of the foot and ankle while bearing the body's weight should be produced in anteroposterior (AP), lateral and axial views of the calcaneus in order to investigate information relating to the bone structure and the biomechanical state of the foot and ankle, and also to detect any presence of spurs or calcification along the medial tuberosity of the calcaneus. Heel spurs can be seen on lateral radiographs of the foot in approximately 50% of patients with subcalcaneal pain, but the exact significance of this is uncertain.^{7,8}

Bone scintigraphy may help in making the differential diagnosis of stress fractures of the calcaneus in patients who present persistence of painful symptoms after routine treatment. The area of high uptake of the radioactive isotope is usually located in the anteroinferior and medial regions of the calcaneus. This examination may be useful for early detection of stress fractures of the calcaneus.

Magnetic resonance imaging (MRI) is only rarely indicated for diagnostic evaluation of plantar fasciitis. It is possible that it might reveal thickening of the plantar fascia or assist in early diagnosis of stress fractures of the calcaneus. However, it is more useful for ruling out other causes that have been correlated with calcaneal pain (plantar fibromatosis, tumors or infection) than for specifically diagnosing plantar fasciitis.¹⁵

Electroneuromyographic tests may help in making the differential diagnosis of plantar fasciitis with peripheral neuropathy or with compressive syndrome of the tarsal tunnel. Symptoms that lead to suspicion of incarceration of the lateral plantar nerve by the abductor muscle of the fifth toe, known as Baxter's syndrome,⁶ cannot be adequately assessed using electroneuromyographic tests. Diagnostic suspicion is based on the clinical history of patients with complaints of pain persisting for several weeks or months that irradiates toward the plantar and lateral regions of the calcaneus.

Laboratory tests are useful for evaluating patients with suspected seronegative spondyloarthritis and are especially indicated in cases in which the symptoms are persistent and bilateral. Investigations using tests for rheumatic activity and assays for human leukocyte antigen (HLA) B27 may be conclusive regarding associations between plantar fasciitis and collagenosis.¹⁶ Other complementary examinations that are useful for differential diagnoses of metabolic diseases include complete hemogram, erythrocyte sedimentation rate (ESR), uric acid assays, rheumatoid factor and antinuclear antibodies.

Pain that patients report as coming from the heel may also be correlated with problems of the lumbar spine. In cases in which this etiology is suspected, appropriate laboratory tests and radiographic studies should be performed.

Treatment

In the great majority of patients, conservative treatment without surgery is sufficient for enabling symptom relief.¹⁷⁻¹⁹ In the literature, some case series have reached success rates from conservative treatment of plantar fasciitis ranging from 73% to 89%.¹⁷⁻¹⁹ Conservative treatment should be directed toward reducing the inflammatory process. Initially, a short period of rest can be recommended, accompanied by non-steroidal anti-inflammatory drugs (NSAIDs) for approximately four to six weeks.

Recent studies have emphasized that the first line of conservative treatment should include a home-based program of exercises to stretch the plantar fascia. The traditional protocol involves exercises for stretching and eccentrically contracting the Achilles tendon, which are done simultaneously with exercises to stretch the plantar fascia^{20,21} (Fig. 1).

Off-the-shelf or made-to-measure insoles, with designs capable of accommodating and providing support for the

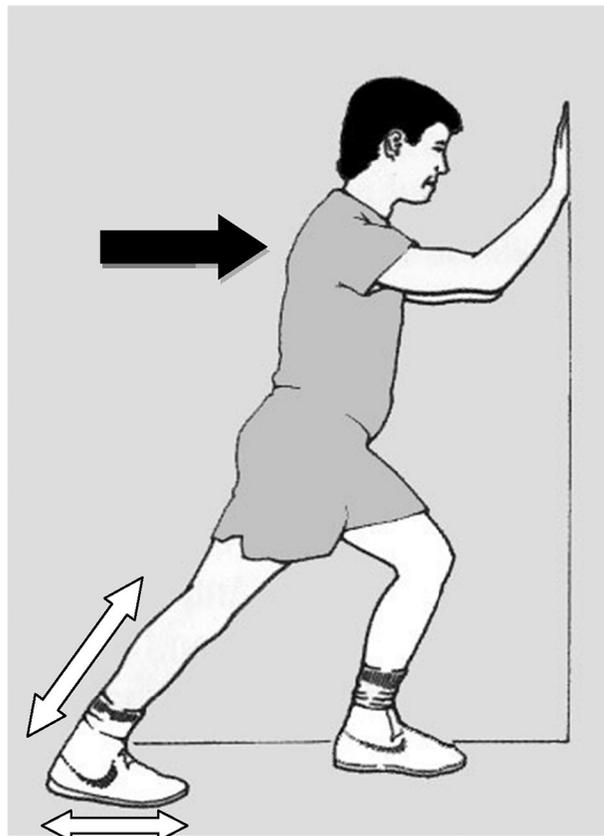


Fig. 1 – Drawing showing the patient's position while carrying out the home-based exercise program that is recommended for treating plantar fasciitis. Note that in this position, the patient applies a continual force (dark arrow) and simultaneously promotes stretching of the Achilles tendon and eccentric contraction of the gastrocnemius-soleus complex, along with stretching of the plantar fascia (white arrows). Ten repetitions are recommended, with alternation of the positions of the feet (one in front and the other behind), each with a duration of 10 s. The patient is instructed to do at least three series of exercises over the course of the day (morning, afternoon and evening), for three to six weeks consecutively.

medial longitudinal arch, as well as to pad the heel region in order to reduce the weight-bearing pressure, may be useful as a complementary form of treatment, provided that this is done in association with the home-based exercise program for stretching the plantar fascia. These insoles should be made of soft material (particularly silicone, microfoam, felt, Plastazote® or similar).²² It is recommended that the insoles should be used every day for several months. They can be fitted inside the patient's own footwear.

Reduction of the level of physical activity is important throughout the period of conservative treatment. People who work standing up for more than 8 h a day tend to present worse results with this type of treatment.²³ Formal physiotherapy of analgesic type can also be prescribed, in sessions with local application of ultrasound and iontophoresis. If the patient does not respond to this type of treatment, the

possibility of immobilization of the extremity in a plaster-cast boot or a boot that is removable for walking ("walker boot") can be offered for around six to eight weeks.^{12,23}

A small number of patients who do not achieve satisfactory relief of their painful symptoms through the abovementioned conservative treatment may benefit from using a nighttime brace. The principle of this type of treatment is to keep the plantar fascia stretched throughout the nighttime resting period, given that the ankle is positioned in dorsiflexion while the patient sleeps.²⁴⁻²⁹ Infiltration of steroids may occasionally produce temporary pain relief in most patients. However, its indiscriminate use may give rise to complications,^{30,31} especially plantar fascia tears, and a serious risk of permanent injury to the plantar fatty pad through its replacement with fibrous material and atrophy, thereby further worsening the symptoms. Thus, the benefit provided by infiltration of corticosteroids in patients with plantar fasciitis remains a matter of controversy.

Shockwave therapy appeared recently as a new technology applied as a means of conservative treatment for plantar fasciitis. The principle involved in this method consists of application of powerful shockwaves with the aim of promoting healing of the inflamed tissue of the plantar fascia. Some studies without control groups have demonstrated results of widely varying clinical success, with satisfaction rates ranging from 56% to 94%.³²⁻³⁹ The current recommendation for indicating shockwave treatment is the presence of chronic pain (of duration greater than six months) and resistance to at least three of the following types of conservative treatment: home-based physiotherapy programs, insoles, non-steroidal anti-inflammatory drugs (NSAIDs) and local infiltration with corticosteroids. The contraindications for this type of treatment include hemophilia, coagulopathy, neoplasia or presence of a growth plate.⁴⁰

Following the various types of treatment described and presented above, Wolguin et al.¹⁷ achieved complete resolution of subcalcaneal pain in 82% of their patients, while 15% still presented possibly painful symptoms after a mean length of follow-up of 47 months, although the residual pain did not cause any limitations to their activities of daily living or at work. Only 3% of the patients presented pain that limited their habitual activities.

Surgical treatment

Indications for surgical treatment should be considered when the symptoms that interfere with these individuals' daily lives or desired athletic activity persist without any significant improvement, after at least six months of use of the various types of conservative treatment, under direct supervision by a doctor. Patients should be informed that, even after surgery, the possibility of no improvement in symptoms exists.

Before surgery, it is important to identify the exact location of the pain and the specific diagnosis of its cause. In cases in which the diagnosis of the cause of subcalcaneal pain cannot be made with any accuracy, a combination of different surgical procedures can be indicated, such as partial plantar fasciotomy, resection of the heel bone spur or release of the

deep fascia of the abductor muscle of the hallux with neurectomy of the abductor muscle of the fifth toe.

Surgical treatment of plantar fasciitis achieves satisfactory results in approximately 95% of the cases.^{23,41-44} The final objective of surgery is to achieve adequate decompression of the subcalcaneal region. Surgical release of the plantar fascia, either through a direct incisional approach or through an endoscopic technique, is the surgical treatment method most frequently indicated for treating subcalcaneal pain that is refractory to conservative treatment. However, it is important to emphasize that the release should only be partial and should only involve the medial portion of the fascia. Complete plantar fasciotomy may give rise to overloading of the lateral column of the foot (lateral column syndrome) and may trigger flattening of the medial longitudinal arch, with development of acquired flat feet.⁴⁵ The authors who have recommended endoscopic release of the plantar fascia have defended the theory that this method enables rapid reestablishment and an earlier return to habitual activities.⁴⁶⁻⁴⁸ However, this technique is still controversial and unexpected complications may occur, such as development of acquired valgus flat foot caused by unintentional complete release of the entire plantar fascia. Another limitation of the endoscopic technique is that it does not allow decompression of the lateral plantar nerve or removal of the heel spur.

Conflicts of interest

The authors declare no conflicts of interest.

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