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## HEEL PAIN

PLANTAR FASCIITIS

"HEEL SPUR"

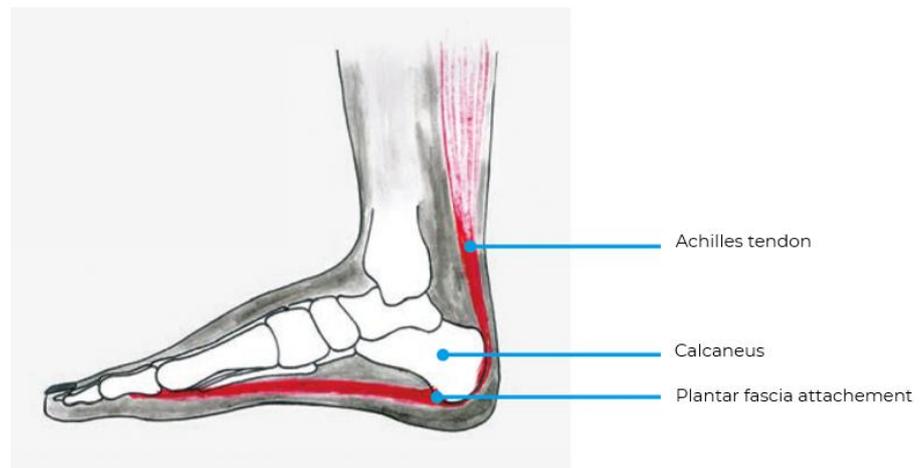


## DEFINITION

The most common cause of heel pain is plantar fasciitis, an overload (irritation, inflammation, microdamage) of the tendon plate in the foot arch. This tendon plate is called the plantar aponeurosis or plantar fascia. Heel pain is widespread, with approximately one in ten people developing plantar fasciitis at some point in their life.

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### 1 Plantar aponeurosis



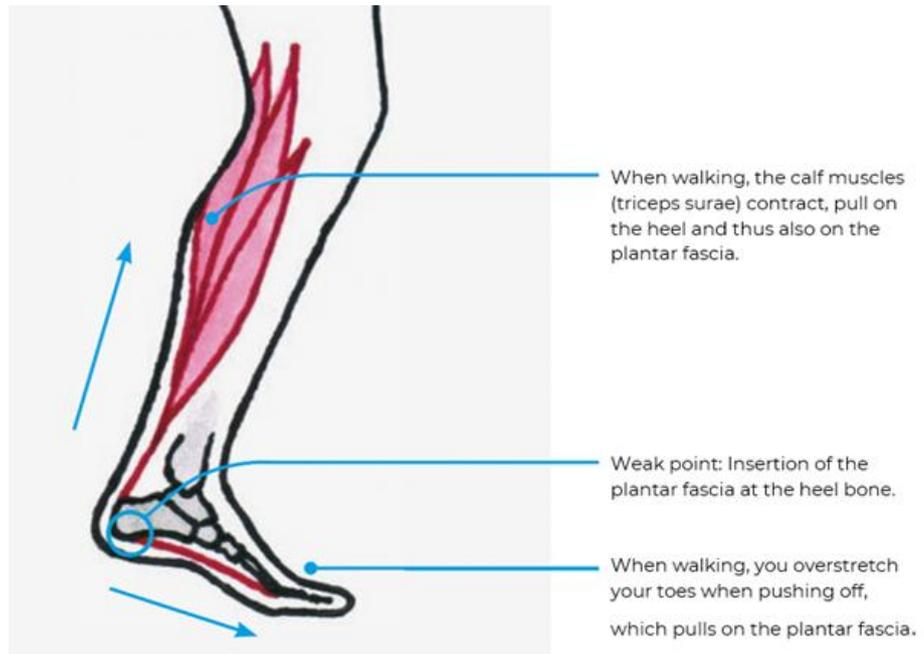
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## HOW DOES PLANTAR FASCIITIS DEVELOP?

The plantar aponeurosis originates from the heel bone and extends to the toes. It stabilizes the foot arch and is tensed while standing and during each step. During the push-off phase, the plantar aponeurosis is further stretched by the extension of the toes. Additionally, the calf muscles pull on the plantar aponeurosis to transfer push-off force to the foot. At the same time, the plantar fascia has a cushioning function. All of this leads to high tensile forces on the plantar aponeurosis and the Achilles tendon. The weakest point is usually the attachment of the plantar fascia to the heel bone, which can become overloaded and inflamed. The strain increases when climbing stairs or running.



2 Functional unit: triceps surae (calf muscles), Achilles tendon, and plantar fascia



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## ARE THERE RISK FACTORS?

Risk factors for developing plantar fasciitis include standing-intensive jobs, running, and a body mass index (BMI) of over 30 kg/m<sup>2</sup>. Certain foot shapes, such as high arches or flat feet, can also contribute to the problem. Almost always, there is some degree of calf muscle shortening and often shortening of the posterior thigh (hamstring) muscles, which exacerbates the overload at the plantar fascia insertion on the heel.



## THE PLANTAR FASCIITIS

### 3 Anatomy

Gastrocnemius muscle (2-headed, superficial calf muscle) begins above the knee joint.

Soleus muscle (1-headed, deep calf muscle) begins below the knee joint.

Here, the two calf muscles (gastrocnemius and soleus muscles) unite to form the Achilles tendon, which attaches to the heel bone.

Part of the fibers pulls around the heel and radiates into the plantar fascia, which originates further down the heel bone.



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## WHY IS IT COMMONLY CALLED "HEEL SPUR"?

Sometimes, an X-ray reveals a bone spur at the heel bone where the plantar fascia attaches. This has led to the term "heel spur," which is commonly used. However, this bone spur is not the cause of the pain. Only about half of patients with plantar fasciitis have a heel spur, and some people with a bone spur experience no pain at all.

### 4 X-ray image with "heel spur"



### 4



## TREATMENT

The treatment of heel pain is primarily non-surgical and consists of the following measures:

### 1. SYMPTOMATIC THERAPY

Rest. Activities that trigger pain should be avoided as much as possible to allow the irritated structures to recover. Wearing shoes with good cushioning and heel support is essential (Fig. 5 right). Temporarily using heel wedges in shoes may also help in the first few days or weeks (Fig 5 left).

Anti-inflammatory medications or local anti-inflammatory measures (ointments, ultrasound, etc.) can provide additional relief. However, their effect is often limited, as the issue is primarily "mechanical" and cannot be solved "chemically".

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5 Left= Heel Wedge

Right= Shoe with good cushioning and heel support (e.g. Asics Gel Kayano)



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### 2. ADDRESSING THE ROOT CAUSE (SEVERAL MONTHS)

Reducing the strain and tension on the plantar fascia is the most crucial step. It is imperative to stretch the plantar fascia and shortened calf muscles every day. These exercises need to be done regularly over a few months because the shortening and increased tension have evolved over years.

Some exercises are described in the appendix. To ensure proper execution, physical therapy can be prescribed. This does not change the fact that the exercises must be done on your own several times throughout the day, though! Stretching exercises are more effective when rigid and stiff muscles, tendons, and fascia are released and mobilized first. Normally this is done by a physical therapist.



### 3. SUPPORTIVE THERAPIES

In cases of severe calf muscle shortening, a night splint can be worn (Fig. 6 left). Prefabricated splints are available, or custom-made plaster splints. These keep the foot dorsiflexed at night or when the foot is not bearing weight. A slightly less intense but possibly more comfortable alternative is the Strassburg Sock (Fig. 6 right).

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6 Night Splint (left)  
Strassburg Sock (right)



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Focused shockwave therapy promotes blood circulation and tissue repair processes through mechanical stimuli. This treatment can be somewhat painful and is not equally effective for all patients. The expenses are not covered by basic health insurance. Insoles can be beneficial for certain foot types (flat feet, high arches). Additionally, they can cushion the heel and relieve the plantar fascia insertion. The cost of insoles is not covered by basic health insurance.

Injections (shots) are another option. We typically use Traumeel, a herbal arnica mixture. The cost of this preparation is not covered by basic health insurance but is relatively low. We are cautious with cortisone injections, as they can lead to plantar fascia lesions and degradation of the heel's fat pad.

Insoles, shock waves and infiltrations are complementary therapies and cannot replace the daily performance of stretching exercises!



#### 4. PREVENTING RECURRENCE

Even if pain disappears after several months, the learned exercises should be continued about three times per week to prevent recurrence.

### WHAT ARE THE PROGNOSIS AND SUCCESS RATES?

Over 90% of heel pain cases resolve completely with the mentioned treatments. However, even with consistent execution of exercises, it takes 6-12 months to see results.

If there is no improvement after six months despite correct, daily multiple executions of the exercises, a specialist evaluation should be sought again.



For the hand-drawn illustrations, we would like to thank Dr. med. Claude Müller.



## APPENDIX: STRETCHING EXERCISES

### 1. Stretching the Gastrocnemius

Perform a lunge a short distance from a wall. Fully extend the back leg and push the pelvis forward until a stretch is felt in the calf/Achilles tendon. Hold for 20-30 seconds. Repeat 3-5 times.

#### Important:

The back knee must remain straight!!

The heel of the back foot must stay on the ground!

Feet must not turn outward! (The big toe of the back foot should point toward the heel of the front foot.)



### 2. Stretching the Soleus

Perform a lunge a short distance from a wall. Bend both Knees slightly and push the pelvis forward until a stretch is felt in the calf/Achilles tendon. Hold for 20-30 seconds. Repeat 3-5 times.

#### Important:

The back knee must remain bent!

The Heel of the back foot must stay on the ground!

Feet must not turn outward! (The big toe of the back foot should point toward the heel of the front foot).





### 3. Stretching the Plantar Fascia

In a seated position, place one foot on the opposite knee. Then pull the foot and toes upward as far as possible.

If well tolerated and the stretch in the foot arch is bearable, massage the foot arch simultaneously.



### 4. . Stretching the Plantar Fascia and the Flexor Hallucis Longus (Big Toe Flexor)

Place the forefoot/big toe against a wall, keeping the heel on the ground. Fully extend the knee and push the pelvis forward toward the wall. If needed, pull forward using a door handle. The aim is to feel a pull in the calf and/or the sole of the foot.

Hold for 20-30 seconds.

Repeat 3-5 times.

#### Important:

Move the pelvis forward rather than just the upper body. The knee must remain straight!



### 5. Stretching the Gastrocnemius and Soleus on Stairs

Stand with the forefoot/front half of the foot on a step. Lower the heels until a stretch is felt in the calf/Achilles tendon.

Hold for 20-30 seconds.

Repeat 3-5 times

#### Important:

Keeping the knee straight stretches the gastrocnemius muscle.

Bending the knee stretches the soleus muscle.





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## THE PLANTAR FASCIITIS

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