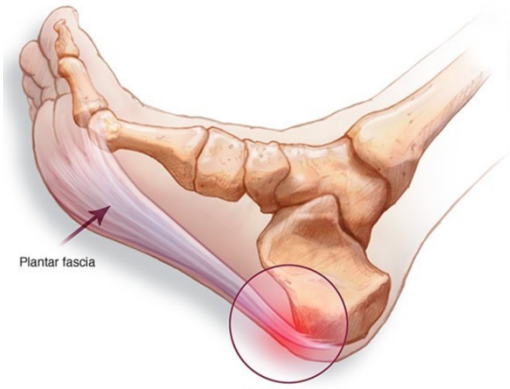
Plantar Fascia

Dr. Jonathan Reid

BACKGROUND

The plantar fascia (also called the plantar aponeurosis) is a thick band of connective tissue on the sole of the foot. It's made mostly of dense collagen fibers arranged longitudinally, which gives it a rope-like, fibrous quality rather than the elasticity of a tendon. It arises from the medial tubercle of the calcaneus (heel bone), on the plantar (bottom) surface. From there it fans out into five slips, one heading toward each toe, ultimately blending with the plantar plates and the base of the proximal phalanges of each digit, as well as attaching into the flexor tendon sheaths and the deep transverse metatarsal ligaments along the way.



The plantar fascia acts as a passive tension band that supports the longitudinal arch of the foot. Its most elegant function is captured by the "windlass mechanism": during the push-off phase of walking, the fascia winds around the metatarsal heads like a cable around a winch, shortening its effective length and pulling the heel and forefoot closer together. This passively raises the arch, converting the foot into a rigid lever for efficient propulsion, without requiring active muscle work to do so. It also helps absorb and distribute the mechanical load of body weight during standing, walking, and running, and works alongside the intrinsic foot muscles, plantar ligaments (like the long and short plantar ligaments and the spring ligament), and the bony architecture to maintain foot shape under repetitive stress.

The plantar fascia is quite strong for its size. Estimates from biomechanical studies suggest it can withstand substantial tensile loads, on the order of several times body weight, before failure, and it's under continuous, repetitive strain with every step. That said, it's also a common site of overuse, injury, and degeneration:

- **Plantar fasciosis:** The most common pathology of the plantar fascia, this degenerative process occurs over the course of years whereby the Achilles tendon fails to heal/repair at the same rate that microtrauma occurs, resulting in a cascade of events: 1) organized Type I collagen is replaced by thinner, weaker Type III collagen in a disorganized manner, 2) proliferation of ground substance (mucoid degeneration), and 3) growth of new blood vessels and nerve fibers. This degenerative process creates a thicker, weaker, and functionally painful fascia.
- **Plantar fasciitis:** Acute-to-subacute inflammation of the plantar fascia, typically at its calcaneal origin, causing sharp heel pain that's classically worst with the first steps in the morning. It's usually driven by repetitive microtrauma from overuse, tight calf muscles, or abnormal foot mechanics, and tends to ease somewhat with activity before worsening again after rest.
- **Plantar fascia tear (rupture):** A partial or complete disruption of the fascial fibers, usually near the calcaneal origin, that causes sudden, sharp pain, swelling, and sometimes bruising along the arch. It's often triggered by an acute traumatic load such as a forceful push-off or jump, or, less commonly, occurs as a complication of corticosteroid injections that weaken the tissue.
- **Plantar fibromatosis (Ledderhose disease):** A benign fibrous nodule or nodules that form within the plantar fascia, typically along its medial band, creating a palpable, sometimes tender lump on the sole of the foot. It can cause discomfort with weight-bearing or shoe pressure, and in more advanced cases may lead to toe contractures similar to those seen in Dupuytren's contracture of the hand.

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- **Plantar fascia entrapment/nerve-related heel pain:** Heel pain caused by compression or irritation of a nearby nerve, most often the first branch of the lateral plantar nerve (Baxter's nerve), which runs close to the plantar fascia. It can closely mimic plantar fasciitis symptoms but tends to produce more burning, tingling, or radiating pain, and often doesn't respond to fasciitis-directed treatments alone.

INITIAL MANAGEMENT

Regardless of the specific diagnosis, initial management of plantar fascia–related injury typically centers on offloading and reducing tension on the fascia through custom orthotics, which support the arch, correct abnormal foot mechanics, and redistribute pressure away from the painful area during standing and walking. Alongside orthotics, daily stretching of the plantar fascia and Achilles tendon/calf complex helps improve tissue flexibility, reduce morning stiffness, and address the tightness that often perpetuates the strain on the fascia's calcaneal origin. ***Consistency is key with this approach***, as most patients see meaningful improvement over several weeks to a few months when orthotics and stretching are performed regularly, often alongside supportive measures like activity modification, supportive footwear, and ice.

Custom Orthotics — Prosthetics & Orthotics will be in contact towards scheduling you for your custom orthotics appt

Icing — Apply ice (frozen water bottle) to the affected area for about 15–20 minutes at a time, several times a day (commonly 2–4 times), especially after activity or at the end of the day when symptoms tend to flare.

Daily Stretches

- **Fascia Stretch:** While seated, cross the affected foot over the opposite knee. Using your hand, grasp the base of the toes and gently pull them back toward the shin until a stretch is felt along the arch and heel. Hold for 15–30 seconds and repeat several times, often recommended before standing up in the morning or after periods of rest.
- **Calf (Gastrocnemius) Stretch:** Stand facing a wall with hands placed on it for support, and step the affected leg back while keeping the heel flat on the ground and the knee straight. Lean forward into the wall until a stretch is felt in the upper calf, holding for 20–30 seconds and repeating a few times on each side.
- **Bent-Knee Calf Stretch (Soleus Stretch):** In a similar wall-facing position as the calf stretch, bend both knees slightly (keeping the back heel down) to target the lower calf muscle (soleus) rather than the gastrocnemius. Hold for 20–30 seconds, since tightness here also contributes to tension transmitted down to the plantar fascia.

Physical therapy: Appointments are scheduled by patients calling the location specific scheduling phone number, which can be found on the provided physical therapy card or by going online.

Ultrasound-Guided Corticosteroid Injection: These appointments are usually scheduled with our care coordinator.

Electromyography (EMG): One of our EMG physician care coordinators will reach out to you once approved by insurance.

Shock Wave Treatment: Our podiatry team led by Dr. Paul Langer will be in contact with you regarding scheduling.

INTERVENTIONAL MANAGEMENT

Plantar pain that persists despite conservative management, as outlined above, often is indicative of a structural pathology that has not recovered or healed adequately. Depending on the etiology or nature of this structural pathology, additional recovery time may be necessary or an intervention recommended. Reevaluation is likely indicated towards this determination, however, advanced imaging can be helpful to review at the time of reevaluation to better understand the structural pathology.

- Advanced imaging will likely be recommended at the time of reevaluation. Please reach out to Rhodora **(952-456-7209)** to coordinate the appropriate imaging.

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Interventional management is tailored to the structural issue preventing recovery and turn to pain-free activity/sport.

- **Orthobiologic Procedure** — Autologous stem cells or blood products (Platelet-rich plasma) can be used to augment fascia recovery
- **Percutaneous Tenotomy (TENJET)**— A minimally invasive intervention that identifies and removes diseased fascia tissue while preserving healthy fascia tissue through a form of guided, high-velocity saline debridement
- **Surgical release with plantar fasciotomy**

Notes

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