

# Plantar Fasciitis Home Study Course

1 CE Hour  
Text, Examination, and Course Guide

Presented by the:  
*Center for Massage Therapy Continuing Education*

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## **Instructions for the Plantar Fasciitis home study course**

Thank you for investing in the Plantar Fasciitis home study course, a 1 CE hour course designed to further your knowledge in the principles and practice of treating clients with signs and symptoms of plantar fasciitis and/or pain in the feet. This guide will contain all of the instructions you will need to complete this course. This is a 1 CE hour course, so that means it should take you approximately 1 hour to read the text and complete the multiple choice exam and course evaluation.

### **The following are steps to follow in completing this course:**

- 1. Read and review the exam and text in this file. The exam is provided for review before testing online and is the same as the online exam.**
- 2. When you are ready to test online, access the online examination by logging in to your account at <https://www.massagetherapyceu.com/login.php>.**
- 3. Complete your examination and print your certificate. The exam is open book and there is no time limit for completion.**

You must pass the exam with a 70% or better to pass this home study course. You are allowed to access and take the exam up to 3 times if needed. There is no time limit when taking the exam. Feel free to review the text while taking the test. This course uses the text *Plantar Fasciitis, an excerpt from Condition-Specific Massage*, by Celia Bucci. All of the answers can be found in the text. It is advised to answer the exam questions in the study guide before testing online. That way, when you are testing you do not have to go back and forth through the online exam.

If you have any questions please feel free to contact us at 866-784-5940, 712-490-8245, or [info@massagetherapyceu.com](mailto:info@massagetherapyceu.com). Most state boards require that you keep your “proof of completion” certificates for at least four years in case of audit. Thank you for taking our Plantar Fasciitis home study course.

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It is the responsibility of the practitioner to determine the appropriateness of the techniques presented in terms within the scope of practice. This information is in no way meant to diagnose or treat medical conditions. Written medical opinions are always the best way to resolve any questions regarding contra-indications to or advanced treatment of foot pain and/or plantar fasciitis.

## Plantar Fasciitis Exam

1. What is the plantar fascia?
  - A. A strap of connective tissue that connects the calcaneus to the toes
  - B. A strap of muscle that connects the calcaneus to the toes
  - C. A strap of connective tissue that connects the navicular to the toes
  - D. A strap of bone that connects the calcaneus to the toes
2. Which of the following is the most cited contributing factor to plantar fasciitis?
  - A. Injury
  - B. Other factors such as arthritis
  - C. Weight
  - D. Overuse
3. What can you do if treatment of the area produces symptoms?
  - A. Adjust the client to a more extended posture
  - B. Adjust the client to a more neutral posture
  - C. Adjust the client to a more flexed posture
  - D. Discontinue treatment
4. When performing visual postural assessment, when is excessive eversion noted?
  - A. When the superior aspect of the calcaneal tendon bends medially
  - B. When the inferior aspect of the calcaneal tendon bends medially
  - C. When the inferior aspect of the calcaneal tendon bends laterally
  - D. When the lateral malleolus protrudes more prominently
5. In cases of plantar fasciitis, what is resisted ROM used for?
  - A. To assess the strength of the muscles that cross the toes
  - B. To assess the strength of the muscles that cross the ankle
  - C. To assess the strength of the muscles that cross the knee
  - D. To assess the strength of the muscles that cross the thigh
6. All of the following are muscles which may contain trigger points that refer pain into the heel and plantar surface of the foot EXCEPT:
  - A. Gastrocnemius
  - B. Tibialis posterior
  - C. Abductor hallucis
  - D. Serratus anterior
7. Which of the following strokes should be used to soften the plantar fascia?
  - A. Kneading
  - B. Feather strokes
  - C. Vibration
  - D. Deep compression

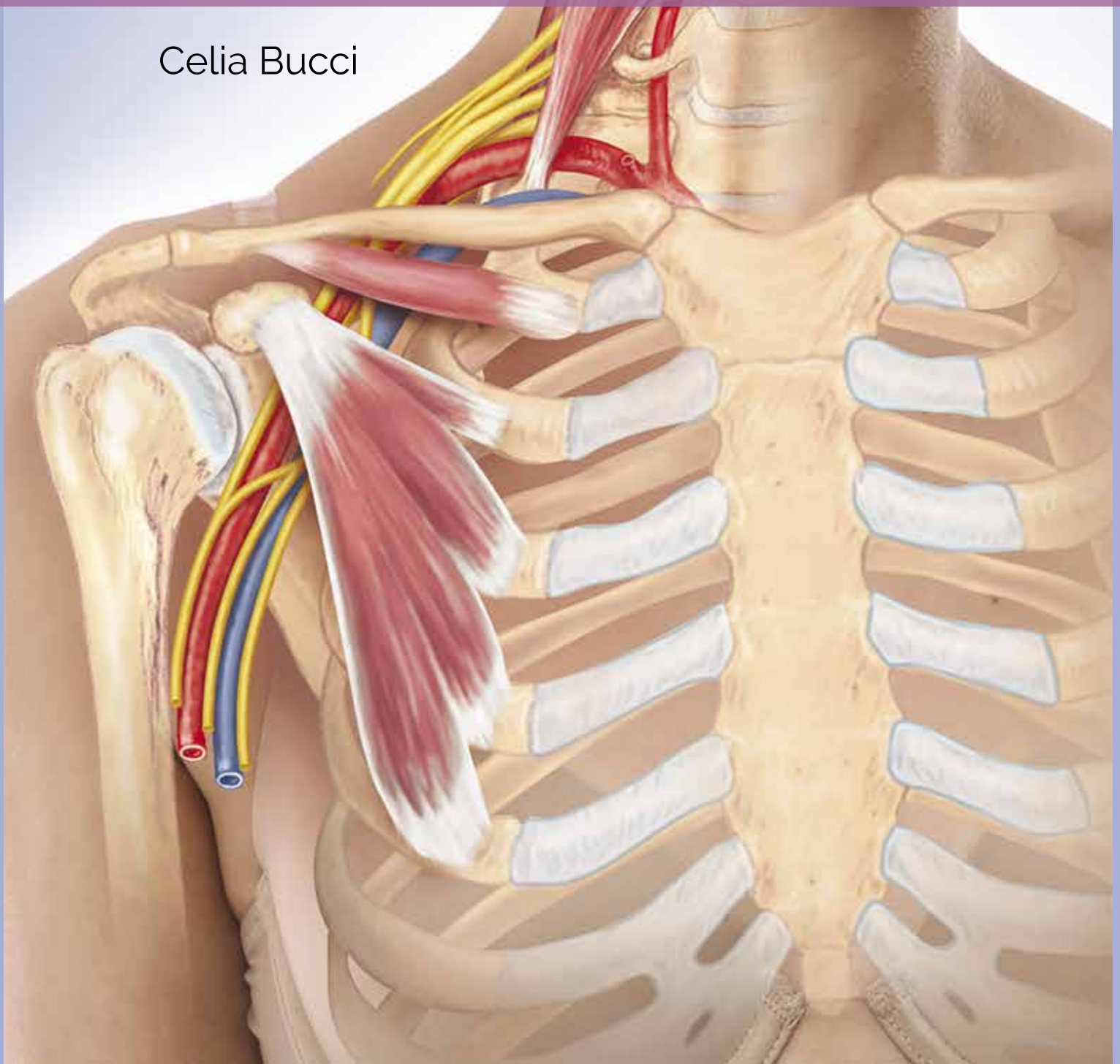
8. Which of the following is a self-massage technique that you can instruct your client to do at home if no swelling is present?
  - A. Stretching of the plantar flexors
  - B. Gently rolling the foot over a tennis ball, can, or other sturdy round object, from the calcaneus to the metatarsals and back
  - C. Perform exercises in which he or she grasps items with the toes
  - D. Gently rolling the foot over marbles on the floor, from the calcaneus to the metatarsals and back
  
9. If the client's symptoms are localized and other postural deviations are minimal, what is the proper time for treatment of plantar fasciitis?
  - A. 15 minutes
  - B. 30 minutes
  - C. 60 minutes
  - D. 90 minutes

This completes the Plantar Fasciitis exam. Proceed to the next page to view the text.

# Condition Specific Massage Therapy

SECOND EDITION

Celia Bucci



## Chapter 11:

# Plantar Fasciitis

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# Plantar Fasciitis

## Understanding Plantar Fasciitis

**P**lantar fasciitis is irritation and inflammation of the plantar fascia. The plantar fascia is a strap of connective tissue that connects the calcaneus to the toes (Fig. 1). It is thick and strong in the center with thinner, weaker wings along the medial and lateral foot. The central band is often referred to as the plantar aponeurosis. It is attached to the medial calcaneal tubercle proximally and divides into five bands that merge with the flexor tendons at the proximal phalanx of each toe. The collagen fibers of the plantar fascia are oriented mostly longitudinally and are arranged in bundles but are reinforced by transverse fibers just inferior to the metatarsal heads. The plantar fascia and calcaneal tendon both have attachments on the calcaneus, linking their roles in plantar flexion and dorsiflexion.

Structurally, the plantar fascia connects the bones of the foot, supports the arch of the foot, and minimizes impact to the arch during weight-bearing activities. Functionally, the plantar fascia operates similarly to what is called the windlass mechanism: extending the toes puts tension on the fascia, which shortens the arch and creates a spring. In normal gait, plantar flexion initiates the heel-off phase, and the windlass mechanism of the plantar fascia increases the strength of propulsion at the push-off phase as the tension is released. The calcaneal attachment of the plantar fascia is much smaller than the distal attachments at the proximal phalanges. This concentrates a great amount of force on a small area at the calcaneal tubercle when either the support mechanism or the windlass mechanism is activated during weight-bearing activity.

The two heads of the gastrocnemius and the soleus blend into the calcaneal tendon. This grouping of muscles is called the triceps surae. The triceps surae attaches to the tuberosity of the posterior calcaneus via the calcaneal tendon. When the calcaneal tendon shortens during plantar flexion, it pulls the calcaneus posteriorly and superiorly while tensile stress in the plantar fascia draws the calcaneus anteriorly, leaving the small attachment site situated between tensile forces in virtually opposite directions (Fig. 2). When these structures are strong, flexible, and unhindered by dysfunction, forces are distributed efficiently to produce smooth movement. Plantar fasciitis is one possible result when biomechanical factors and soft tissue dysfunction keep those forces from being distributed efficiently.



**Figure 11-1** Plantar Fascia

Image Credit: Kosi Gramatikoff User:Kosigirm, CCo, via Wikimedia Commons



**Figure 11-2** Localized pain characteristic of plantar fasciitis.

## COMMON SIGNS AND SYMPTOMS

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Plantar fasciitis usually develops gradually, but it can appear suddenly and can be acute. It typically occurs unilaterally but can be bilateral. The most common symptom of plantar fasciitis is sharp, burning, or aching pain in the arch of the foot. The worst of the pain is often felt in the push-off phase of gait, when passive extension of the toes increases tensile stress in the plantar fascia. Pain is often most intense near the calcaneal attachment of the plantar fascia where tearing is most likely to occur, but pain sometimes spreads along the medial border of the arch of the foot toward the toes. Symptoms are felt most frequently with the first steps in the morning or after rest. During periods of inactivity, when the injured tissues undergo the process of repair, the plantar fascia contracts and loses flexibility, making those first steps the most painful. As the tissues warm up and become more flexible, symptoms may improve or subside temporarily, but if left untreated, they are likely to return following subsequent periods of rest.

Pain may also be felt while standing, when bearing weight increases tensile stress in the plantar fascia. This is particularly true when the toes are extended either actively or passively. Climbing stairs increases the demand on these structures and may also be painful. Standing on the toes involves plantar flexion of the ankle, which shortens the calcaneal tendon, and passive extension of the toes, which adds tensile stress to the plantar fascia. When the integrity of the plantar fascia is compromised, this action may cause pain, swelling, or tearing of fibers. In all of the cases described above, tension in the plantar fascia increases stress on the periosteum of its small bony attachment on the calcaneus, pulling the tissue away from the bone, which may result in the development of bone spurs. Likewise, stress and tearing of the tissue often result in inflammation of the plantar fascia, which in turn increases sensitivity and pain. When pes cavus is a contributing factor, or if the individual attempts to avoid pain in the arch by walking on the outside of the foot, pain may be felt on the lateral foot due to increased impact during activity.

## POSSIBLE CAUSES AND CONTRIBUTING FACTORS

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Many possible factors may contribute to plantar fasciitis, but the factor cited most frequently is overuse. Overuse occurs with any activity in which exaggeration of the normal mechanical function of the tissue may lead to inflammation and tearing. A new or intense exercise regimen that involves running, jumping, or other actions that increase tensile stress on the plantar fascia puts the unconditioned tissues at risk for injury. Standing for long periods on hard, inflexible surfaces increases demand on the spring mechanism of the plantar fascia and also increases the risk of injury. The injured tissue, which repairs itself by forming scars, is continually at risk for further tearing, fibrosis, and inflammation, increasing the risk of bone spurs, and continuing the cycle until the contributing factors are resolved. In addition, because the plantar fascia has a limited blood supply, it heals slowly.

But while plantar fasciitis is often referred to as an overuse injury, underuse may also be a predisposing factor. Inactivity not only decreases circulation to the area, reducing hydration and nutrition to the tissues, but it may also contribute to adhesions, contractures, and joint dysfunction. Sedentary routines may affect the length and strength of the muscles that move the foot as well as the soft tissues that support the structures of the foot. If the foot is not rested flat on the floor while sitting, the ankle may rest in plantar flexion, passively shortening the plantar flexors and the calcaneal tendon, and the toes may be held in passive extension, increasing tension on the plantar fascia. Knee flexion also shortens the gastrocnemius and may affect its resting tone. During sleep or another recumbent position, the ankles generally rest in passive plantar flexion, which may contribute to adhesions and shortening of the plantar flexors, particularly if neuromuscular health is compromised.

Eversion contributes to pes planus, which stretches the plantar fascia taut, reducing its ability to provide the protective spring mechanism during weight-bearing activity. Pes cavus, conversely, brings the origin and insertions together, shortening and thickening the plantar fascia, reducing its ability to absorb shock during



weight-bearing activity. Femoral and tibial rotations, common with patellofemoral syndrome, may also affect the orientation of the ankle and contribute to plantar fasciitis. Left untreated, chronic plantar fasciitis continues to affect gait and may contribute to the development of knee, hip, and back pain.

Improper footwear is a common contributing factor to plantar fasciitis. Shoes that do not fit well, that have worn around the edges increasing eversion or inversion, or that do not provide sufficient arch support may alter biomechanics and stress the plantar fascia. When such a deviation exists, an orthotic may be necessary. Orthotics are prescribed, and should be tailored to individual needs and reassessed frequently as gait patterns change and structures adapt. High-heeled shoes also contribute to plantar fasciitis because they increase plantar flexion and passive extension of the toes.

Weight gain, particularly when it occurs rapidly, increases the demand on the plantar fascia primarily by flattening the arch and stretching the fascia. During pregnancy there is rapid weight gain in addition to hormonal changes that loosen connective tissues, which may contribute to increased demand and reduced functionality of the plantar fascia. Some types of arthritis that affect tendons and ligaments may also contribute to plantar fasciitis. Ankylosing spondylitis—a form of arthritis that often begins in the spine and results in fusion of the vertebrae—may progress to affect the hips, knees, and ankles. Reiter’s syndrome is an inflammatory disorder of the joints that often occurs following infection in the intestines or urinary tract, causing degeneration at the attachment sites of ligaments and tendons. Although it is unclear why, thickening of the deep tissues of the foot, which contributes to plantar fasciitis, is common among diabetics. Diabetics are also more prone to peripheral neuropathies, which may coexist or be confused with plantar fasciitis. Corticosteroids, which are often injected to relieve the pain and inflammation, may also contribute to the weakening of ligaments, tendons, and bone as well as atrophy of the fat pads in the foot, in turn contributing to chronic cases or the risk of more serious injury. For this reason, the number of repeated injections to a specific area is often limited, and local massage is contraindicated for several days following injections.

**Table 11-1: Differentiating Conditions Commonly Confused with or Contributing to Plantar Fasciitis**

CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MASSAGE THERAPY
<b>Tarsal tunnel syndrome (compression of the posterior tibial nerve)</b>	Tingling, burning, and numbness or sharp, shooting pain in the medial ankle, heel, arch, and toes  Symptoms may extend into the calf  Symptoms may occur at rest, and worsen with activity	Dorsiflexion-eversion test  Tinel’s sign  MRI  EMG  Nerve conduction velocity test	Massage is indicated to reduce adhesions and hypertonicity that may contribute to compression. Take caution not to reproduce symptoms or further compress the nerve.
<b>Stress fracture (calcaneus, tarsals, or metatarsals)</b>	Symptoms may be mistaken for soft tissue trauma  Swelling, bruising  Pain increases with activity and often persists during rest  Limited ROM	X-ray (stress fracture may not be apparent until symptoms have persisted for weeks)  MRI  Bone scan	Massage is locally contraindicated until bone is healed. Massage peripheral to injury or to reduce compensating patterns is indicated with caution. Circulatory massage distal to a cast is contraindicated to avoid congestion under the cast.
<b>Calcaneal tendon injuries</b>	Pain in joint crossed by tendon  Swelling  Pain worsens with weight-bearing activity such as jumping, squatting, or climbing stairs  Reduced ROM	Physical exam  ROM tests	Massage is indicated.

**Table 11-1: Differentiating Conditions Commonly Confused with or Contributing to Plantar Fasciitis (continued)**

CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MASSAGE THERAPY
<b>Heel fat pad atrophy</b>	Localized heel pain that does not radiate  Deep, dull ache in middle of heel	Diagnosed by symptoms  Tests may be performed if conservative treatment does not relieve symptoms	Massage is locally contraindicated until the symptoms subside. Massage peripheral to the heel may be supportive.
<b>Ankylosing spondylitis</b>	Pain often begins in the low back unilaterally and progresses bilaterally to the upper back, throughout the thorax, and possibly into the joints of the extremities  Fatigue and anemia may develop	MRI  Blood tests	Massage is indicated to reduce pain, maintain mobility, and slow the progress of joint distortion
<b>Reiter's syndrome (reactive arthritis)</b>	Often preceded by infection, low-grade fever, or conjunctivitis  Calcaneal tendon pain  Heel pain  Joint pain  Skin lesions in palms or soles  Redness, burning, or discharge from eyes  Urinary urgency or burning	Physical exam  Joint X-ray  Urinalysis  HLA-B27 antigen test	Massage is contraindicated until the infection is resolved and during active flare-ups of arthritis.  Work with the health care provider to tailor the treatment plan to meet the individual's needs. Avoid skin lesions.
<b>Bone spur</b>	Pain in heel, particularly with weight-bearing activity  Local skin lesion may be present  Reduced ROM	X-ray  MRI  CT scan	Massage will not reduce a bone spur but may be effective in reducing further damage due to tension in soft tissue. Be cautious with techniques that may fragment the spur.
<b>Bursitis (retrocalcaneal)</b>	Heel pain, particularly with activity or palpation  Heat, redness, swelling, or tenderness at the back of the heel	Physical exam  ROM tests  X-ray or MRI if conservative treatment is not successful	Massage is systemically contraindicated if bursitis is due to infection, and locally contraindicated in the acute stage to avoid increased swelling. In the subacute stage, massage of the structures surrounding the joint is indicated.
<b>Morton's neuroma</b>	Burning and pain in the ball of the foot that radiates into the toes  Numbness or tingling in the toes  Symptoms most common between third and fourth toes	Palpation assessment for tender mass  X-ray	Massage is indicated to reduce adhesions or scar tissue that may contribute to nerve irritation and to increase the space between the third and fourth metatarsals. Take care not to reproduce

**Table 11-1: Differentiating Conditions Commonly Confused with or Contributing to Plantar Fasciitis (continued)**

CONDITION	TYPICAL SIGNS & SYMPTOMS	TESTING	MASSAGE THERAPY
<b>Gout</b>	Redness, heat, and swelling Sudden, intense pain, often at night, that diminishes gradually over a couple of weeks	Physical exam Blood and urine uric acid concentration tests Synovial fluid test	Local massage is contraindicated during acute attacks. Gout may indicate other systemic conditions. Work with health care team.
<b>Rheumatoid arthritis</b>	Periods of flare-ups and remission Pain, swelling Aching and stiffness, particularly after rest or inactivity Reduced ROM Distortion of joint Rheumatic nodules Occasional low-grade fever and malaise	Physical exam Blood tests Synovial fluid tests Radiography	Massage is indicated in nonacute stages. Work with the health care team.

## CONTRAINDICATIONS AND SPECIAL CONSIDERATIONS

First, it is essential to understand the cause of foot pain. If the client has a history of arthritis, cartilage degeneration, or previously unresolved injuries or if you suspect the client has a fractured bone or significant tearing to the tissues, work with the client's health care provider and consult a pathology text for massage therapists before proceeding. These are a few general cautions:

- **Underlying pathologies.** Arthritis, bone fractures, or symptoms common to systemic conditions like diabetes may be contributing factors. If you suspect an underlying condition (consult Table 1 and your pathology book for signs and symptoms), refer the client to their health care provider for medical assessment before initiating treatment. If the client is diagnosed with an underlying pathology that is not a contraindication for massage, work with the health care team to develop a treatment plan that is appropriate for that individual.
- **Endangerment sites.** Be cautious with pressure around the dorsalis pedis artery where you feel its pulse.
- **Producing symptoms.** Symptoms may occur during treatment. If treatment produces symptoms, adjust the client to a more neutral posture. Reducing dorsiflexion may help. If this does not relieve the symptoms, reduce your pressure or move away from the area. You may be able to treat around the site that reproduced the symptoms, but proceed with caution.
- **Treatment duration and pressure.** If the client is elderly, has degenerative disease, or has been diagnosed with a condition that diminishes activities of daily living, you may need to adjust your pressure as well as the treatment duration. Frequent half-hour sessions may suit the client better. Take care when applying pressure or friction around the calcaneal attachment of the plantar fascia, particularly if there is any risk of tearing or rupture. If the client's symptoms are severe or their activities of daily living have been significantly reduced due to pain, recommend medical assessment to determine the degree of degeneration of tissue. If bone spurs are present, do not apply pressure directly, and avoid any techniques that might chip or detach the spur.

- **Friction.** Do not use deep frictions if the client has a systemic inflammatory condition such as rheumatoid arthritis, if the health of the underlying tissues is at risk for rupture, or if the client is taking anti-inflammatory medication. Friction creates an inflammatory process, which may interfere with the intended action of anti-inflammatory medication. Recommend that the client refrain from taking such medication for several hours before treatment if their health care provider agrees.
- **Injections.** If the client has had a steroid or analgesic injection within the previous 2 weeks, avoid the area. These injections reduce sensation, which may prevent the client from assessing your pressure adequately. Steroid injections may also alter the physiology of the tissues, increasing the risk of injury from deep massage techniques.
- **Tissue length.** It is important when treating myofascial tissues that you do not lengthen those that are already stretched. Assess for myofascial restrictions first and treat only those that are clearly present. Likewise, overstretched muscles should not be stretched from origin to insertion. If you treat trigger points in overstretched tissue, use heat or a localized pin and stretch technique instead of full ROM stretches.
- **Hypermobile joints and unstable ligaments.** Be cautious with mobilizations if the client has hypermobile joints or if ligaments are unstable due to injury, pregnancy or a systemic condition.

## MASSAGE THERAPY RESEARCH

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A thorough review of the literature revealed no research, case studies, or peer-reviewed articles specifically about the benefits of massage therapy for plantar fasciitis or heel pain. Many of the research studies of effective treatment for plantar fasciitis include stretching, although little attention is given to lengthening the muscles manually. In “A Combined Treatment Approach Emphasizing Impairment-Based Manual Physical Therapy for Plantar Heel Pain: A Case Series,” Young et al. (2004) report the benefits of physical therapy techniques to mobilize the joints of the ankle and foot using manual therapy. Although this study involved treatment goals similar to those of massage therapy, the methods used to achieve them followed an impairment-based physical therapy approach, focused largely on mobilization, and did not include methods more common in massage therapy such as reducing adhesions, increasing local circulation, and releasing trigger points.

Several studies of treatment options including the use of orthotics, Botox, shock wave therapy, and splinting the ankle into dorsiflexion during sleep included “deep tissue massage” as part of the treatment, although none of these specified a procedure. Several articles reviewing recent literature regarding effective treatments suggest that while stretching increases ROM, it has not proven to be an effective, long-term solution for plantar fasciitis without other interventions. These results suggest a need for detailed studies of the specific benefits of massage therapy for treating not only the muscles but also the noncontractile tissues affected in plantar fasciitis. It may be possible that focused stretching of the muscles without attention to fascia may not be sufficient for positive, long-term results.

The January 2001 issue of *The Journal of Bodywork and Movement Therapies* presented an interesting interdisciplinary look at plantar fasciitis. The survey begins with a case study of a single client with heel pain, followed by individual articles that consider the case from the perspectives of Chinese medicine, body-mind healing, neuromuscular therapy, physical therapy, and chiropractic care. While it provides no conclusive evidence of the benefits of these treatments, this series offers a rare and comprehensive examination into the variety of possible factors contributing to chronic pain.

# Working with the Client

## CLIENT ASSESSMENT

While the symptoms of plantar fasciitis are fairly consistent, the biomechanical factors can vary. For this reason, each case should be considered individually. For example, pes planus often presents with eversion of the ankle; short and tight peroneal muscles, gastrocnemius, and soleus; and weakened tibialis muscles. With pes cavus, you may find the ankle inverted with a short and tight tibialis anterior, tibialis posterior, and the muscles that flex the toes. The impact on the knees, hips, and low back may also vary. Common presentations of plantar fasciitis are described here, but it is essential to assess every joint involved to put together an accurate picture for each individual client.

Assessment begins during your first contact with a client. In some cases, this may be on the telephone when an appointment is requested. Ask in advance if the client is seeking treatment for a specific area of pain so that you can prepare yourself.

Table 11-2: Health History

QUESTIONS FOR THE CLIENT	IMPORTANCE FOR THE TREATMENT PLAN
Was there a precipitating event, or can you remember a specific moment when the pain began?	The details of the activity or posture that initiated the pain may help you to determine contributing factors such as tendon injuries or stress fractures. A new regimen of running, a new activity that requires weight-bearing movement, or a newly developed sedentary posture may contribute to the symptoms of plantar fasciitis.
Where do you feel symptoms?	The location of symptoms gives clues to the location of trigger points, injury, or other contributing factors. Plantar fasciitis generally causes pain near the anterior, inferior calcaneus. Pain elsewhere in the foot, ankle, or calf is not uncommon and may suggest a coexisting condition.
Describe what your symptoms feel like.	Differentiate between possible origins of symptoms, and determine the involvement of bones, nerves, and soft tissues.
Do any movements make your symptoms worse or better?	Locate tension, weakness, or compression in structures producing such movements. Dorsiflexion, toe extension, and weight bearing often exacerbate symptoms of plantar fasciitis.
Have you seen a health care provider for this condition? What was the diagnosis? What tests were performed?	Medical tests may reveal stress fractures, bone spurs, nerve involvement, or other conditions. If no tests were performed to make a diagnosis of plantar fasciitis, use the tests described in this chapter for your assessment. If your assessment is inconsistent with the diagnosis, ask the client to discuss your findings with their health care provider or ask for permission to contact the provider directly.
Have you been diagnosed with a condition such as arthritis or diabetes? Are you pregnant?	Arthritis, diabetes, and other systemic conditions may contribute to signs and symptoms, may require adjustments to treatment, and may impact treatment outcomes. Pregnancy leads to weight gain and affects hormones that may contribute to symptoms.
Have you had a previous injury or surgery?	Injury or surgery and resulting scar tissue may cause adhesions, hyper- or hypotonicity, and atypical ROM.
What type of work, hobbies, or other regular activities do you do?	A new physical training program, repetitive motions that stress the ankle and foot, and static postures that shorten the plantar fascia may contribute to the client's condition.
Are you taking any prescribed medications or herbal or other supplements?	Medication of all types may contribute to symptoms or have contraindications or cautions.

Table 11-2: Health History (continued)

QUESTIONS FOR THE CLIENT	IMPORTANCE FOR THE TREATMENT PLAN
Have you had a corticosteroid or analgesic injection in the past 2 weeks? Where?	Local massage is contraindicated. A history of repeated corticosteroid injections may affect the integrity of the plantar fascia and calcaneal tendon, thus increasing the risk of tearing or rupture. Use caution when applying pressure or cross-fiber strokes.
Have you taken a pain reliever or muscle relaxant within the past 4 hours?	The client may not be able to judge your pressure.
Have you taken anti-inflammatory medication within the past 4 hours?	Deep friction initiates an inflammatory process and should not be performed if the client has recently taken anti-inflammatory medication.

## Postural Assessment

Allow the client to walk and enter the room ahead of you while you assess their posture and movements. Look for imbalances or patterns of compensation for deviations common with plantar fasciitis. Watch as the client climbs steps, looking for reduced mobility or favoring one side. Assess for joint instability, limping, rotation of the femur or tibia, or hyper- or hypolordosis. Have the client sit to fill out the assessment form, watching to see if they plantar flex the ankle or flex the toes to avoid stretching the calcaneal tendon and plantar fascia. Watch also as the client stands up to see if they can stand without assistance or if they avoid bearing weight on the affected foot.

When assessing the standing posture, be sure that the client stands comfortably. If they deliberately attempt to stand in the anatomic position, you may not get an accurate assessment of their posture in daily life. Excessive eversion of the ankle is noted when the inferior aspect of the calcaneal tendon bends laterally. The medial malleolus may also protrude more prominently (Fig. 3). With excessive inversion, the inferior aspect of the calcaneal tendon may bend medially, although this may not be as visible as the lateral curve of an everted ankle. With inversion, the lateral malleolus may protrude more prominently (Fig. 4). You can also inspect the soles of the client's shoes for wearing of the inside or outside edges, indicating an atypical position of the foot. The calcaneal tendon and fascia of the plantar flexors may appear thick or dimpled. Assess the arches of the feet for pes cavus or pes planus. Pes planus is more common with plantar fasciitis, particularly if the ankle is everted. Some extension of the metatarsophalangeal joint is normal but may be exaggerated with plantar fasciitis. Hyperextension of the metatarsophalangeal joint may force hyperflexion of the interphalangeal joints.

Improper alignment of the knee, hip, and pelvis, as well as calcaneal tendinitis, may coexist with plantar fasciitis. Review chapters on hyperlordosis, piriformis syndrome, patellofemoral syndrome, and tendinopathies to assess for possible coexisting conditions.

Figure 5 compares a healthy posture to a posture affected by plantar fasciitis with pes planus and ankle eversion.



Figure 11-3 Everted ankles.



Figure 11-4 Inverted ankles.

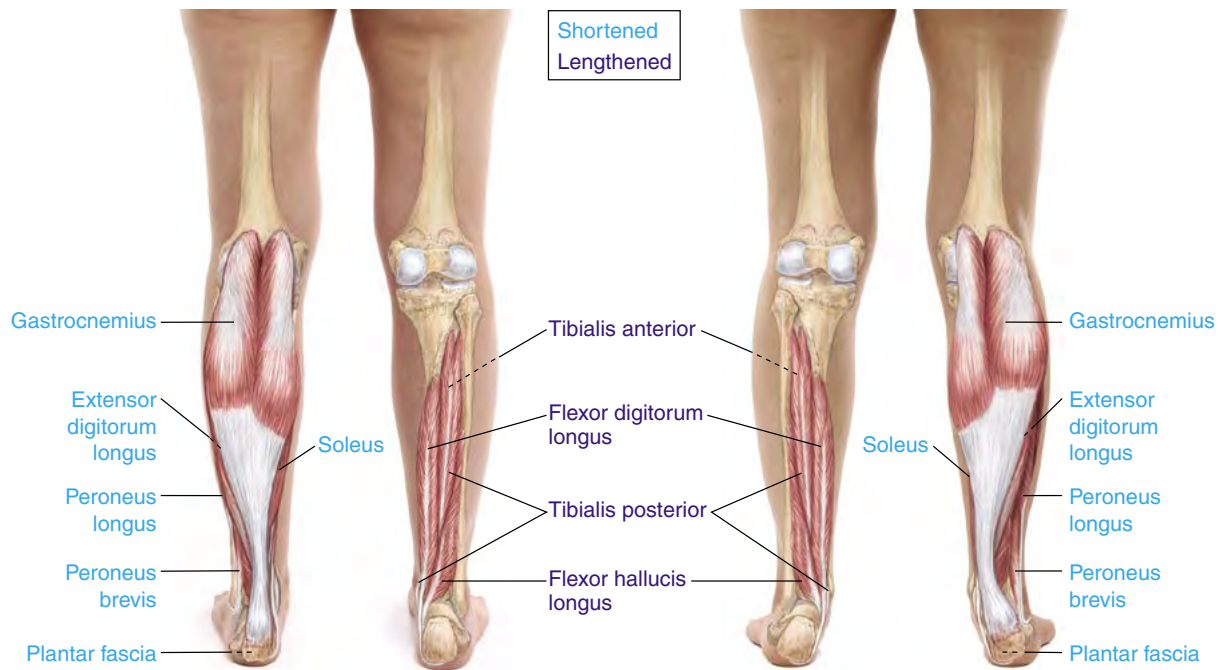


Figure 11-5 Postural assessment comparison.

## ROM Assessment

Test the ROMs of the ankle and toes involving muscles as both agonists and antagonists. Since it allows the client to control the amount of movement and stay within a pain-free range, only active ROM should be used in the acute stage of injury to prevent undue pain or re-injury. Box 1 presents the average active ROM results for the joints involved in plantar fasciitis.

### Box 11-1: Average Active ROM for Joints Involved in Plantar Fasciitis

#### Ankle

##### **Dorsiflexion 20°**

Tibialis anterior  
Extensor digitorum longus  
Extensor hallucis longus

##### **Plantar Flexion 50°**

Gastrocnemius  
Soleus  
Tibialis posterior  
Peroneus longus  
Peroneus brevis  
Flexor digitorum longus  
Flexor hallucis longus  
Plantaris

##### **Inversion 45–60°**

Tibialis anterior  
Tibialis posterior  
Flexor digitorum longus  
Flexor hallucis longus  
Extensor hallucis longus

##### **Eversion 15–30°**

Peroneus longus  
Peroneus brevis  
Extensor digitorum longus

#### First toe

##### **Flexion 45°**

Flexor hallucis longus  
Flexor hallucis brevis  
Abductor hallucis

##### **Extension 70°**

Extensor hallucis longus  
Extensor hallucis brevis

#### Second to Fifth Toes

##### **Flexion 40°**

Flexor digitorum longus  
Flexor digitorum brevis  
Lumbricals  
Dorsal and plantar interossei  
Abductor digiti minimi  
Flexor digiti minimi  
Quadratus plantae

##### **Extension 40°**

Extensor digitorum longus  
Extensor digitorum brevis  
Lumbricals

## Active ROM

Compare your assessment of the client's active ROM to the values in Box 1. Pain and other symptoms may not be reproduced during active ROM assessment because the client may limit movement to a symptom-free range.

- **Active dorsiflexion of the ankle** may be restricted when tight plantar flexors limit movement.
- **Active extension of the toes** may be limited and cause pain when this action stretches the plantar fascia. In addition, because the flexor digitorum brevis, abductor digiti minimi, and abductor hallucis attach to the plantar surface of the calcaneus, extension of the toes may add tension to the attachment site they share with the plantar fascia.

## Passive ROM

Compare the client's P ROM on one side to the other when applicable. Note and compare the end feel for each range.

- **Passive dorsiflexion of the ankle** may produce a painful stretch to the plantar flexors and plantar fascia.
- **Passive extension of the toes** may cause pain as the plantar fascia and toe flexors are stretched.

## Resisted ROM

Use resisted tests to assess the strength of the muscles that cross the ankle. Compare the strength of the affected side to the unaffected side.

- **Resisted dorsiflexion of the ankle** may reveal weakness.

## Special Tests

The following special tests will help you to determine which structures are contributing to pain and when a client should be evaluated by a medical professional using X-ray or other tools, which may reveal conditions that contraindicate massage or require special considerations when planning treatment.

The **dorsiflexion eversion test** is used to assess compression of the tibial nerve within the tarsal tunnel—the space formed by the medial malleolus, calcaneus, and the flexor retinaculum through which the tendons of the tibialis posterior, flexor digitorum longus, and flexor hallucis longus along with the tibial artery, tibial vein, and tibial nerve pass (Fig. 6).

**Tinel's sign**—a test that can be used to assess nerve conduction anywhere in the body—is often added when simple dorsiflexion and eversion alone do not reproduce symptoms. Use these tests together to assess for the possibility of tarsal tunnel syndrome in clients with heel pain:

1. Begin with the dorsiflexion eversion test. With the client supine, maximally dorsiflex the ankle and toes, and evert the ankle. This position pushes soft tissues deeper into the tarsal tunnel to assess their involvement in compressing the tibial nerve.



Figure 11-6 Dorsiflexion eversion test with Tinel's sign.



2. Hold the position for up to 15 seconds or until symptoms of numbness or tingling are produced.
3. Reproducing symptoms of numbness and tingling along the distribution of the nerve into the foot suggests compression of the nerve.
4. If no symptoms are produced, add Tinel’s sign by tapping the tibial nerve between the medial malleolus and the medial aspect of the calcaneus.
5. Reproducing symptoms of numbness and tingling along the distribution of the nerve into the foot suggests nerve involvement.

The **windlass test** is used to assess whether the windlass mechanism of the plantar fascia produces pain (Fig. 7). The test is performed in non-weight-bearing and weight-bearing postures.

1. Begin with the non-weight-bearing test by asking the client to sit with the legs hanging off the edge of the table.
2. With one hand, gently stabilize the ankle in a neutral position, free from plantar flexion and dorsiflexion.
3. With the other hand, fully extend the first toe passively at the metatarsophalangeal joint until you reach the end point or pain is reproduced.
4. Pain in the arch indicates a positive test for dysfunction of the plantar fascia when the windlass mechanism is activated. If no pain is produced, perform the test during weight bearing.
5. Ask the client to stand on a chair, stair, or other stable surface that allows a secure stance with the metatarsal heads at the edge, so the toes are uninhibited.
6. Passively extend the metatarsophalangeal joint of the first toe until you reach the end range or pain is reproduced.
7. Pain in the arch indicates a positive test for dysfunction of the plantar fascia when the windlass mechanism is activated.



Figure 11-7 A and B The windlass test.

## Palpation Assessment

Dysfunction in any joint from the sacroiliac to the metatarsals may cause or result from plantar fasciitis. Because contributing factors may vary widely, it is essential to assess the tissues of each individual client from the hips to the toes. It should not be surprising to find minor or even major differences in the ways the tissues respond to this dysfunction.

Assess the ankle and foot for atypical temperature, color, and texture. You may find inflammation, adhesions, fibrotic tissue, or tenderness around the malleoli or calcaneus or in the intrinsic muscles of the foot. The tenderest spot may be felt at the anterior calcaneus, where the plantar fascia attaches to the calcaneal tubercle. The gastrocnemius and soleus may be tight and the calcaneal tendon may be thick and dense. If eversion of the ankle is a factor, the peroneus longus and brevis and the extensor digitorum longus may be short and tight.

Trigger points that refer pain into the heel and plantar surface of the foot may be found in the gastrocne-

mius, soleus, flexor digitorum longus, tibialis posterior, abductor hallucis, and quadratus plantae. See Figure 8 for common trigger points with referrals into the heel and plantar surface of the foot.



Figure 11-8 Common trigger points associated with plantar fasciitis and their referral patterns.

## CONDITION SPECIFIC MASSAGE

Because the causes of heel pain vary widely, the exact cause can be difficult to pinpoint and more than one condition may coexist. Systemic conditions that involve cautions or contraindications for massage may be the underlying cause of heel pain. If you feel uncertain that the client's symptoms are caused by irritation or inflammation of the plantar fascia or by any of the soft tissue dysfunctions listed earlier, refer the client to their health care provider for medical assessment prior to treatment with massage.

It is essential for the treatment to be relaxing. You are not likely to eliminate the symptoms associated with plantar fasciitis or any coexisting conditions in a single treatment. Do not attempt to do so by treating aggressively. Be sure to ask your client to let you know if the amount of pressure you are applying keeps them from relaxing. If the client responds by tensing muscles or has a facial expression that looks distressed, reduce

your pressure. Remember that you are working on tissue that is compromised. Ask the client to let you know if any part of your treatment reproduces symptoms, and always work within their tolerance. Deep palpation of a trigger point may cause pain at the upper end of the client’s tolerance. Explain this to your client, describe a pain scale and what level of pain should not be exceeded, and ask them to breathe deeply during the application of the technique. As the trigger point is deactivated, the referral pain will also diminish.

The following suggestions are for treating heel pain caused by irritation or inflammation of the plantar fascia with weak dorsiflexion and increased eversion of the ankle. This is the most common presentation, although each client should be assessed for individual needs. If the client has an acute injury, the protocol is PRICE. You may work conservatively proximal or distal to the site, but avoid the area of injury until the subacute or chronic stage.

#### Treatment Goals:



Increase circulation



Reduce adhesions



Reduce tone/tension



Lengthen tissue



Treat trigger points



Passive stretch



Clear area

- Begin in the prone position with the ankles bolstered to reduce passive plantar flexion of the ankle.



- If you notice any swelling, apply superficial draining strokes toward the nearest lymph nodes.



- If swelling is minor or absent, apply moist heat to the plantar flexors and calcaneal tendon.



- Use your initial warming strokes to increase superficial circulation, soften tissues, and assess the tissues from the low back down to the feet. You should be able to minimally assess the tissues of the low back, hips, and leg, which may help you to determine where to focus the time remaining after treating the lower leg.



- Before applying emollient, assess for and treat fascial restrictions in the lower leg. You may find restrictions along the gastrocnemius and soleus.



- Once the superficial tissues are pliable enough to allow for deeper work, apply lengthening strokes to tissues that are short and tight. Plantar flexors and evertors of the ankle include the gastrocnemius, soleus, peroneus longus and brevis, extensor digitorum longus, tibialis posterior, flexor digitorum longus, and flexor hallucis longus, although all of the muscles of the lower leg should be assessed. These muscles should be treated along their full length with special attention to the sections that cross the ankle.



- Treat any trigger points that are found.



- Apply moderate traction to the ankle to increase mobility between the talus and the tibia and fibula, which may improve dorsiflexion.



- Assess and treat the muscles of the foot if they are tight or adhered or contain trigger points. Gently knead the tissues between the metatarsals within the client’s tolerance.



- Soften the plantar fascia with kneading strokes. Begin superficially and progress into the deeper tissues (see Fig. 1).



- Once you feel pliability in the fascia, use cross-fiber strokes to reduce any adhesions. Treating the tissues near the calcaneal attachment may provide the greatest relief, but it is essential to take great care around this attachment, particularly in the first treatments, to avoid rupture of the tissue or encouraging bone spurs.



- Treat the flexor digitorum brevis, abductor digiti minimi, and abductor hallucis for hypertonicity, taking care with pressure at the calcaneal attachments.



- Apply lengthening strokes to the plantar fascia, beginning superficially and progressing to deeper tissues. Unless you are certain that there are no bone spurs or risk of rupture, apply strokes from the metatarsal heads toward the calcaneus to avoid pulling the plantar fascia away from the calcaneal attachment.



- Clear the leg from the foot toward the hips.



- Turn the client supine, and with the knee extended, stretch the plantar flexors, calcaneal tendon, and plantar fascia by performing passive dorsiflexion of the ankle and toes.

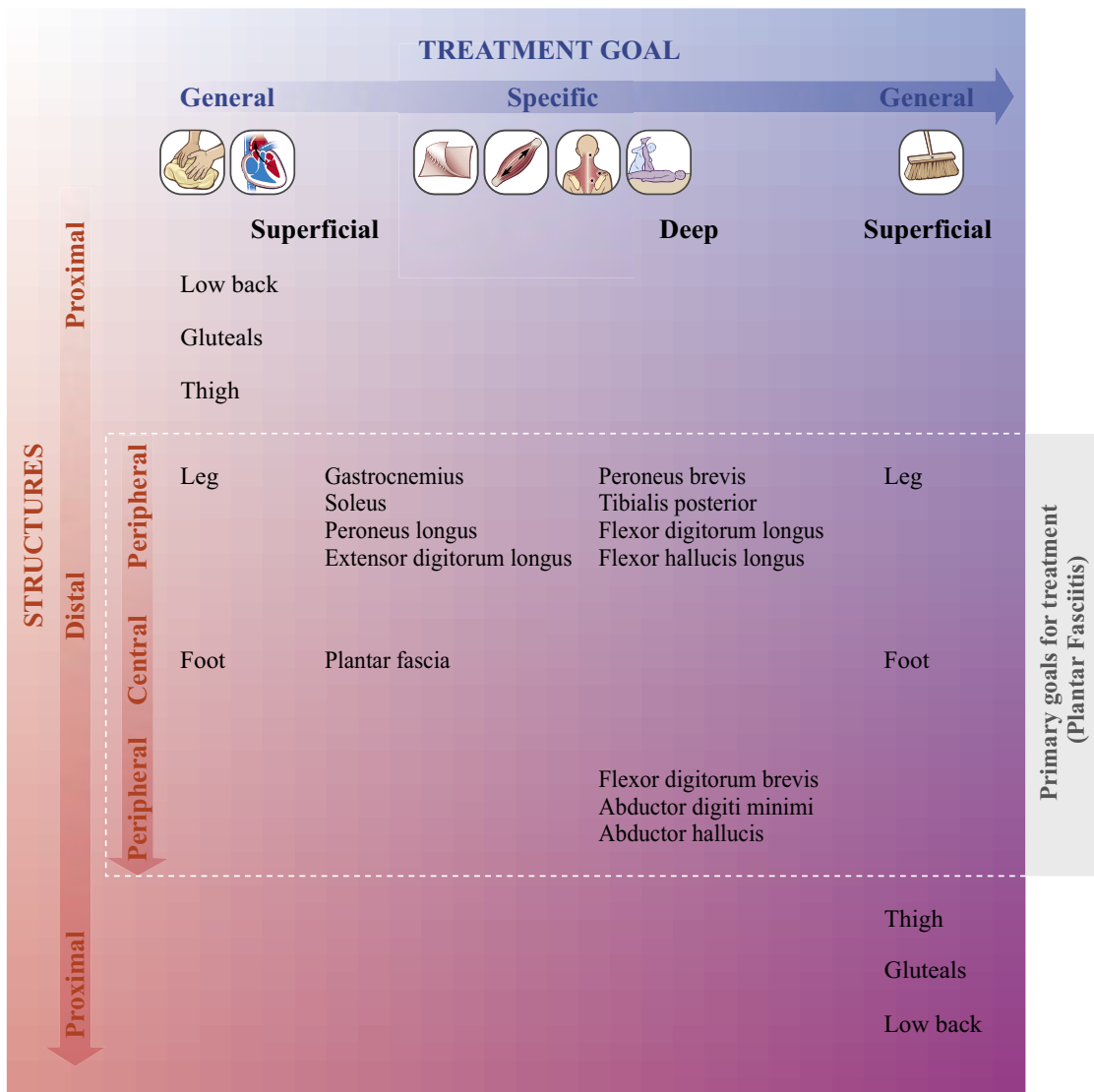


- Use PIR if you feel resistance to lengthening the plantar flexors.
- If time permits, assess and treat the muscles involved in any coexisting conditions.

## CLIENT SELF-CARE

When plantar fasciitis significantly reduces the client's activities of daily living, the individual should rest or at least minimize weight-bearing activity as much as possible to give the tissue time to initiate healing. Elevating the leg and applying ice to the plantar fascia are indicated to reduce inflammation. A client with chronic plantar fasciitis should also minimize weight-bearing activities that may re-injure tissues and prolong the healing process, reintroducing these activities as gradually as healing allows. That said, moderate activity to keep the tissues mobile and prevent chronic adhesions is an important part of the healing process. The client should be diligent in stretching the plantar flexors before activity. The client will likely benefit from wearing shoes with good arch support or tailored orthotic inserts to support pes cavus, slow the progression of pes planus, or to reduce eversion. Heel cups are used to cushion the heel of a client with fat pad atrophy. These should be used in all shoes and worn regularly, not just when participating in sports or other intensive activities. For chronic cases, the client may wear a night splint that prevents plantar flexion.

The following are intended as general recommendations for stretching and strengthening muscles involved in the client's condition. The objective is to create distance between the attachment sites of muscles that have shortened and to perform repetitions of movements that decrease the distance between the attachments of muscles that have weakened. If you have had no training in remedial exercises and do not feel that you have a functional understanding of stretching and strengthening, refer the client to a professional with training in this area.



Clients often neglect self-care due to time constraints. Encourage them to follow these guidelines:

- Instruct the client to perform self-care throughout the day, such as while talking on the phone, reading e-mail, washing dishes, or watching television instead of setting aside extra time.
- Encourage the client to take regular breaks from stationary postures or repetitive actions. If the client's daily activities include hours of sitting, suggest walking for at least a few minutes every hour to prevent the plantar fascia from tightening. If the client's daily activities require standing for long periods or repetitive actions that contribute to plantar fasciitis, suggest sitting for at least a few minutes every hour.
- Demonstrate gentle self-massage of the plantar fascia and the tissues surrounding the plantar fascia to keep adhesions and hypertonicity at bay between treatments. If no swelling is present, instruct the client to gently roll the foot over a tennis ball, can, or other sturdy round object, from the calcaneus to the metatarsals and back, to keep the tissues pliable. Soaking the feet in warm water prior to rolling over the object may soften the superficial tissues. If bone spurs are present, avoid the affected area or leave out this exercise.
- Demonstrate all strengthening exercises and stretches to your client and have them perform these in your presence before leaving to ensure that they are performing them properly and will not harm

himself or herself when practicing alone. Stretches should be held for 15–30 seconds and performed frequently throughout the day within the client’s limits. The client should not force the stretch or bounce. The stretch should be slow, gentle, and steady, trying to keep every other joint as relaxed as possible.

- Stretching and strengthening exercises should be recommended according to your findings in ROM testing and palpation.

## Stretching

Maintaining the proper length and tone of the plantar flexors is essential to reduce hyperflexion and eversion of the ankle and to reduce the flattening of the arch that may contribute to plantar fasciitis. Stretches should be performed throughout the day, particularly before and after activity.

Instruct the client to stand at an arm’s length away from a wall, leaning against it. Bring the toes of the unaffected foot forward close to the edge of the wall, and bend that knee. This will place the opposite, affected ankle into passive dorsiflexion. When the knee of the affected leg is extended, the gastrocnemius gets the best stretch. To stretch the soleus more, flex the knee of the affected leg. Both heels should be on the floor at all times, and the stretch should be held for 15–30 seconds or as long as is comfortable (Fig. 9). If the client is unable to keep the heel on the floor, instruct them to reduce the distance between the feet. Stretch the opposite ankle as needed.

To stretch the plantar flexors while seated, instruct the client to sit comfortably with the back supported, and then extend the knees, dorsiflex the ankles, and hold for 15–30 seconds (Fig. 10). This action also helps to strengthen the dorsiflexors. Suggest that the client repeat this action a few times, and then get up and walk around to mobilize the ankle and the foot.

If eversion is a contributing factor, instruct the client to simultaneously stretch the evertors and strengthen the invertors by actively inverting the ankle fully and holding for as long as it is comfortable. Repeat this action a few times, and then get up and walk around to mobilize the ankle.



Figure 11-9 Stretch the plantar flexors.



Figure 11-10 Stretch the plantar flexors.

## Strengthening

Strengthening the dorsiflexors may prime them to better oppose plantar flexion. The seated calf stretch described above also strengthens the dorsiflexors. In addition, strengthening the intrinsic muscles of the foot may increase their ability to absorb shock and maintain both flexibility and structural support. Instruct the client to perform exercises in which they grasp items with the toes. Begin with bigger, flexible items, like a towel. As the foot becomes stronger, gradually progress to smaller items, such as a pen or marbles, picking them up between the toes as well (Fig. 11). Drawing the alphabet in the air with the foot is a simple exercise for strengthening the ankle and improving ROM. Instruct the client to make the movements only as big as is comfortable and to draw only as many letters as possible until they feel fatigue.



Figure 11-11 Strengthen the muscles of the foot.

## SUGGESTIONS FOR FURTHER TREATMENT

Ideally, a client with plantar fasciitis will have treatments twice a week until they can perform activities of daily living with minimal or no pain for at least 4 days. Once this is achieved, reduce frequency to once per week until symptoms are absent for at least 7 days. When the client reports that they have been pain-free for more than 7 days, treatment can be reduced to twice per month. If the client is pain-free for 3 or more consecutive weeks, they can then schedule once per month or as necessary. If the client's symptoms are localized and other postural deviations are minimal, half-hour treatments may be sufficient to effect a change in plantar fasciitis. When treating plantar fasciitis caused by soft tissue dysfunction, there should be some improvement with each session. If this is not happening, consider the following possibilities:

- There is too much time between treatments. It is always best to give newly treated tissues 24–48 hours to adapt, but if too much time passes between treatments in the beginning, the client's activities of daily living may reverse any progress.
- The client is not adjusting activities of daily living or is not keeping up with self-care. As much as we want to fix the problem, we cannot force a client to make the adjustments we suggest. Explain the importance of their participation in the healing process, and encourage the client to follow your recommendations, but be careful not to judge or reprimand a client who does not.
- The condition is advanced or has other musculoskeletal complications that are beyond your basic training. Refer this client to a massage therapist with advanced clinical massage training. Continuing to treat a client whose case is beyond your training could turn the client away from massage therapy altogether and hinder healing.
- The client has an undiagnosed, underlying condition. Discontinue treatment until the client sees a health care provider for medical assessment.

If you are not treating the client in a clinical setting or private practice, you may not be able to take this client through the full program of healing. Still, if you can bring some relief in just one treatment, it may encourage the client to discuss this change with their health care provider and seek manual therapy rather than more aggressive treatment options. If the client agrees to return for regular treatments, the symptoms are likely to change each time, so it is important to perform an assessment before each session. Once you have released superficial tissues in general areas, you may be able to focus more of your treatment on deeper tissues in a specific area. Likewise, once you have treated the structures specific to plantar fasciitis, you may be able to pay closer attention to compensating structures and coexisting conditions.

## Professional Growth

### Case Study

*Dewan is a 45-year-old married male. Four years ago, he moved from a small Caribbean island, where he was a professional soccer player and coach, to the United States to attend university. He began feeling pain in his right foot approximately 1 month ago, which has gradually gotten worse.*

#### SUBJECTIVE

*Dewan complained of pain in his right foot, which began approximately 1 month ago and has gotten progressively worse. Prior to moving to the United States to attend school, Dewan was a professional soccer player and soccer coach. He played soccer nearly every day. After moving to the United States, his life has become more sedentary. Between his studies and work, he had little time for physical fitness. Now that he has completed his degree and secured a job, he has returned to coaching his son's high school soccer team. The pain in his right foot began within the first week of coaching soccer 3 days a week. When it first began, he felt the pain during practice and in the mornings after. When he had more than 48 hours between practices, he felt no pain. Over the past month, the pain has become more regular. He stated that he feels it most often in the morning, at the beginning of a practice, and in the evenings after practice. He stated that icing the foot brings temporary relief, but that his first steps in the morning and his first run of a practice are very painful. Because he goes to practice right after work, he has not made time to properly stretch before practice, and he stated that stretching after practice is painful.*

*Dewan described a healthy diet. He had several minor injuries to his legs and ankles while playing soccer that he stated never kept him from playing for more than a day or two with the exception of a kick to the posterior right leg that resulted in myositis ossificans. This required 1 week of rest followed by a few weeks of manual therapy to encourage reabsorption of calcium and to restore normal tone. He has not consulted his health care provider about his foot pain. His soccer team in the Caribbean had a full-time massage therapist on staff, and he thought massage might help his foot pain. His goal is to be able to continue coaching soccer without pain.*

#### OBJECTIVE

*Dewan appears very healthy and vibrant, lean and muscular. He showed no signs of pain or dysfunction when climbing the stairs, walking, or standing from a seated position. He sat with his feet flat on the floor.*

*Postural assessment revealed a slight increase in the kyphotic curve with internally rotated shoulders. His knees remain slightly flexed when standing, and his ankles are slightly everted bilaterally.*



*The four lateral toes of the right foot are hyperextended at the metatarsophalangeal joint, and flexed at the interphalangeal joint. The arches are within normal height, very slightly flatter on the right.*

*The passive dorsiflexion-eversion test reproduced a level 3 pain, on a scale of 1–10, near the calcaneus with no referral, numbness, or tingling. Tinel’s sign was negative for tarsal tunnel syndrome. Weight-bearing plantar flexion with passive extension of the toes, performed by asking the client to stand on his tip-toes, reproduced pain that the client suggested was closest to what he feels during activity. The non-weight-bearing windlass test was positive and produced pain at level 8. I did not perform the weight-bearing test. There is no visible or palpable swelling in the foot or ankle. The calcaneal tendon and superficial fascia into the mid calf are dense and adhered. There is an area of dimpled, dense tissue in the right leg just below the musculotendinous junction of the gastrocnemius. When asked, Dewan answered that this was the area of his past myositis ossificans. The right calcaneal tendon is less flexible than the left. The skin of the plantar surface of both feet is thick, dry, and cracked superficially around the edges of the heel. There was no local or specific pain with palpation of the calcaneus, and there is no indication of a bone spur. The tenderest spot on the sole of the foot is approximately 1 cm distal to the medial calcaneal tubercle. Still, only deep cross-fiber strokes reproduced pain at a level 3.*

### **ACTION**

*Treatment today focused on lengthening shortened plantar flexors, reducing adhesions in the intrinsic muscles of the feet, reducing adhesions and lengthening the plantar fascia. I treated both legs, with more aggressive treatment on the right. I began with general massage to the low back, gluteal area, and thighs bilaterally. Nothing remarkable was noted.*

*I used myofascial release on the posterior leg with special attention paid to the distal tendinous area. I used kneading followed by longitudinal gliding and deeper muscle stripping to the plantar flexors and evertors, namely the gastrocnemius, soleus, tibialis posterior, peroneus longus and brevis, and the extensor digitorum longus. I applied specific, localized cross-fiber strokes followed by superficial and deep muscle stripping to the area affected by myositis ossificans. A trigger point was found in the soleus, approximately 2 inches superior and slightly posterior to the lateral malleolus, and it referred into the heel. Ischemic compression followed by muscle stripping reduced pain from level 7 to level 3. I used cross-fiber strokes followed by longitudinal strokes to the calcaneal tendons bilaterally. There was no change in texture. I applied gentle kneading to the intrinsic muscles of the foot followed by longitudinal stripping between the metatarsals. I used gliding and kneading to warm and soften the plantar fascia until the tissue felt pliable enough to apply deeper pressure. I applied cross-fiber strokes to the plantar fascia, beginning superficially and slowly working deeper, avoiding the medial calcaneal tubercle until pain with the extension of the first toe reduced to a level 3. I also applied deep muscle stripping to the plantar fascia from distal to proximal. Finally, I used clearing strokes on the full leg.*

*Turning the client supine with no bolster, I stretched the plantar flexors and plantar fascia with a passive dorsiflexion of the ankle. This produced pain at the medial calcaneal tubercle at a level 2. Adding passive extension of the toes increased pain to level 6. Decreasing the extension of the toes reduced pain to a level 3. I held the stretch for 15 seconds. At the end of the stretch, the pain remained at level 3. I applied general Swedish techniques to the anterior leg. I found that the iliotibial bands were dense and adhered bilaterally. I cleared the whole leg, and then attempted to stretch the plantar flexors and plantar fascia again. Dorsiflexion alone produced no pain. Adding extension of the toes increased pain to a level 3. After holding the stretch for 15 seconds, the client’s pain reduced to a level 2.*

### **PLAN**

*As a life-long athlete, Dewan is familiar with stretching and strengthening exercises, so simple demonstrations were sufficient. His symptoms are not debilitating and do not severely hinder his*

*activities of daily living. For this reason, I think it is unnecessary for him to stop coaching but suggested that he take it slowly and be gentle on the feet until symptoms become less frequent. It is essential that he make time to thoroughly stretch the plantar flexors and plantar fascia before each practice. I suggested making this the first activity for the whole team at each practice. I recommended applying ice to the sole of the foot for approximately 3 minutes after practice. Icing for too long could stiffen the tissues and increase the risk of tearing. I also suggested stretching the plantar flexors and plantar fascia and strengthening the dorsiflexors by extending the knees and dorsiflexing the ankles while seated during the workday. I suggested avoiding extending the toes during this exercise until this action no longer produced pain greater than level 3.*

*Dewan will return for treatment 3 days from today and twice next week. As symptoms decrease and the risk of tearing is minimized, treatment can be reduced to once weekly.*

*I will plan to focus more intently on lengthening the flexor hallucis during the next treatment.*

## CRITICAL THINKING EXERCISES

1. 1. Excessive eversion of the ankles is commonly seen with plantar fasciitis and is described in the treatment guidelines above. Create a SOAP chart with history, assessment, and a treatment plan that describes a case of plantar fasciitis due to excessive inversion of the ankle. How might inversion of the ankle affect posture at the knees, hips, or low back? Treatment goals should include lengthening shortened tissues, strengthening weak muscles, and restoring proper neuromuscular function.
2. 2. A client calls to schedule a massage for foot pain. She states that she sprained the ankle of the affected leg a few times. She was also diagnosed with calcaneal tendonitis in the affected leg for which she received no treatment. A month or so after the diagnosis, the daily pain was gone, but the tendon continued to hurt when she stretched her calves deeply in yoga. Discuss the possible relationship between the injuries and plantar fasciitis. What questions would you ask this client? Are there questions that you need to ask her health care provider?
3. 3. Develop a 10-minute stretching and strengthening routine for a client that covers all of the muscles involved in plantar fasciitis. Use Box 11-1 and Figure 11-5 as a guide. Remember that a stretch increases the distance between the origin and insertion of a muscle and is important for those muscles that are shortened while strengthening is performed by actively bringing the origin and insertion closer together and is important for the antagonists of shortened muscles. Describe each step of the routine in enough detail that the client can refer to these descriptions in your absence and perform them without harm.
4. 4. Conduct a short literature review to learn about the relationship between symptoms resembling plantar fasciitis and the following:
  - Diabetes
  - Rheumatoid arthritis
  - Morton's toe
  - Night splinting

## BIBLIOGRAPHY AND SUGGESTED READINGS

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- Alshami AM, Souvlis T, Coppieters MW. A review of plantar heel pain of neural origin: Differential diagnosis and management. *Manual Therapy*. 2008;13(2):103–111.
- American College of Foot and Ankle Surgeons. Tarsal Tunnel Syndrome. Available at <http://www.footphysicians.com/footankleinfo/tarsal-tunnel-syndrome.htm#2>. Accessed Spring 2009.
- Barrett SL. A guide to neurogenic etiologies of heel pain. *Podiatry Today*. 2005;18(11):36–44. Available at <http://www.podiatrytoday.com/article/4735>. Accessed Spring 2009.
- Biel A. *Trail Guide to the Body: How to Locate Muscles, Bones and More*, 3rd ed. Boulder, CO: Books of Discovery, 2005.
- Bolgia LA, Malone TR. Plantar fasciitis and the windlass mechanism: A biomechanical link to clinical practice. *Journal of Athletic Training*. 2004;39(1):77–82.
- Burns J, Crosbie J, Hunt A, et al. The effect of pes cavus on foot pain and plantar pressure. *Clinical Biomechanics*. 2005;20(9):877–882.
- Clarkson HM. *Joint Motion and Function Assessment: A Research-Based Practical Guide*. Baltimore MD:, Lippincott Williams & Wilkins, 2005.
- Cornwall MW, McPoil TG. Plantar fasciitis: Etiology and treatment. *Journal of Orthopaedic and Sports Physical Therapy*. 1999;29(12):756–760.
- Hambrick T. Plantar fasciitis: A chiropractic perspective. *Journal of Bodywork and Movement Therapies*. 2001;5:49–55.
- Hertling D, Kessler RM. *Management of Common Musculoskeletal Disorders: Physical Therapy Principles and Methods*, 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins, 2006.
- Kullman J, Steinbock K. Plantar fasciitis: Chinese medicine perspective. *Journal of Bodywork and Movement Therapies*. 2001;5(1):31–33.
- Lowe W. *Orthopedic Massage: Theory and Technique*. St Louis MO:, Mosby-Elsevier, 2003.
- Mayo Foundation for Medical Education and Research. Bursitis. Available at <http://www.mayoclinic.com/health/bursitis/DS00032>. Accessed Spring 2009.
- Mayo Foundation for Medical Education and Research. Plantar Fasciitis. Available at <http://www.mayoclinic.com/health/plantar-fasciitis/DS00508>. Accessed Spring 2009.
- Mayo Foundation for Medical Education and Research. Rheumatoid Arthritis. Available at <http://www.mayoclinic.com/health/rheumatoid-arthritis/DS00020>. Accessed Winter 2009.
- McPoil TG, Martin RL, Cornwall MW, et al. Heel pain–plantar fasciitis: Clinical practice guidelines linked to the International Classification of Functioning, Disability, and Health (ICF), presented by the Orthopaedic Section of the American Physical Therapy Association. *Journal of Orthopaedic & Sports Physical Therapy*. 2008;38(4):A1–A18.
- Oatis C. *Kinesiology: The Mechanics and Pathomechanics of Human Movement*, 2nd ed. Baltimore, MD: Lippincott Williams & Wilkins, 2009.
- Potts J. Plantar Fasciitis: Physical therapy perspective. *Journal of Bodywork and Movement Therapies*. 2001; 5:45–49.
- Rattray F, Ludwig L. *Clinical Massage Therapy: Understanding, Assessing and Treating over 70 Conditions*. Toronto ON:, Talus Incorporated, 2000.
- Rosenholz C. Plantar fasciitis: Body-mind perspective. *Journal of Bodywork and Movement Therapies*. 2001; 5: 33–36.
- Rosenholz C. Plantar fasciitis: Introduction. *Journal of Bodywork and Movement Therapies*. 2001;5:29–30.
- Simons DG, Travell JG, Simons LS. *Myofascial Pain and Dysfunction: The Trigger Point Manual*, 2nd ed. Philadelphia, PA: Lippincott Williams & Wilkins, 1999.
- U.S. National Library of Medicine and the National Institutes of Health. Broken Bone. Available at <http://www.nlm.nih.gov/medlineplus/ency/article/000001.htm>. Accessed Spring 2009.
- U.S. National Library of Medicine and the National Institutes of Health. Gout. Available at <http://www.nlm.nih.gov/medlineplus/ency/article/000424.htm#Symptoms>. Accessed Winter 2009.
- U.S. National Library of Medicine and the National Institutes of Health. Reactive Arthritis. Available at <https://www.nlm.nih.gov/medlineplus/ency/article/000440.htm>. Accessed Spring 2009.
- Werner R. *A Massage Therapist's Guide to Pathology*, 4th ed. Philadelphia, PA: Lippincott Williams and Wilkins, 2009.
- Witt P. Plantar Fasciitis: Neuromuscular perspective. *Journal of Bodywork and Movement Therapies*. 2001; 5: 36–45.
- Young B, Walker MJ, Strunce J, et al. A combined treatment approach emphasizing impairment-based manual physical therapy for plantar heel pain: A case series. *Journal of Orthopaedic & Sports Physical Therapy*. 2004;34(11):725–733.