



**HOOSIER**  
PHYSICAL THERAPY

## PLANTAR FASCIITIS



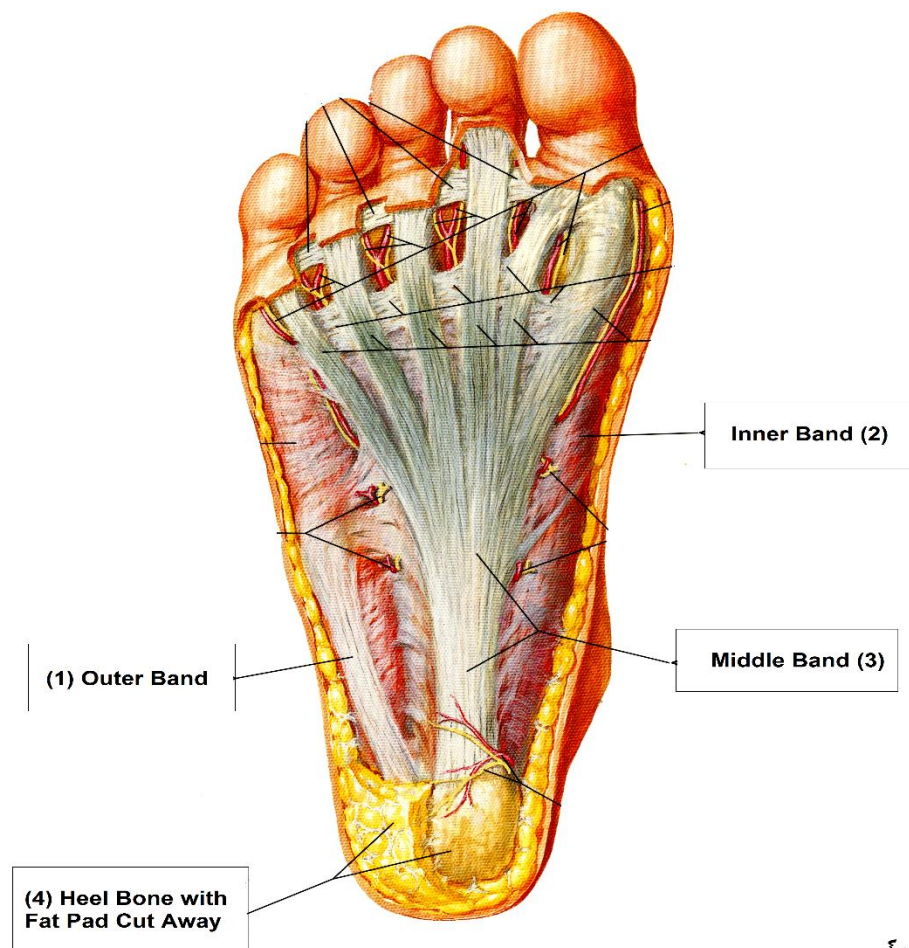
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## Prevalence:

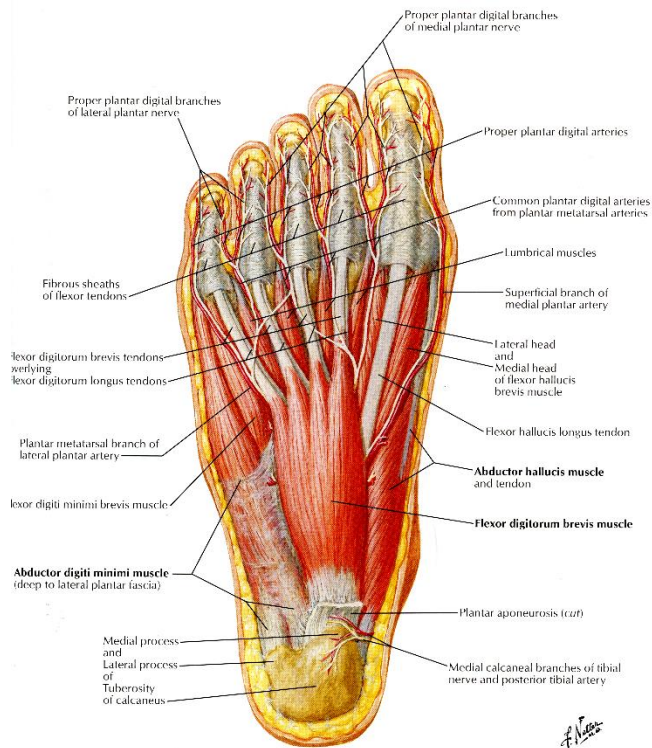
- Plantar fasciitis is the most common foot condition treated by healthcare provider.
- Plantar fasciitis occurs in approximately 2 million Americans each year and affects as much as 10% of the population over the course of a lifetime.

## Anatomy:

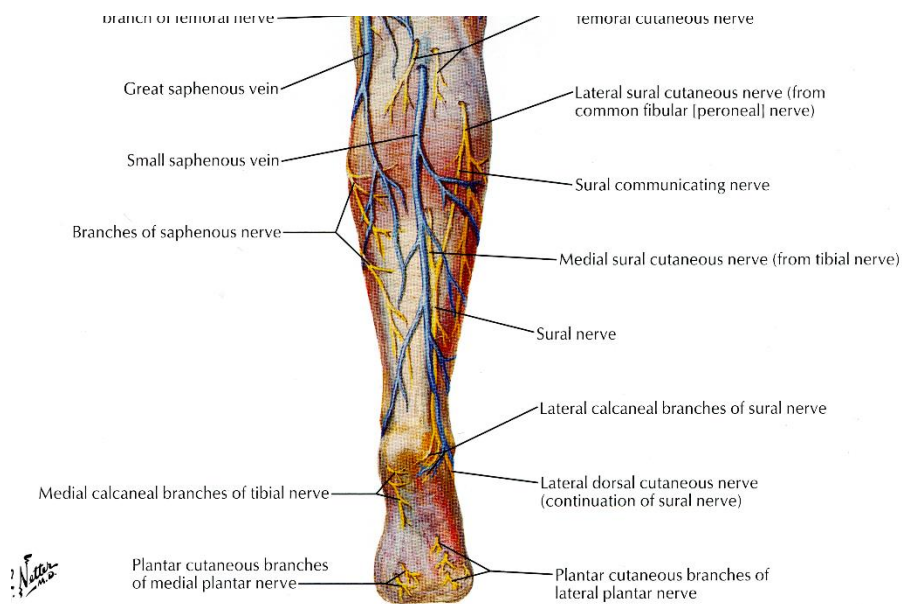
- The plantar fascia consists of three fibrous bands: two smaller thinner bands (1) outer band and (2) inner band, and a thicker larger, (3) middle band.
- The middle band travels from the heel bone (4) and eventually forming single bands attaching to each of the five toe bones.



■ A number of muscles on the underside of the foot also travel from the heel bone to the toes.



■ The plantar fascia has a direct connection with the connective tissue that surrounds the calf muscle.



## How Injury Occurs:

- The plantar fascia is like a rubber band and loosens and tightens with movement. Because of this function, repetitive or excessive stress on the tissue and lead to tears and inflammation and tissue degeneration near the heel bone.
- Bone spurs are frequently mentioned in connection with plantar fasciitis. A heel spur most often results from tension placed on the bone from fascial structures that originate from the heel bone. The presence of a heel spur is not diagnostic in and of itself, nor does it indicate heel pain.

## Symptoms:

- An unknown onset of pain under the undersurface of the heel upon standing after a period of non-weight bearing.
- This pain in the underside of the heel and is most noticeable in the morning with the first steps after waking or after a period of inactivity.
- In some cases, the pain is so severe that it results in a limp.
- Heel pain will lessen with increasing levels of activity (i.e., walking, running), but will tend to worsen toward the end of the day.
- A recent change in activity level is common, such as increased distance with walking or running, or an employment change that requires more time standing or walking.
- In most cases the pain is sharp and localized on the underside of the heel, with numbness and tingling being uncommon.

## Risk Factors:

- Limited ankle dorsiflexion (bending of the ankle upwards) range of motion.
- High body mass index greater than 30 in nonathletic populations as predisposing factors for the development of plantar fasciitis.

$$\text{BMI} = \left[ \frac{\text{weight in pounds}}{(\text{height in inches}) \times (\text{height in inches})} \right] \times 703$$

## Prognosis:

- Although plantar fasciitis can seem quite debilitating during its initial phase, it rarely causes lifelong problems.
- Based on long-term follow-up data in case series comprised primarily of patients seen in an orthopaedic outpatient setting, the clinical course for most patients was positive, with 80% reporting resolution of symptoms within a 12-month period.
- Operative treatment can be very helpful in selected “failed” patients; the success rate of surgery is 50% to 85%.

## Interventions:

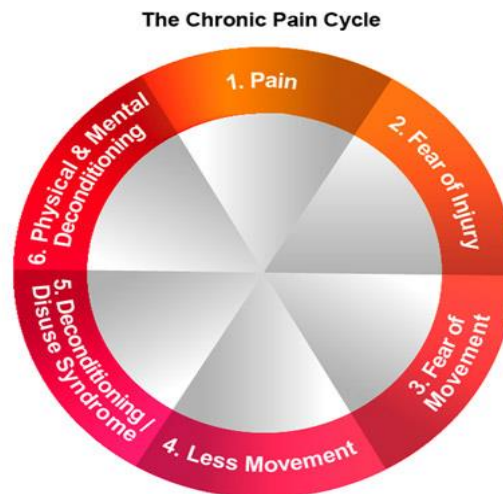
### 1. Protection-Relative Rest

- Protect or provide relative rest to the area by avoiding activities and movements that cause pain beyond a tolerable level. Do move the area in a range that is not painful or tolerable. Movement allows the injured tissue to heal along the normal stress lines of the joint; therefore allowing greater tissue strength after healing is completed. Movement also helps pump out any fluid that has accumulated in the soft tissue from injury, and it pumps in nutrients necessary for healing. Movement helps keep muscle tissue strong, and it helps reduce scar tissue and adhesion formation. This is why bed rest is no longer routinely recommended for low back pain. A walking boot is commonly recommended.
- Let pain be your guideline for what activities that you should and should not do and how much you should and should not do.

### 2: Balms-Creams



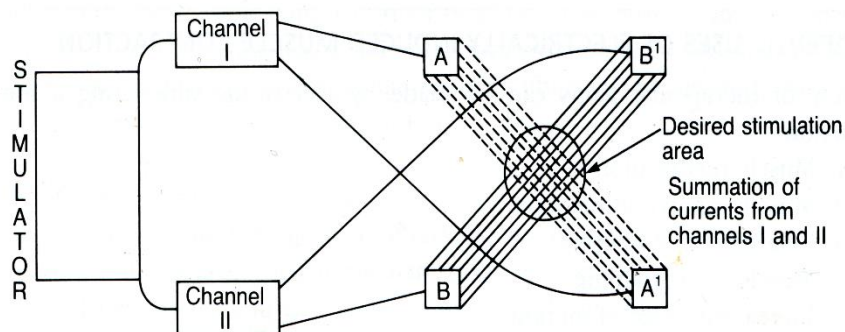
- Analgesic balms or crèmes such as SOMBRA and BIOFREEZE help break the pain cycle, thus decreased pain = increased movement = increased healing.



- SOMBRA also contains capsaicin, the substance that makes chili peppers so hot; have been found to reduce pain in patients when topically applied repeatedly over several weeks. Researchers have found that capsaicin appears to work by reducing substance P that is found at nerve endings and is involved in transmitting the pain signal to the brain.
- Creams can be applied up to three times a day.

### 3. Modalities

#### ■ Electrical Stimulation



- increases blood flow for accelerated healing
- increases permeability of cells
- releases natural pain killers such as endorphins
- helps break the pain cycle

## ■ Cold Laser



-accelerates repair of the injured tissue through a photochemical effect

## ■ Ice

Ice relieves pain through the stimulation of endorphins—a natural painkiller released by the body. Also, congestion in the area due to swelling inhibits oxygen flow to the cells of the healing tissue, thus causing impaired healing and cell death. Ice helps to slow down the metabolic rate of the cell. Ice packs may be applied for 10 to 20 minutes every two hours. If reapplying, wait 2 hours in order to allow the skin to rewarm. Ice massage is another way to apply ice. Fill a Dixie cup or a Styrofoam cup with water and freeze it. Tear off  $\frac{1}{4}$  to  $\frac{1}{2}$  of the cup bottom, and directly massage the injured area for 5 to 10 minutes. You might experience the following sensations, in order, during the application: coldness, aching, burning, and numbness. Use circular motions and be sure to place a towel under the treated area to catch any dripping water. If reapplying, wait 2 hours in order to allow the skin to rewarm.

## ■ Heat

When using heat, consider using moist heat than dry heat. Dry heat robs moisture from muscles and skin, which are primarily composed of water. Moist heat may be applied for 20 minutes. If reapplying, wait 2 hours in order for the skin to return to its normal temperature.

☒ Alternating heat and ice is also an option. For example, moist heat 10 minutes followed by ice for 10 minutes. If reapplying, wait 2 hours.

## 4. Manual Therapy

- Augmented Soft Tissue Mobilization (ASTM > Graston)



- separates and breaks down scar tissue
- increases the rate and amount of blood flow to and from the area
- increases cellular activity in the region for healing

- Joint Mobilization:



- improves joint flexibility for increased range of motion

## 5. Dry Needling



Dry needling requires the use of a thin monofilament needle as used in the practice of acupuncture. The technique does not use a hollow bore needle to deliver a liquid agent such as cortisone or other liquid agents used in medicine thus the name "dry" needling. Dry needling is a skilled therapeutic intervention in which fine "acupuncture" needles are inserted into myofascial trigger points (painful knots in muscles), tendons, scar tissue, fascial adhesions, ligaments, or near nerves to stimulate a healing response in painful neuromusculoskeletal conditions.

For more information visit: <https://hoosierpt.com/files/pdf/Dry-Needling.pdf>



## 6. Exercise

☞ all exercises should be performed obeying your pain threshold

■ Before arising or with periods of inactivity:

1. Ankle Dorsiflexion without toe extension: place hand as shown on the front of the foot and bend the ankle upward 15- 20 times



2. Ankle Dorsiflexion with toe extension: place hand as shown on the toes, bends the toes upward followed by bending the ankle upward 15- 20 times



3. Maintained Ankle-Toe Dorsiflexion with toe extension with Deep Massage  
5 minutes: bend toes and ankle upwards, spend up to 5 minutes massaging  
the area as shown in a stroking motion from back to front



## ■ Stretching

### -Seated Calf Stretch:

Wrap a belt or towel around the ball of the foot, keep the knee straight while pulling upwards to bend the ankle until you feel a stretch in back of the leg, hold for 3 minutes for 1 repetition or 30 seconds for 3-4 repetitions, 2x a day. May repeat with the knee slightly bent to reach the lower calf area



Note: The plantar fascia spans from the heel to the all toes and has a direct connection with the connective tissue that surrounds the calf muscle. The Stretch-EZ allows for a more functional type stretching to include the entire plantar fascia and connective tissue of the calf:



### -Standing Calf Stretch

Hold for 3 minutes for 1 repetition or 30 seconds for 3-4 repetitions, 2x a day. May repeat with the knee slightly bent to reach the lower calf area



### ■ Strengthening

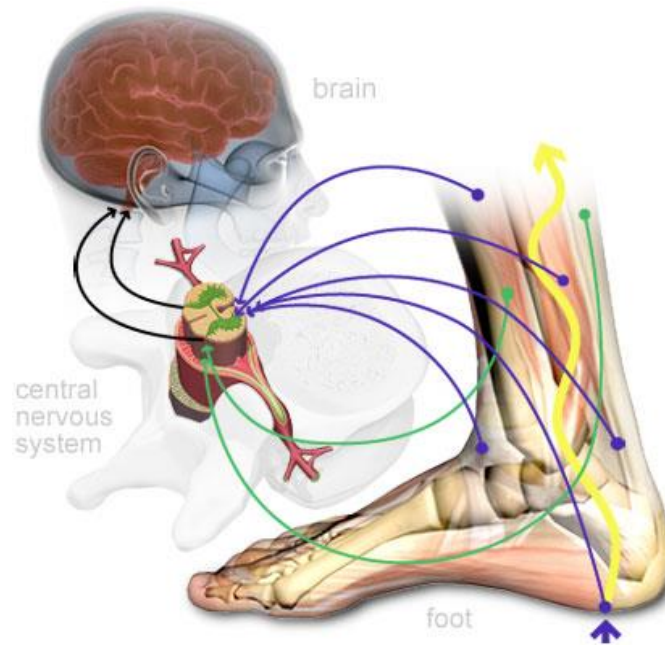
-Towel Scrunch: place a towel on a slippery surface such as a tile floor or cookie sheet, scrunch towel with your toes up to 25 repetitions, 2x a day



-Place marbles on one side of the cup, 25 repetitions on one side then repeat on the other side 2x a day



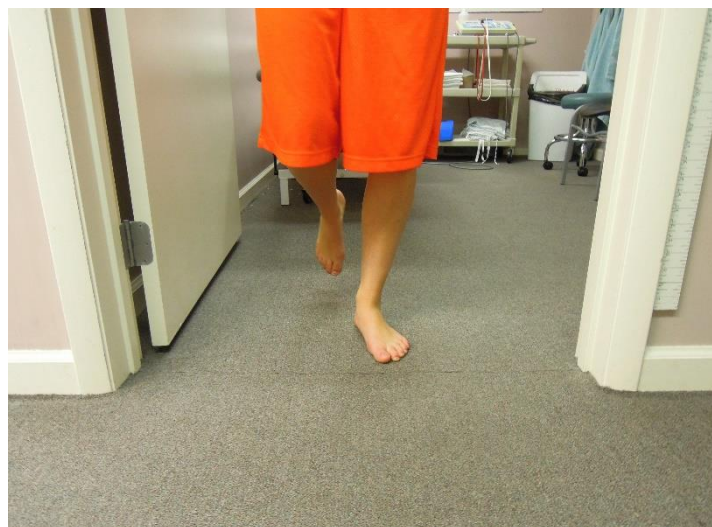
■ Proprioception



The body's ability to sense position subconsciously through mechanical receptors in muscle to allow a response from the brain for joint protection through muscle control. Balance activities help retrain this system. The foot has a very high concentration of mechanical receptors.

#### -Single Leg Stance

Stand in door frame to steady yourself as needed for safety, stand on one leg  
 Hold for 30 seconds, 10 repetitions, 2x a day  
 May increase difficulty by closing eyes, read from a magazine, or stand on a pillow



### 6. Supplemental Strengthening Exercises for the Lumbar Spine, Hip & Ankle-Foot



☞ The lumbar spine and hip joint play an important role in stabilizing the lower extremity thus helping in decreasing stress on the foot.

Abdominal bracing is the act of “stiffening” or “tightening” the muscles of the midsection by forming a brace of muscles around the spine to provide stability.

This “stiffening” of the core muscles should be used with all activities to protect the low back.



Tighten the abdominal muscles gently in their natural location by pressing down on a pillow or ball on a table top, do not pull in or push out the abdominal wall, squeeze buttock muscles, hold for 5 seconds, repeat up to 25 x, 2x a day

**Clam:**

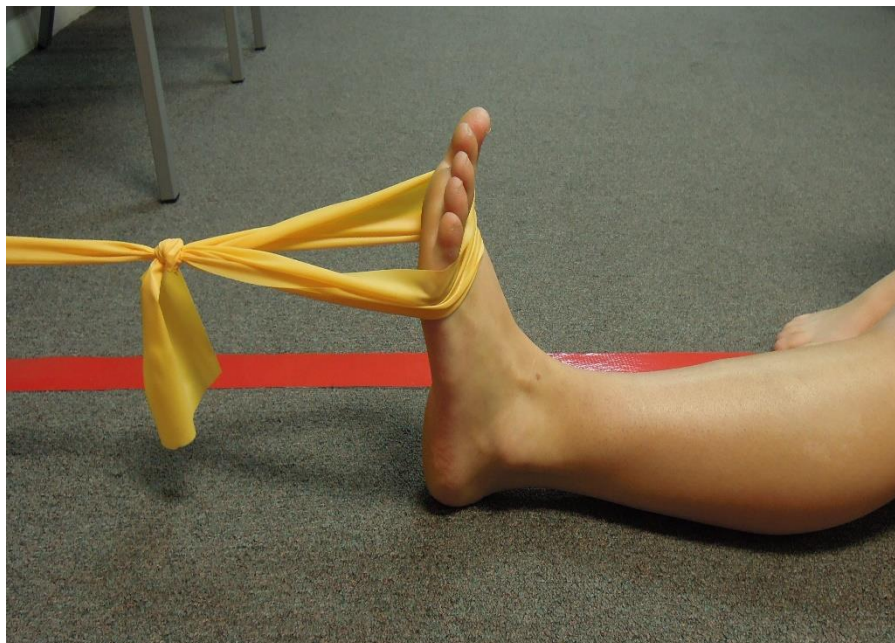


Lie on side with hips and knees slightly bent  
Keep pelvic bone straight up and down or rolled slightly forward  
Brace abdominal muscles  
Keep feet together bring knees apart  
Do not allow pelvic bone to tilt backwards  
Hold 5 seconds, slowly lower over a count of 4 seconds build up to 25 repetitions, 2 x a  
day  
☞ Progress by making a loop with Rep Band  
**peach>orange>green>blue>plum**

## Rep Band Exercises:

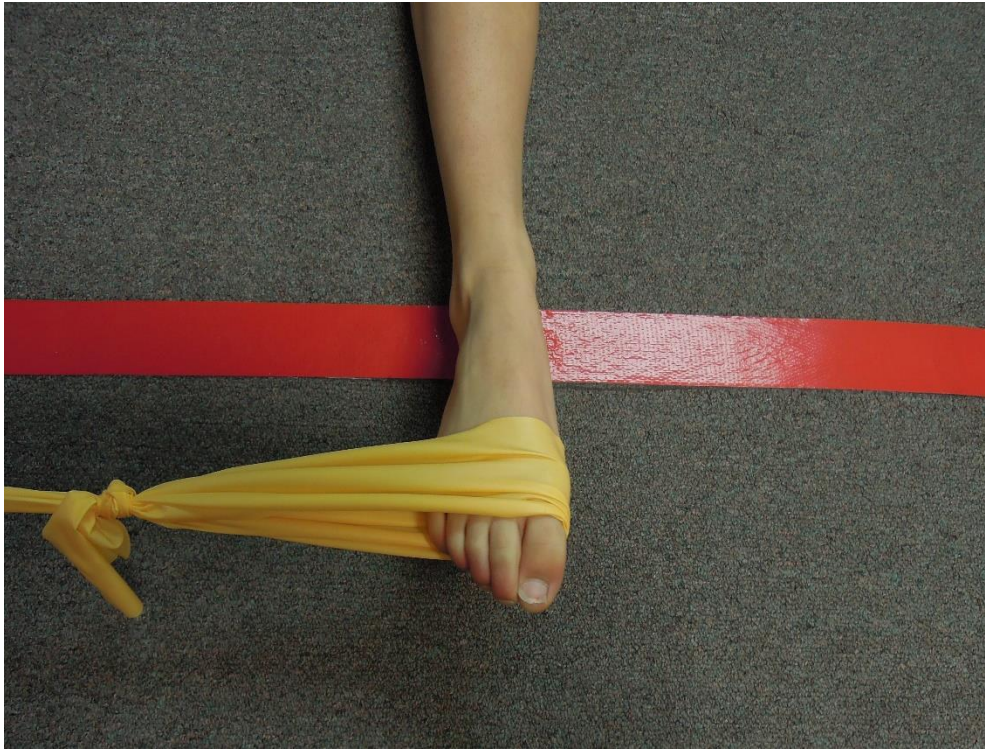
☞ When one band is mastered for 25 repetitions, 2x a day, move to the next band in the strength progression: **peach>orange>green>blue>plum**

-Dorsiflexion



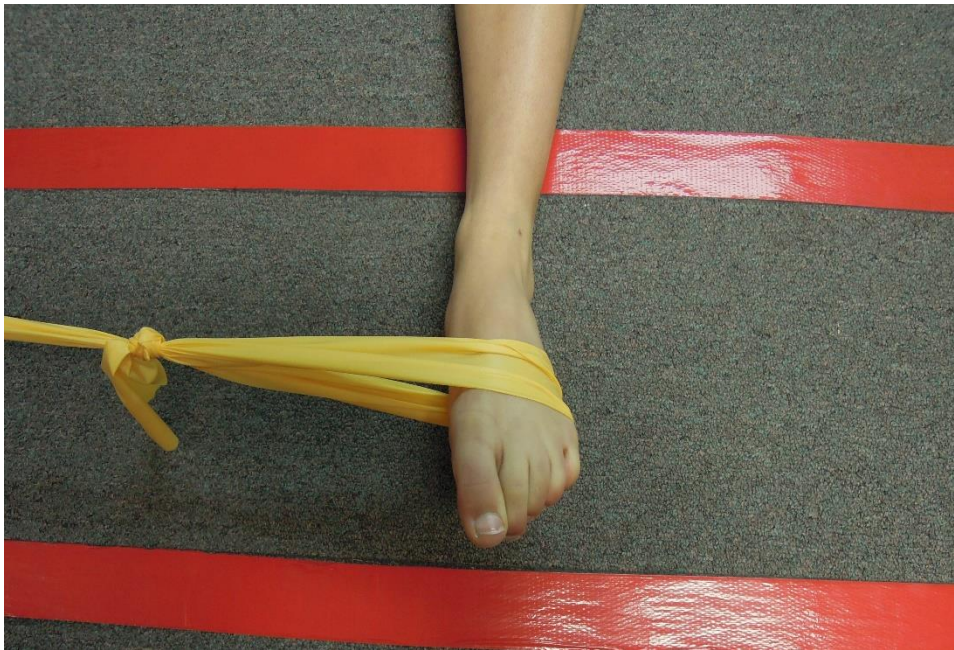
Wrap band around the front part of the foot as show, bend ankle upward, hold for 1-2 seconds, slowly return over a count of four seconds

-Plantarflexion-Inversion



Wrap band around the front part of the foot as show, point foot down, turn foot inward, hold for 1-2 seconds, slowly return over a count of four seconds

-Plantarflexion-Eversion



Wrap band around the front part of the foot as show, point foot down, turn foot outward, hold for 1-2 seconds, slowly return over a count of four seconds

## -Heel Raise

Hold 1-2 seconds, slowly lower over a count of 4 seconds  
Build up to 25 repetitions, 2 x a day



## **7. Shoes**

Most people with heel pain will benefit from shoes with the following features:

1. Stable heel counter and torsional stability. Shoes with these features help stop the heel of the foot from rolling in. When the heel rolls in the foot lengthens and tension increases on the plantar fascia. So more stable shoes like this can help reduce tension on the plantar fascia.
2. Extra cushion under the heel. Cushioning helps to slow the velocity of the foot as it strikes the ground and thus will reduce force through the heel.
3. Rocker sole. A rocker sole can help reduce pressure off of the heel by reducing the amount of the time the heel spends on the ground.

Below are shoe brands and models that contain one or more of these criteria that work well with heel pain:

Hoka: Most models have fair to excellent stability and exceptional cushioning under the heel. Many also have a rocker sole. They're not for everyone (no shoe is) but many people with heel pain find them very comfortable.

Brooks: Many Brooks shoes have excellent torsional stability and a stable heel counter. We often recommend the Adrenaline and Addiction models to patients with heel pain

Visit [https://hoosierpt.com/files/pdf/2023\\_shoe\\_recommendations.pdf](https://hoosierpt.com/files/pdf/2023_shoe_recommendations.pdf) for more information.

## 8. Orthotic Devices

- Prefabricated or custom foot orthoses can be used to provide short-term reduction in pain and improvement in function.
- There appears to be no difference in the amount of pain reduction or improved function created by custom foot orthoses in comparison to prefabricated orthoses.



## 9. Night Splints

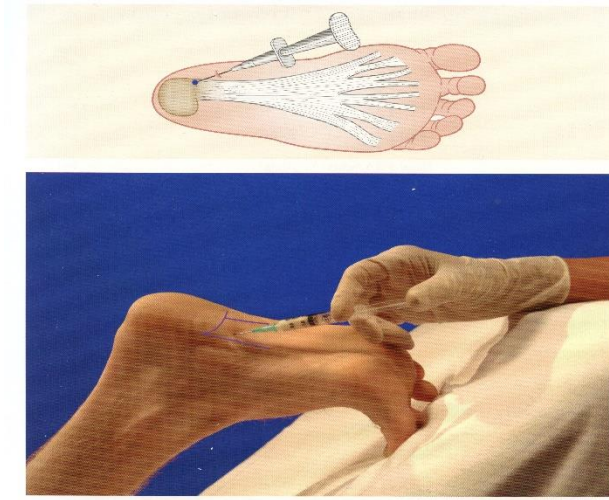
- Night splints should be considered as an intervention for patients with symptoms greater than 6 months in duration. The desired length of time for wearing the night splint is 1 to 3 months.
- The type of night splint used (i.e., posterior, anterior, sock-type) does not appear to affect the outcome.





## 10. Anti-inflammatory Agents-Cortisone Injections

- Clinical trials evaluating the use of NSAIDs in isolation have not been conducted. NSAIDs such as Naproxen and Mobic stop prostaglandin formation, chemicals that activate pain signals to the brain.
- There is limited evidence to support the use of steroid injection to provide short-term pain relief. A major concern with steroid injection has been the risk of subsequent plantar fascia rupture and plantar fat pad degeneration.



## 11. Surgery

- Operative treatment can be helpful in selected “failed” patients; the success rate of surgery is 50% to 85%.