# Preventative Exercises for Plantar Fascia

## Outline

1. Towel Exercises x 20
2. Toe walk x 15 each foot
3. Knee pointers (both legs) x 7 all directions
4. Shin exercises with band x 10 each foot

## Towel Exercises

Value for runners: This exercise helps strengthen your arch and the hundreds of tiny muscles in your foot. By making these tiny muscles stronger, you'll take pressure off your arch and plantar fascia and prevent the "pulling away" from the heel bone that aggravates the injury.

Instructions and variations: Put a towel on the ground (preferably a slippery surface like a hardwood floor) and scrunch the towel together using only your toes.

## Toe walk

Value for runners: Toe walking helps to develop the eccentric (support) strength and mobility in the muscles of the foot and calf, as well as the plantar fascia and Achilles tendon. The exercise also works the foot and ankle through a full range of motion. Toe walking also improves balance and stability, which are critical factors for improving efficiency, especially if transitioning to barefoot running.

Instructions and variations: Only drop the heel of your foot slightly with each step (not all the way to the ground) and focus on flexing your foot and ankle to get as far on your toe as possible. Walk for 30 steps (15 each foot)

## Knee Pointers (Both Legs)

*(front pointer start)*

*(front pointer end)*

*(side (left) pointer end)*

*(side (right) pointer end)*

Value for runners: The frontal-plane and rotational movement of the knee during the knee pointer exercise forces the Achilles tendon to undergo rotation. The rotational component of the stretch ensures that Achilles flexibility is developed in both the transverse (rotational) plane as well as the sagittal (side-to-side) plane.

Instructions and variations: Stand with your toes 2-3 inches away from a wall. Keep your weight on your heels. With your heels on the ground, slowly bend your knees until they touch the wall. (Count for 5 seconds on the way down.) Without resting your knees against the wall, hold your knees in the bent position for two seconds and then return to the starting position. Repeat, but this time move your knees at a thirty degree angle to the right. The movement should come from the ankles and not by rotating your feet or twisting your hips. Repeat again moving your knees at a thirty degree angle to the left. Repeat 7 times in each direction for 21 total repetitions.

## Single Leg Pointers

Value for runners: This is the same exercise as above, but standing on one leg increases the need for balance and therefore difficulty.

Instructions: If this exercise becomes easy you can stand on a bosu ball or other unstable surface. Repeat 7 times in each direction for 21 total repetitions.

# Shin exercises with Theraband

*(push down)*

*(Inside)*

*(outside)*

*(pull forward)*

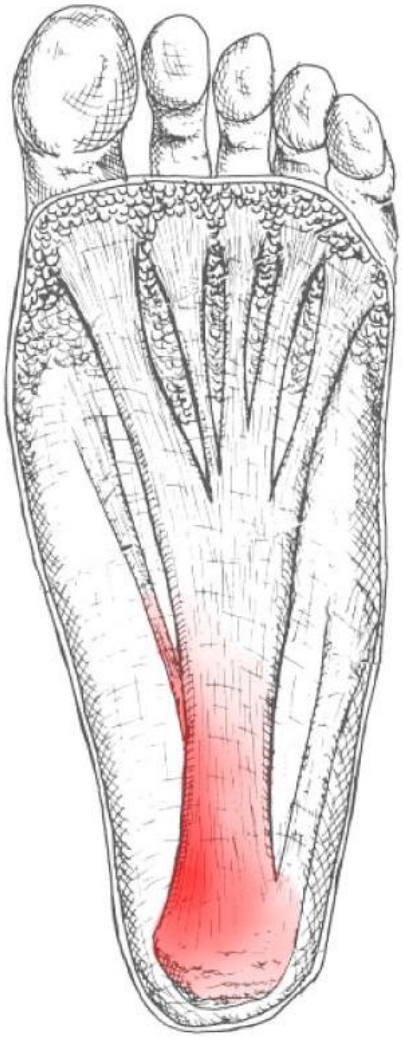
Value for runners: These exercises strengthen the ankle and the shin muscles using the added resistance of a theraband. These are very helpful for preventing shin splints and increasing ankle strength and proprioception.

Notes: Perform 15-20 repetitions each moving inside, outside, and up.

# Plantar Fasciitis

## Part 1: About the injury

Plantar fasciitis, an irritation to the tough, fibrous tissue at the base of the heel, is one of the most bothersome running injuries due to its infamous stubborn nature. Athletes with plantar fasciitis can sometimes have heel pain for months or even years before the fascia finally heals. Because of this, it is very important to catch and treat plantar fasciitis quickly. Fortunately, with proper treatment, most cases do come around in a matter of weeks.



The plantar fascia is a thick band of fibers that runs from the base of the heel to the metatarsal heads. It has several branches, any of which may become injured, but by far the most common area of the plantar fascia that's hurt is the very base of the innermost bundle of fibers, right at the base of the heel. Plantar fasciitis will hurt the worst at the beginning of a run, but will gradually go away once you get warmed up. It may return again at the end of the run, and will be more severe in less-supportive shoes or when barefoot. Your arch or heel may also hurt after a long day on your feet, especially in hard or uncomfortable shoes. The most tell-tale symptom is "first step pain": a sharp, stabbing pain at the base of the heel immediately after you get out of bed in the morning.

Plantar fasciitis accounts for around eight percent of all running injuries,[1] and is common among runners of all ability levels, and is even a problem for sedentary people, where obesity and working long hours while standing are probably the driving causes. Runners, of course, face additional issues due to the forces associated with running, but you shouldn't overlook your footwear or habits in the rest of your life if you come down with a case of plantar fasciitis. Women's footwear is especially bad with respect to strain on the arch, but unsupportive hard-soled men's shoes are problematic too.

## Part 2: Causes, what irritates it, what's happening

Unfortunately, the root causes of plantar fasciitis are still not fully understood. There are, however, some clues. Some studies have found a connection between poor ankle range of motion, especially in dorsiflexion,[2, 3] which implies that calf tightness plays a role in the development of plantar fasciitis. Indeed, the plantar fascia itself is in many ways simply a continuation of the Achilles tendon, which anchors the calf muscles to the heel bone. Like a cable that angles around a corner, tight calves could put excessive tension on the plantar fascia, increasing the risk of injury. As mentioned earlier, obesity and time spent on your feet are risk factors as well,[2] though these are not as often a problem for runners. However, they do indicate that putting high strains on the foot is problematic, and new research out of the University of Delaware has connected high impact loading rates with plantar fasciitis.[4]

The plantar fascia is also forced to absorb significantly more strain when you wear hard, flat shoes or walk around barefoot. While the dynamics of "arch support" are not fully understood from a biomechanical perspective, it's fairly obvious to most sufferers of arch pain that a cushioned, supportive surface feels better on the foot than a hard, flat one.

## Part 3: Research backed treatment options

To that end, the first goal of treatment should be to protect the plantar fascia from additional strain while it is injured. While the "-itis" suffix implies that inflammation is the cause of plantar heel pain, new evidence indicates that the real problem is damage and degeneration of the fascial fibers[5]—icing is always a good idea, but it's not an excuse to continue to strain the plantar fascia with long runs, hard workouts, or unsupportive shoes. Aggressive rehabilitation, combined with avoiding activities that hurt, are your best chance for a speedy recovery.

Several conservative treatment methods are supported by scientific research. These treatments are all designed either to protect the arch or stretch the plantar fascia/calf muscle complex.

Several studies support arch taping, called "low-Dye taping" in medical circles after Ralph W. Dye, the inventor.[6] While there are several ways to do a low-Dye taping, even its most basic form is effective. The magnitude of the effect, however, is small, so arch taping is only one part of a rehabilitation plan.

*Instructions for a low-Dye taping. The lateral straps (lower left, lower right) should be pulled reasonably firmly and should always come FROM the outside of the foot TO the inside.*

Supporting the arch with a custom or over-the-counter orthotic is another strategy that can protect the arch while it heals. It's unclear whether there is a significant difference between custom orthotics or a rigid over-the-counter orthotic like SuperFeet Green or Powerstep insoles when it comes to treating plantar fasciitis.[7] While they may not be tailored for your foot, over-the-counter insoles are not nearly as expensive and are available immediately—you'll have to wait at least a few weeks for a pair of custom orthotics. Avoid soft gel arch supports, as they'll likely do nothing to help your injury. In a similar vein, many runners find that wearing casual shoes with more arch support (including Birkenstocks and other brands of cork-soled shoes/sandals) relieves their symptoms.

Calf stretching, foot stretching, and using a night splint are the final three conservative treatments vetted by research. All three treatments are designed to stretch out the calf/Achilles/plantar fascia complex, reducing tension and strain on the arch.

For lack of any superior exercise, regular calf stretching is the mainstay of most plantar fasciitis treatment programs. Calf stretching should be done several times a day,

including right away in the morning. A typical protocol would be three sets of 30 seconds, three times per day, stretching with the knee straight and bent each session.

*Calf stretches, with both a straight knee (top) and a bent knee (bottom)*

One study compared a calf stretching protocol to a plantar fascia-specific foot stretch, held for 10x10 seconds, three times per day, and pictured below.[8]

*Plantar fascia-specific stretch. Note that all the toes are stretched, not just the big toe.*

This study found better results from the plantar fascia specific stretch; the authors hypothesized that the advantage of the foot stretch is that it recreates the Windlass mechanism, the pulley-like connection between the plantar fascia, heel, Achilles tendon, and calf.

Night splinting is another treatment which aims to stretch out the plantar fascia. As its name suggests, a night splint is a device you wear while you sleep which keeps your

ankle dorsiflexed. The theory is that the "first-step pain" that is the hallmark of plantar fasciitis is caused by the arch healing at night without any tension on it. In the morning, the healing is disrupted by the tension put on the arch when you get out of bed. Solid, cast-like night splints are available online and at a few specialty stores, but the Strassburg Sock is an easier and more practical solution.[9] "The Sock" is a regular knee-high sock with a strap that runs from the toes to the kneecap. When this strap is (gently) tightened, the ankle is dorsiflexed like in a regular night splint, but so are the toes. A Strassburg sock can be ordered online or often picked up at your local running store.

*A Strassburg Sock in use. Be careful not to put excessive tension on the strap.*

## Part 4: Other possible treatment options

Manipulating the tissue of the plantar fascia is an approach that's become more popular among runners recently. Using a golf ball or other hard, round object, you can "roll out" your arch much like you'd roll out your quads or calves with a foam roller. More aggressive soft-tissue manipulations like Active Release Technique (A.R.T.) or Graston Technique are also popular. All of these are unproven in the scientific literature, however, so while many runners do find them very helpful, there's no evidence they'll work for you. If you do decide to roll out your arch or get some soft tissue work done, icing your foot afterwards is not a bad idea.

Injections of corticosteroids are a common second-line treatment among podiatrists. While some research has showed that they may help,[7] other scientists have urged caution, since their success rate is fairly low and there is a risk of complete rupture of the plantar fascia.[10, 5] Application of a corticosteroid like dexamethasone through the

skin via iontophoresis, an electric charge-driven process, may be more helpful and have a lower risk of complications than a direct injection.[11] This is an issue you should talk with your orthopedist or podiatrist about.

Chronic, long-standing cases of plantar fasciitis can be particularly tricky to deal with. Two new treatments, extracorporeal shockwave therapy (ESWT)[12, 13, 14]and platelet-rich plasma therapy (PRP),[15] show good promise in treating recalcitrant cases, especially in runners. Because of their relatively recent development, they may be difficult to get access to, however, and their efficacy is not yet solidly vetted.

## Part 5: Outline of treatment options

Because of plantar fasciitis' reputation for hanging around for months at a time if not properly addressed, even a mild case of arch pain should be attacked aggressively with several treatments. Protection, ice, and stretching should be the mainstays of your early treatment. While you don't have to completely cease physical activity, you should avoid anything that makes your arch worse, and protect it while you run and while you go about your daily life.

### Conservative treatments:

These are methods that are fairly simple, inexpensive, and can be done on your own at home.

1. Wear comfortable shoes with some cushioning and arch support, and avoid hard shoes or anything barefoot.
2. Ice your foot several times a day, either with ice cups or a round, frozen object like a plastic water bottle. If you run, ice immediately afterwards.
3. Stretch your calves at least three times per day. Each session should consist of 3x30 second holds, first with your knee straight, then with it bent.
4. Stretch your plantar fascia three times per day. Each session should consist of 10x10 second holds. Make sure you stretch right after getting up in the morning.
5. Use a low-Dye taping to protect your arch when you walk around or exercise.
6. Consider using an over-the-counter orthotic like SuperFeet Green or Powerstep in your everyday shoes and running shoes.
7. Wear a night splint or a Strassburg Sock at night to stretch out your arch, Achilles, and calf muscles.
8. Roll out your plantar fascia with a golf ball, taking care not to press too hard on the injured area.

### Aggressive treatments:

These are treatments with more cost and less certainty about outcomes, but may prove useful in recalcitrant cases.

1. Consider seeing a podiatrist and getting custom orthotics made. They have a large up-front cost and may take a few weeks to arrive, but many runners credit their recovery to orthotics.
2. Talk with your doctor or podiatrist about the risks and benefits of a corticosteroid injection or, preferably (to reduce the risk of plantar fascia rupture), iontophoresis.
3. Seeing an A.R.T. or Graston Technique practitioner may speed your recovery, though there's no research to back these treatments
4. Look into extracorporeal shockwave therapy or platelet rich plasma injections for particularly stubborn cases

## Return to running

How quickly you can return to running will depend on the severity of your injury and how fast you heal. Some runners find that they can work their way back into running even while some residual arch stiffness persists, but if running is making your arch pain worse, you need more time off and more time for your rehab program to do its job. As you return to running, consider increasing your stride frequency by 10% or so to reduce your impact loading rate,[16] a factor connected with the development of plantar fasciitis in runners. Keep stretching your calves even after you've recovered to stave off any future bouts with plantar fasciitis.

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