

Running into Trouble with Lower Leg Injuries

by Joseph H. Fillmore, M.D.

Practically any part of the body can run into trouble for a runner. Even hands and arms can get injured from a fall. A headache can take on new meaning if you try to run in spite of it. Knees and feet may get more attention in the domain of sports injury, but your lower legs are right in there taking a beating every time you head out. Injuries to the lower legs account for many running injuries and they can stop you in your tracks.

How You're Built-Anatomy 101

The calf muscles are composed of the outer gastrocnemius and inner soleus muscles (these are the large calf muscles at the back of your leg), which the Achilles tendon connects to the foot. This muscle-tendon complex allows for foot plantarflexion (the ability to push the ankle down in order to stand on your toes or step on the gas pedal). Beneath these muscles are the posterior tibialis and flexor hallucis longus. The posterior tibialis enables the foot to turn inward at the ankle and the flexor hallucis longus controls flexion or downward motion of the big toe. The soleus, posterior tibialis and flexor hallucis longus have direct attachments to the major bone of the lower leg, the tibia (this is your shinbone). These and the other muscles of the lower leg are divided into groups or compartments surrounded by layers of fibrous tissue call fascia. Irritation and injury to any of these structures, including the nerves to the lower leg and blood vessels can cause calf pain.

How You Move-Biomechanics

Common biomechanical factors leading to injury include both excessive pronation and supination of the foot, both normal motions of the foot. However, when either pronation or supination is extreme, it can place stress on the lower leg muscles and tendons. Pronation is more common among flat-footed runners. Excessive supination is seen more often in people with highly arched feet.

In order to determine if abnormal biomechanical factors are contributing to lower leg pain, a thorough running analysis is needed. A sports medicine expert, trained in biomechanics can make observations during treadmill running.

Seven Ounces of Prevention

Although the running shoe industry may seem like a macho version of the fashion industry with "hot" styles dominating the market (and changing all the time), a serious runner can thank running shoe technology for solutions to and prevention of many common running problems. By choosing the right shoe for your foot and training style, you are way ahead of the game. For example, a straight shoe may be better if you tend to pronate too much. A curved last can be better for the supinator. If you've had problems, consult a sports medicine professional or a podiatrist for shoe selection advice.

Running shoes should be replaced at least every six months or earlier if you cover more than about 20 miles a week. You should examine your shoes regularly for wear and tear. Economy doesn't pay when running in shoes that are breaking down. Check the outersole and the midsole (pull out the innersole and inspect underneath). Place both shoes on a countertop and check to see if either shoe tilts as viewed from behind. This indicates excessive wear (or if new, faulty construction). Using a shoe with a worn midsole can cause injuries due to decreased shock absorption.

Visual inspection of the sole of the shoe can be like consulting a palm reader to tell your future, only with a lot less guesswork. Wear-patterns can identify abnormal biomechanical factors and predict injury. For example, excessive wear at the ball of the foot on the inside can indicate over-pronation. Inside the shoe can reveal some secrets too. Wear under the first two toes can be a sign of over-pronation.

Training Errors-Poor Judgement Hurts

Persistent high intensity training without low-intensity (easy days) is one of the most common training errors. Runners can fall into the trap of feeling as if more is always better and that taking it easy results in losses that shouldn't be tolerated. Overly intense training without allowance for recovery is one of the worst mistakes a runner can make and it will almost always catch up with you one way or another.

Sudden increases in training load can also spell trouble. A general rule of thumb is to keep increases of both mileage and intensity within 10% and never increase both at the same time. Sometimes inexperienced runners can push too fast during a race and wind up injured. The addition of new (to you) training techniques like hills, plyometrics, or sprints should be introduced carefully and gradually.

The Long and Winding Road-Terrain

Running on certain terrain may cause leg injuries. Persistent training on asphalt or concrete can lead to increased mechanical stress causing overload injuries of the joints, muscles, and tendons. Excessively soft surfaces may cause hypermobility of the joints, tendons, and muscles leading to overuse injuries. Running on uneven, rocky trails or slippery roads can set the stage for ankle-twisting sprains. Canted surfaces (like banked roads) can create problems if you always run on the same side. Having one leg on the high side of the road can cause a functional leg length discrepancy and result in injury.

The Injuries

Shin splints are actually stress injuries to the lower leg and are often found in the inner and back part of the tibia. Professionals sometimes call this medial tibia stress syndrome which includes tendinitis, periostitis (inflammation at the site of attachment of muscle and tendon on the bone) and stress fractures. Runners with this problem complain of pain over the lower one-third of the tibia on the inner side. Sometimes caused by over-pronation, there may be an enlargement of the tibial cortex (outer part of the tibial bone) or tendinitis. Attachments of the soleus, posterior tibialis, and the flexor digitorum longus muscle are located in the posterior side of the tibia. These are all subject to stress injuries. Treatment includes correction of any biomechanical errors, choosing the right shoe, correcting training errors, and stretching and strengthening.

Achilles tendinitis is very common among runners. Increasing hill running can help to cause this problem. Some runners even experience Achilles tendinitis on both legs simultaneously. Pain is often noticeable when getting up in the morning and with stair climbing. In contrast, large tears of this tendon are characterized by an acute onset of localized, severe pain, superficial tenderness and swelling. There are several approaches to the treatment of Achilles tendinitis. Often heel lifts are used to take the stress off the tendon.

Compartment syndrome refers to a condition in which muscle pressure increases within the confines of the leg fascia and compromises blood flow and function. Patients with chronic compartment syndrome complain of fullness in the lower leg and a painful pressure that occurs

at a specific moment in training and may persist for hours after exercise. This pain tends to increase with increasing activity. In certain cases, numbness, tingling, burning or weakness can occur due to nerve impingement. At an extreme, muscle cell death can occur with permanent damage. Treatment of compartment syndrome is surgical release of the fascia. Conservative management is generally unsuccessful.

Compartment syndrome in the posterior leg has been associated with repetitive dorsiflexion and plantarflexion of the foot in runners. It may be caused by a repetitive type trauma to the musculature causing a build up of fluid and pressure in the compartment. This syndrome is suspected when pain is localized in a particular muscle compartment and can be bilateral in many cases. Diagnosis of compartment syndrome is made by a medical procedure that measures the pressure within the compartment at rest and during exercise to determine whether they are abnormally high, particularly with exertion.

Do-It-Yourselfers Not Wanted

Chronic injuries, recurrent injuries, and serious injuries all deserve professional attention. Determining the cause of an injury is often difficult, and without knowing what circumstances created an injury a runner is doomed to re-injury and rest cycles. Find a sports medicine physician to work with you to uncover the cause of your pain. A biomechanical assessment of your running style to determine abnormalities, review shoe wear patterns and training history can be your insurance against re-injury.

Treatment for biomechanical problems includes stretching tight lower leg muscles, strengthening the weak ones, finding the right running shoes, and using orthotics for motion control. Sometimes an over-the-counter shoe insert is all that's needed to stabilize the foot. In other cases a custom made semi-rigid orthotic is needed. Physical therapy is often recommended.

One of the best things a runner can do is to develop an understanding of the importance of recovery in your training. The majority of injuries could be avoided by incorporating rest into your schedule as a training tool. Consider taking a week off in every six and alternate high intensity days with low intensity days. Avoiding injury and overtraining guarantees that your training will continue to progress. Becoming stale or worse enduring full-blown overtraining syndrome or injury is like a boat with torn sails-you're not going to get where you want to go.

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