

Achilles Tendinitis/Tendonopathy: Too Little – Too Much

During running, there are two moments when the Achilles tendon is active. The calf muscle (Achilles), is the key muscle involved in push off. Push off occurs as the heel is lifted off the ground till the toe leaves the ground. After swing phase, the foot is brought back to the ground and if done correctly, the entire foot strikes the ground. The Achilles is immediately activated to cushion the landing and to store energy to be given back at push off. The amount of time it takes to get from foot strike to push off is a fraction of a second and, depending on speed of running, it can be as little as two tenths of a second. This quick loading and stretching of the Achilles tendon at foot strike leads to an elastic return of energy to facilitate push off and forward propulsion.

If the Achilles is going to be stressed to the point of injury, it is going to occur during one or both of these two instances in the running cycle - push off or foot strike.

There are a number of circumstances that can increase the stress to the Achilles during these two moments when running. They can be classified as either too little or too much.

Too Little

Too little height in the heel of the shoe such as a racing flat, track spikes, flip flops, moccasins or loafers can result in the Achilles being stretched excessively in order to get the heel down to the ground at foot strike. Individuals who are old enough to remember the "Earth Shoe", which was the fad during the sixties, may remember the discomfort that shoe caused. Generally speaking, individuals with flat feet can tolerate shoes with a lower heel height, and individuals with a high arch need to have shoes with a relatively high heel height.

Too little flexibility or length in the calf muscle (Achilles) has been implicated as predisposing the Achilles to excessive stress. A short Achilles can occur as a result of incomplete rehabilitation from a previous Achilles injury, previous surgery to the Achilles or wearing high heel shoes a majority of the time. A short Achilles can compromise foot strike or push off. In my experience, a short Achilles does not occur as a result of running or not doing stretching exercises.

Too little strength in the Achilles increases risk of injury. Again, this can happen if there was a previous Achilles injury or surgery which was incompletely rehabilitated. Not being strong enough in the leg muscles to

participate in high level training - too much, too fast, too soon - obviously can injure the Achilles.

Too little strength in the thigh (quadriceps) muscle can lead to abnormal compensation by the Achilles. At push off, the Achilles is lifting the heel off the ground. At the same time the thigh muscle is straightening the knee to propel the body forward. If the quadriceps muscle (thigh muscle) is weak, the Achilles can help straighten the knee by pulling the knee backwards. In this situation, the Achilles is doing double duty. Too little strength in the opposite leg may lead to compensation by pushing off harder with the stronger Achilles in order to keep running fast and straight down the road. If the tire on a car is flat on the left, the car will drift to the left unless you use the right hand to pull the steering wheel to the right.

Too much:

Choosing a running shoe that is too large can result in greater stress to the Achilles tendon. A shoe which is longer than necessary causes the Achilles to work harder to lift the heel off the ground and propel the body forward at push off. A similar effect happens if the mid sole of the running shoe is too soft, particularly in the forefoot. Running in a soft shoe is like running in soft sand; more muscular work is required to propel the body forward.

There is anecdotal information in the medical literature suggesting that wearing a shoe with too stiff a sole leads to Achilles problems. In my experience, this occurs less frequently than in the past, perhaps because the quality of the modern running shoe has addressed the problem.

If the Achilles is too long, the calf muscle effectiveness is diminished. An Achilles can be too long if there was a previous rupture/tear or if there was previous surgery designed to lengthen the Achilles. In my experience, an Achilles can become relatively long if there has been aggressive and frequent stretching of the Achilles as part of an exercise program. Too long an Achilles adversely affects elastic recoil which occurs at foot strike. A spring which is stretched and long does not snap back and recoil as well as a short, tightly coiled spring.

Running too much on the toes for extended periods of time can lead to excessive stress to the Achilles. For middle and long distance running the ideal foot strike is to have the entire foot land on the ground.

If you are one of the individuals blessed with an arch that is considered too high, you are at greater risk of developing Achilles tendon problems.

A high arch foot is classified as too stiff, which leads to excessive stress to the Achilles at foot strike and push off.

The medical literature reports that too much pronation can lead to Achilles problem. Over the years I am seeing this correlation less frequently.

Possible interventions for Achilles tendinitis/tendonopathy include: selecting shoes with a higher heel, adding a heel lift to the shoe, avoiding high heel shoes, selecting smaller size shoes, selecting a firmer shoe, selecting a shoe that is more flexible, stretching exercises for the calf muscle, avoiding stretching exercises for the calf, strengthening exercises for the calf, strengthening exercises for the thigh muscles, strengthening exercises for the opposite leg, progressing the training at an appropriate rate, running with correct form mid-foot strike and controlling excessive pronation. Obviously there is contradictory advice; the answer lies in proper evaluation to determine if there is too much or too little.