

**Mark D. Dollard DPM**

Loudoun Foot and Ankle Center

46440 Benedict Dr, Suite 111

Sterling VA 20164

(703) 444-9555

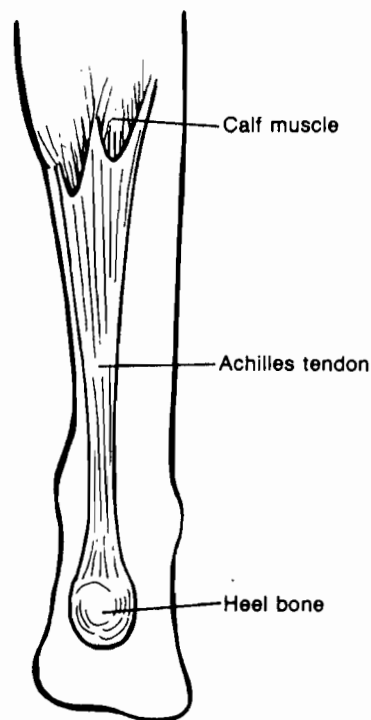
# Achilles Tendon Injuries (Tendinitis; Tenosynovitis; Tendinosis; Tendon Rupture)

**Mark D. Dollard, D.P.M.**

Achilles tendon injuries rank among the most common overuse injuries in athletes, and among the most difficult to treat. These injuries can range from simple tendinitis to severe rupture. The key to diagnosis of the stages of Achilles injuries is recognizing their signs and symptoms.

## Anatomy

Comprised of the two conjoined tendons of the soleus and gastrocnemius muscles, the Achilles tendon inserts into the rear part of the heel bone (Figure 5.1). The bulk of the soleus fibers insert into the inside aspect of the heel bone. Surrounding both tendons is an extremely important vascular sheath, the peri-



**Figure 5.1** The Achilles tendon arises from the calf muscles (gastrocnemius and soleus) and inserts into the heel bone (calcaneus).

tenon, which nourishes the tendon fibers with its blood supply. Because of the specific insertion of these individual tendon fibers, athletes with a tendency to pronate (e.g., become flat-footed) repeatedly stretch the soleus tendon, increasing the likelihood of its injury. Athletes with high-arched, supinated foot types constantly stretch the gastrocnemius fibers, causing injuries higher up in the Achilles complex.

## Injury Definitions

Tendinitis is a catchall term for a variety of inflammatory conditions that affect the Achilles tendon. Accurately diagnosing the structural level of an injury to the tendon is important in starting treatment. Usually, the first set of symptoms involves inflammation of the vascular sheath surrounding the tendon; a tenosynovitis of the peritenon. This pain is described as a mild burning or prickly heat sensation about 1 to 3 inches in the Achilles tendon above the heel bone. This area of the tendon has the poorest blood supply and is susceptible to injury even from simple shoe counter irritation.

The second stage of injury causes inflammation and degeneration of the actual tendon fibers: a tendinosis. Second stage pain is described as a shooting, stabbing sensation during physical activity, especially after a sudden change in direction or while running uphill. The athlete may actually feel a crackling sensation while rubbing a hand over the tendon; this is due to inflammatory fluid collecting under the peritenon sheath.

Stage three involves extensive weakening of collagen protein fibers, leading to partial or complete rupture. The athlete may feel a sudden snap or a pop when the tendon ruptures. It may not even be painful; however, a great deal of swelling develops. The torn Achilles provides little strength to allow the athlete to stand on his toes or push off with his foot. To test the integrity of the Achilles, the athlete

should lie on his or her stomach. Another person should squeeze the bulky belly of the calf muscle. This normally causes the foot to jerk downward; the ruptured side fails to move the foot in this test.

### ***Mechanism of Injury***

When the peritenon is irritated by the back of the shoe rubbing against the tendon, this is easily corrected. In other instances, the sheath may have been damaged by repetitive overstretching during running. Blood vessels are damaged and oxygen supply is lost. Running "cold"—without the proper warm-up necessary to increase the viscosity of the lubricating oils between the sheath and the tendon—allows friction to wear away at the peritenon sheath.

Tendinosis develops in two ways: (a) chronic loss of blood supply from the peritenon, or (b) degeneration in the collagen protein makeup of tendon fibers from the mechanical trauma of repetitive overstretching of the tendon. The primary cause of tendon damage is now known to be due to sudden overstretching of tendon fibers (eccentric stretch) and not from strong contractions (concentric contraction). If the Achilles tendon has not been properly preconditioned with sound flexibility and strength programs, it loses its ability to comply with sudden stretches and to withstand the strain of body weight with each bouncing step. Tendon fibers cannot stretch beyond a certain maximum point. Hill running, stair climbing, and bouncing activities are not handled well by unconditioned tendon fibers.

With normal athletic activities, this physical limitation shows itself when the heel strikes the ground. At this point, as the Achilles becomes fully outstretched with leg extension and ankle flexion, the athlete feels the majority of his or her discomfort. Injured athletes often relate that they experienced the greatest pain when they landed on a curb, ran up stairs, or suddenly changed running directions. If a chronic tendinosis condition is allowed to continue, any sudden stretch may violently snap or rupture weakened tendon fibers. Much as occurs with bony stress fracture repair, the tenocytes—cells that repair tendon—work slowly and cannot overcome daily damage done by the overenthusiast ath-

lete. The athlete may also be in double jeopardy if his or her foot type is also contributing to strain on the Achilles complex.

### ***Self-Treatment***

Prevention with a solid preconditioning program is the best treatment. A flexibility program concentrating on both the soleus and gastrocnemius muscles is advised (see "Stretching Exercises" section for calf stretches). After developing increased flexibility and compliance to stretching, the athlete may adopt certain plyometric drills in order to further coordinate his or her muscle reflexes to counter sudden stretches. These exercises are a series of bouncing drills that should be done only after trained instruction and supervision.

If symptoms do appear, simple self-treatment includes (a) stretching, (b) ice treatment after running, (c) heel lifts, (d) avoidance of hilly courses, (e) avoidance of irritating shoes, (f) use of orthotic devices, and (g) use of aspirin. If symptoms do not resolve after 2 weeks, professional care is recommended.

### ***Professional Care***

Don't hesitate to seek professional care in persistent cases. Chronic conditions deteriorate tendon fiber integrity fast. A sports-oriented physician, after examination, can classify your injury as acute—less than 2 weeks duration; subacute—2 to 6 weeks duration; or chronic—greater than 6 weeks duration.

In chronic forms of Achilles injury, degenerative changes and irregularities in the tendon fibers occur. Chronic tendinosis may produce nodular and palpable deformities in the tendon itself. The acute stage is treated with 10 days rest, physical therapy using contrast cold/heat treatment, and oral anti-inflammatory medication. The subacute stage is treated as above, with the addition of heel lifts, orthotic devices, mild compression wraps, or mild restrictive strappings. Some physicians may elect to carefully and judiciously place steroid medication along the outside of the tendon sheath. Direct injections into the tendon is absolutely contraindicated. Direct steroid injection can cause greater deterioration to the tendon material. The chronic

stage requires at least 4 to 6 weeks of absolute immobilization.

If conservative treatments prove ineffective, surgery is sometimes warranted to remove nodular irregularities and surgically induce channels for vascular ingrowth into the central core of the tendon. In complete ruptures, emergency surgical repair of the tendon is necessary. This then requires several weeks of immobilization, followed by several months of rehabilitation.

### **Summary**

The key to recovery from Achilles tendon injury is for the athlete to understand both the level and stage of the injury. The athlete must effect appropriate changes in his or her physical activity program or seek professional care

in time to avoid serious Achilles tendon damage.

### **Suggested Reading for "Achilles Tendon Injuries (Tendinitis; Tenosynovitis; Tendinosis; Tendon Rupture)"**

- Checkick et al. (1982)
  - Clement & Padmore (1984)
  - Derscheid & Brown (1985)
  - Leach et al. (1981)
  - MacLellan & Vyvyan (1981)
  - Scheller et al. (1980)
  - Smart et al. (1980)
-