Orthopod®
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A Patient's Guide to
Achilles Tendon Problems

Summit Orthopaedics
208-227-1100

Summit Orthopedics
2321 Coronado
Idaho Falls, ID 83404
Phone: 208-227-1100
jdenny@summitortho.net

Compliments of: **Summit Orthopedics**

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2321 Coronado
Idaho Falls, ID 83404
Phone: 208-227-1100
jdenny@summitortho.net
http://www.summitortho.net/

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Introduction

Problems that affect the Achilles tendon include tendonitis, tendinopathy, tendo-calcaneal bursitis, and tendonosis. Each of these conditions will be described and explained. These problems affect athletes most often, especially runners, basketball players, and anyone engaged in jumping sports. They are also common among both active and *sedentary* (inactive) middle-aged adults. These problems cause pain at the back of the calf. Severe cases may result in a rupture of the Achilles tendon.

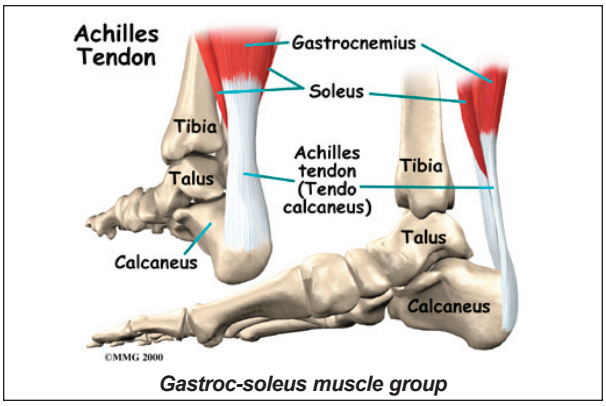
This guide will help you understand

- **where the Achilles tendon is located**
- **what kind of Achilles tendon problems there are**
- **how an injured Achilles tendon causes problems**
- **what treatment options are available**

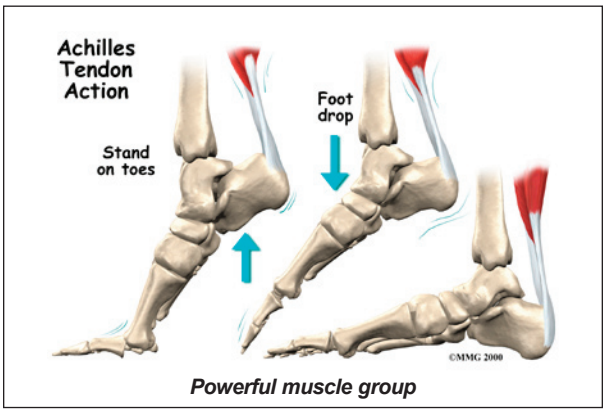
Anatomy

Where is the Achilles tendon, and what does it do?

The Achilles tendon is a strong, fibrous band that connects the calf muscle to the heel. The calf is actually formed by two muscles, the underlying *soleus* and the thick outer *gastroc-nemius*. Together, they form the *gastroc-soleus muscle group*. When they contract, they pull on the Achilles tendon, causing your foot to point down and helping you rise on your toes. This **powerful muscle group** helps when you sprint, jump, or climb. Several different problems can occur that affect the Achilles tendon, some rather minor and some quite severe.



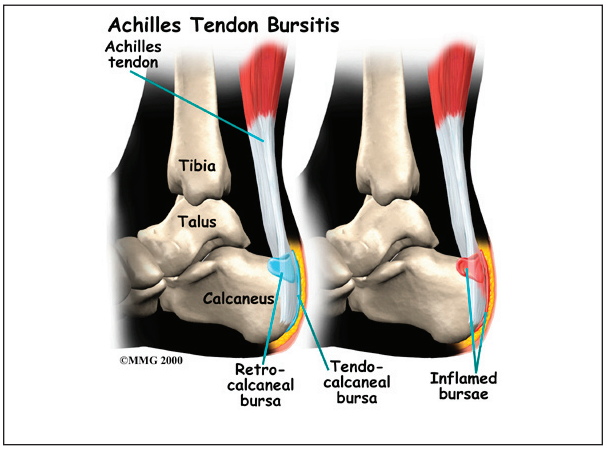
Gastroc-soleus muscle group



Powerful muscle group

Tendocalcaneal Bursitis

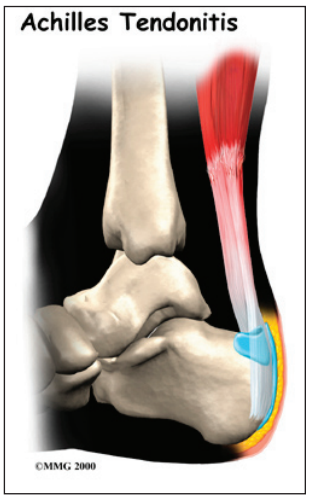
A *bursa* is a fluid-filled sac designed to limit friction between rubbing parts. These sacs, or



bursae, are found in many places in the body. When a bursa becomes inflamed, the condition is called *bursitis*. *Tendocalcaneal bursitis* is an inflammation in the bursa behind the heel bone. This bursa normally limits friction where the thick fibrous Achilles tendon that runs down the back of the calf glides up and down behind the heel.

Achilles Tendonitis

A violent strain can cause trauma to the calf muscles or the Achilles tendon. Sometimes this is referred to as *tendonitis*. This injury can happen during a strong contraction of the muscle, as when running or sprinting. Landing on the ground after a jump can force the foot upward, also causing injury. The strain can affect different portions of the muscles or tendon. For instance, the strain may occur in the center of the muscle. Or it may happen where the muscles join the Achilles tendon (called the *musculotendinous junction*).

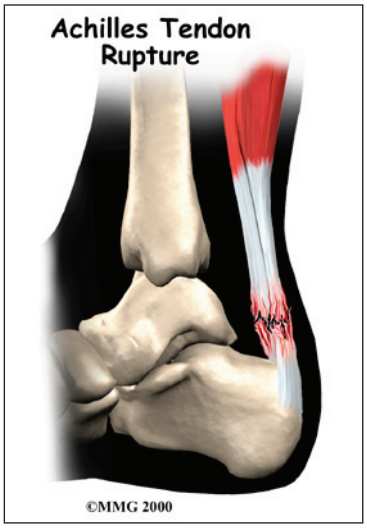


Achilles Tendinopathy/Tendonosis

Chronic overuse may contribute to changes in the Achilles tendon as well, leading to **degeneration and thickening** of the tendon. Studies show there is no sign of inflammation with overuse injuries of tendons. Most experts now refer to this condition as *tendinopathy*, or *tendonosis* instead of tendonitis.

Achilles Tendon Rupture

In severe cases, the force of a violent strain may even **rupture the tendon**. The classic example is a middle-aged tennis player or weekend warrior who places too much stress on the tendon and experiences a tearing of the tendon. In some instances, the rupture may be preceded by a period of tendonitis, which renders the tendon weaker than normal.



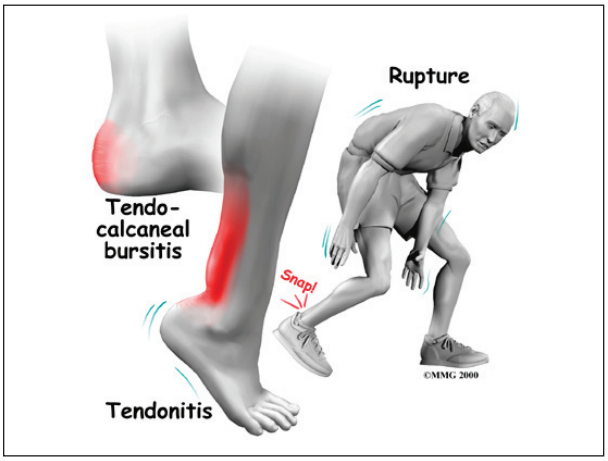
Causes

How do these problems develop?

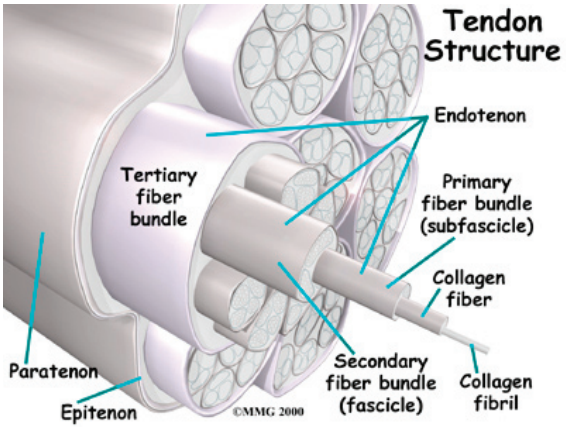
It's not entirely clear why these problems develop in some people but not in others. Changes in the normal alignment of the foot and leg may be part of the problem. Anyone with one leg shorter than the other is at increased risk of Achilles tendon problems.

For the athlete, sudden increases in training may be a key factor. Runners may add on miles or engage in excessive hill training while other athletes increase training intensity. Other risk factors include obesity, diabetes (or other endocrine disorders), aging, exposure to steroids, and taking *fluoroquinolones* (antibiotics).

Problems with the Achilles tendon seem to occur in different ways. Initially, irrita-



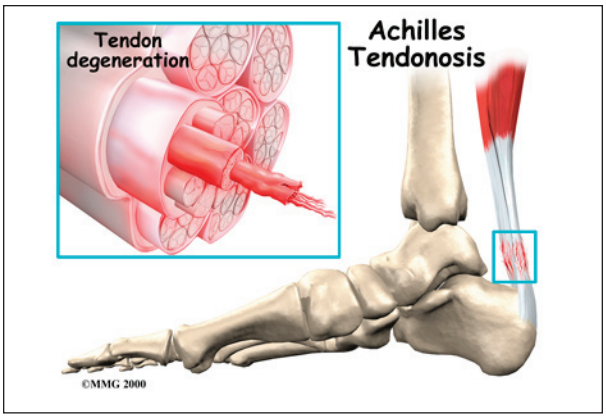
tion of the outer covering of the tendon, called the *paratenon*, causes *paratendonitis*. Paratendonitis is simply inflammation around the tendon. Inflammation of the tendocalcaneal bursa (described above) may also be present with paratendonitis. Either of these conditions may be due to repeated overuse or ill-fitting shoes that rub on the tendon or bursa.



Collagen

As we age, our tendons can degenerate. *Degeneration* means that wear and tear occurs in the tendon over time and leads to a situation where the tendon is weaker than normal. Degeneration in a tendon usually shows up as a loss of the normal arrangement of the fibers of the tendon. Tendons are made up of strands of a material called *collagen*. (Think of a tendon as similar to a nylon rope and the strands of collagen as the nylon strands.) Some of the individual strands of the tendon become jumbled due to the **degeneration,** other fibers break, and the tendon loses strength.

The healing process in the tendon causes the tendon to become thickened as scar tissue tries to repair the tendon. This process can continue to the extent that a nodule forms within the tendon. This degenerative condition without inflammation is called **tendonosis**. The area of tendonosis in the tendon is weaker than normal tendon. Tiny tears in the tissue around the tendon occur with overuse. The weakened,



degenerative tendon sets the stage for the possibility of actual rupture of the Achilles tendon.

Symptoms

What does the condition feel like?

Tendocalcaneal bursitis usually begins with pain and irritation at the back of the heel. There may be visible redness and swelling in the area. The back of the shoe may further irritate the condition, making it difficult to tolerate shoe wear.

Achilles tendonitis usually occurs further up the leg, just above the heel bone itself. The Achilles tendon in this area may be noticeably thickened and tender to the touch. Pain is present with walking, especially when pushing off on the toes.

An Achilles tendon rupture is usually an unmistakable event. Some bystanders may report actually hearing the snap, and the victim of a rupture usually describes a sensation similar to being violently kicked in the calf. Following rupture the calf may swell, and the injured person usually can't rise on his toes.

Diagnosis

How do doctors identify the problem?

Diagnosis is almost always by clinical history and physical examination. The physical examination is used to determine where your leg hurts. The doctor will probably move your

ankle in different positions and ask you to hold your foot against the doctor's pressure. By stretching the calf muscles and feeling where these muscles attach on the Achilles tendon, the doctor can begin to locate the problem area.

The doctor may run some simple tests if a rupture is suspected. One test involves simply feeling for a gap in the tendon where the rupture has occurred. However, swelling in the area can make it hard to feel a gap.

Another test is done with your leg positioned off the edge of the treatment table. The doctor squeezes your calf muscle to see if your foot bends downward. If your foot doesn't bend downward, it's highly likely that you have a ruptured Achilles tendon.

When the doctor is unsure whether the Achilles tendon has been ruptured, a *magnetic resonance imaging* (MRI) scan may be necessary to confirm the diagnosis. This is seldom the case. The MRI machine uses magnetic waves rather than X-rays to show the soft tissues of the body. The MRI creates images that look like slices and shows the tendons and ligaments very clearly. This test does not require any needles or special dye and is painless.

Your doctor may order an *ultrasound* test. An ultrasound uses high-frequency sound waves to create an image of the body's organs and structures. The image can show if an Achilles tendon has partially or completely torn. This test can also be repeated over time to see if a tear has gotten worse.

By using the MRI and ultrasound tests, doctors can determine if surgery is needed. For example, a small tear may mean that a patient might only need physical therapy and not surgery.

Treatment

What treatment options are available?

Nonsurgical Treatment

Tendonitis/Tendinopathy

In the past, nonsurgical treatment for tendocalcaneal bursitis and Achilles tendonitis started with a combination of rest, ice, and anti-inflammatory medications such as aspirin or ibuprofen.

Since it is now recognized that many tendon problems occur without inflammation, the use of antiinflammatories and ice have come under question. In the case of true inflammation, the overuse of these modalities may prevent a normal, healing inflammatory process. Preventing inflammation needed to clean up cellular debris in the injured area may lead to delayed or incomplete healing. The result may be future chronic problems of tendonosis and/or tendinopathy.

Many experts suggest when there is any doubt about inflammation, treatment should proceed as if there are no inflammatory cells present. This approach focuses on pain relief and restoring proper motion and weight-bearing so you can return to your usual activities.

If there is an inflammatory process, then the condition should respond fairly quickly to drug and antiinflammatory interventions. Limiting, but not eliminating, inflammation is the new goal.

Physical therapy may be recommended for any of these tendon problems. Treatment will depend on what type of problem (tendonitis or tendinopathy/tendonosis) is present.

Your therapist will know when and how to apply cold modalities to reduce swelling and pain but still allow the healing inflammatory process. Physical therapy for chronic tendon problems may also include a special program of stretching and eccentric strengthening exercises. Your therapist will instruct you in a home care program.

Low-energy shock wave therapy has been used successfully for chronic tendinopathy. The procedure does not require anesthesia but it may take several treatment sessions. The vibration produced by the energy waves is applied to areas of tenderness while the affected foot and ankle are gently moved in all directions. Shock wave therapy works by turning off nerves responsible for pain without affecting motor function. It also stimulates soft-tissue healing by increasing blood supply to the area treated.

Tendonosis

If the problem is one of tendon tissue degeneration, healing and recovery may take longer. The injury will not respond to treatment designed to reduce inflammation. Correct treatment of tendonosis involves fostering new collagen tissue growth and improving the strength of the tendon. Rehabilitation following rupture of the tendon is quite different and is described later.

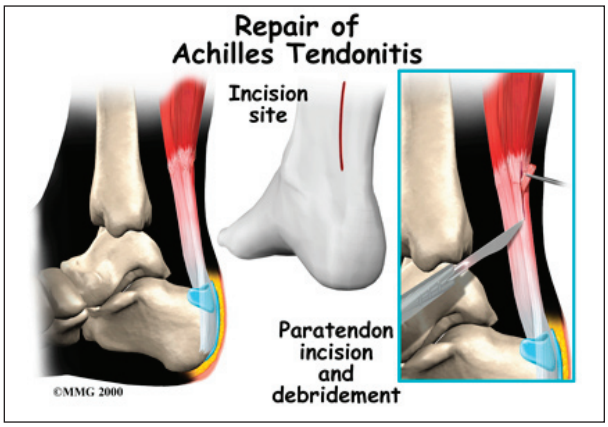
An acute injury needs rest. This can be done by limiting activities like walking on the sore leg. A small (one-quarter inch) heel lift placed in your shoe can minimize stress by putting slack in the calf muscle and Achilles tendon. Be sure to place a similar sized lift in the other shoe to keep everything aligned. A cortisone injection is not advised for this condition, due to the increased risk of rupture of the tendon following injection.

Tendon Rupture

Nonsurgical treatment for an Achilles tendon rupture is somewhat controversial. It is clear that treatment with a cast will allow the vast majority of tendon ruptures to heal, but the incidence of rerupture is increased in those patients treated with casting for eight weeks when compared with those undergoing surgery. In addition, the strength of the healed tendon is significantly less in patients who choose cast treatment. For these reasons, many orthopedists feel that Achilles tendon ruptures in younger active patients should be surgically repaired.

Surgery

Surgical treatment for Achilles tendonitis is not usually necessary for most patients but it is an option when nonoperative measures fail. Surgery options range from a *tenotomy* (a simple release of the tendon) to a more involved, open approach of repair.

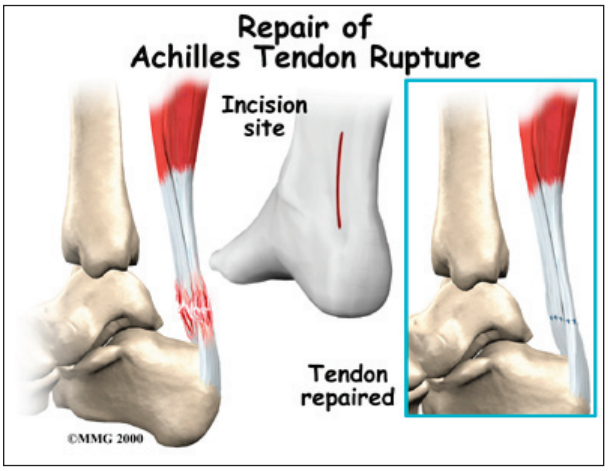


In some cases of persistent tendonitis and tendonosis a procedure called *debridement* of the Achilles tendon may be suggested to help treat the problem.

This procedure is usually done through an incision on the back of the ankle near the Achilles tendon. The tendon is identified, and any inflamed *paratenon tissue* (the covering of the tendon) is removed. The tendon is then split, and the degenerative portion of the tendon is removed. The split tendon is then repaired and allowed to heal. It is unclear why, but removing the degenerative portion of the tendon seems to stimulate repair of the tendon to a more normal state.

Surgery may also be suggested if you have a ruptured Achilles tendon. Reattaching the two ends of the tendon repairs the torn Achilles tendon. This procedure is usually done through an incision on the back of the ankle near the Achilles tendon. Numerous procedures have been developed to repair the tendon, but most involve sewing the two ends of the tendon

together in some fashion. Some repair techniques have been developed to minimize the size of the incision.



In the past, the complications of surgical repair of the Achilles tendon made surgeons think twice before suggesting surgery. The complications arose because the skin where the incision must be made is thin and has a poor blood supply. This can lead to an increase in the chance of the wound not healing and infection setting in. Now that this is better recognized, the complication rate is lower and surgery is recommended more often.

Rehabilitation

What can I expect following treatment?

Nonsurgical Rehabilitation

Patients with mild symptoms of tendocalcaneal bursitis or Achilles tendonitis often do well with two to four weeks of physical therapy. Treatments such as ultrasound, moist heat, and massage are used to control pain and inflammation. As pain eases, treatment progresses to include stretching and strengthening exercises.

In cases of Achilles tendinopathy, or when a partial tendon tear is being treated without surgery, patients may require two to three months of physical therapy. A heel lift placed in your shoe helps take tension off the painful tendon. Ultrasound and massage are used to help the tendon heal.

Injured tendons shorten and need to be stretched. Only gentle stretches for the calf muscles and Achilles tendon are used at first. As the tendon heals and pain eases, more aggressive stretches are given.

As your condition improves, exercises to strengthen the calf muscles begin. Strengthening starts gradually using *isometrics*, exercises that work the muscles but protect the healing area. Eventually, specialized strengthening exercises, called *eccentrics*, are used. Eccentrics work the calf muscle while it lengthens. For example, if you stand on your tiptoes, the calf muscles work *eccentrically* to carefully lower your heels back to the ground.

Patients are gradually able to get back to normal activities. Athletes are guided in rehabilitation that is specific to their type of sport.

Nonsurgical treatment for a ruptured Achilles tendon is handled differently. This approach might be considered for the aging adult who has an inactive lifestyle. Nonsurgical treatment in this case allows the patient to heal while avoiding the potential complications of surgery. The patient's foot and ankle are placed in a cast for eight weeks. Casting the leg with the foot pointing downward brings the torn ends of the Achilles tendon together and holds them until scar tissue joins the damaged ends. A large heel lift is worn in the shoe for another six to eight weeks after the cast is taken off.

After Surgery

Traditionally, patients would be placed in a cast or brace for six to eight weeks after surgery to protect the repair and the skin incision. Crutches would be needed at first to keep from putting weight onto the foot. Complications can occur such as delayed healing, infection, and scarring. More serious problems such as tendon rupture and nerve damage can also occur.

Conditioning exercises during this period help patients maintain good general muscle strength

and aerobic fitness. Upon removing the cast, a shoe with a fairly high heel is recommended for up to eight more weeks, at which time physical therapy begins.

Immobilizing the leg in a cast can cause joint stiffness, muscle wasting (*atrophy*), and blood clots. To avoid these problems, surgeons may have their patients start doing motion exercises very soon after surgery. Patients wear a splint that can easily be removed to do the exercises throughout the day. A crutch or cane may be used at first to help you avoid limping.

In this early-motion approach, physical therapy starts within the first few days after surgery. Therapy may be needed for four to five months. Ice, massage, and whirlpool treatments may be used at first to limit (but not completely prevent) swelling and pain. Massage and ultrasound help heal and strengthen the tendon.

Treatments progress to include more advanced mobility and strengthening exercises, some of which may be done in a pool. The buoyancy of the water helps people walk and exercise safely without putting too much tension on the healing tendon. The splint is worn while walking for six to eight weeks after surgery.

As your symptoms ease and your strength improves, you will be guided through advancing stages of exercise. Athletes begin running, cutting, and jumping drills by the fourth month after surgery. They are usually able to get back to their sport by six full months after surgery.

The physical therapist's goal is to help you keep your pain and swelling under control, improve your range of motion and strength, and ensure you regain a normal walking pattern. When you are well under way, regular visits to the therapist's office will end. Your therapist will continue to be a resource, but you will be in charge of doing your exercises as part of an ongoing home program.

Notes