

# Equinus Contractures

CU Orthopedic Surgery - Foot & Ankle

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## Summary

Equinus contractures are the inability to bring the foot up to a neutral position (a right angle to the lower leg) due to either tightness of the muscles and/or tendons in the calf, scarring of the ankle joint capsule and other restraining structures, or a bone spur at the front of the ankle that restricts normal ankle motion. It is named after horses (equine) who essentially walk “on their toes.”

## Clinical Presentation

The largest muscles within the calf are called the gastrocnemius and soleus. The gastrocnemius is the larger and longer of the two, arising from above the knee joint before joining the soleus below in a manner that makes the gastrocnemius naturally more prone to tightness in humans. As these muscles course together towards the foot, they eventually combine to become one tendon called the Achilles, which inserts itself on the heel. The primary function of this “gastroc-soleal complex” in humans is to control motion through the ankle joint and plantarflex the foot to promote push off strength.

Occasionally, one or both of these calf muscles can become too tight, which can result in what is termed a contracture or an equinus deformity. If this happens, it will typically become difficult to move the foot in an upward direction, otherwise known as a restriction in dorsiflexion. This anatomical problem can result in an altered gait and lead to various problems over time that may include: chronic pain, ulceration, or other types of mechanical breakdown in the foot or ankle.

Rather than walk on their toes, most people will naturally and unconsciously compensate for an underlying equinus by developing greater (excess) upward motion in other nearby joints such as the transverse tarsal joints. Many gastrocnemius contractures are subtle, and patients are often asymptomatic. When present, however, this problem over time will often result in significant and progressive midfoot compensation that results in repetitive overload of various bony and soft tissue structures in the foot during both standing and walking. The presence of such a condition, therefore, can predispose to the development of certain foot conditions, such as plantar fasciitis, acquired adult flatfoot deformity, metatarsalgia, or Achilles tendon disorders.

In general, isolated gastrocnemius contracture is believed to develop from one of several causes:

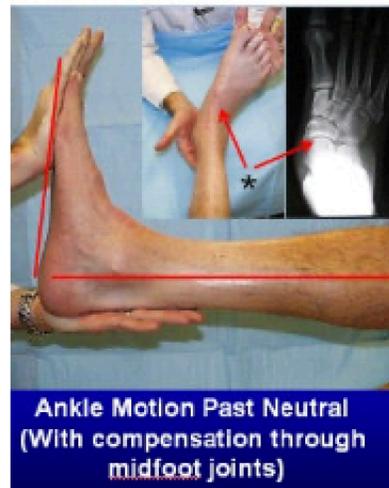
- A hereditary predisposition (our evolutionary ancestors all had equinus contractures)
- Aging, which tends to cause muscles to stiffen through progressive collagen crosslinking
- Chronic deconditioning and lack of weightbearing or use of a lower extremity (for example, being bedridden for a prolonged period of convalescence)
- Medical conditions such as diabetes, which cause muscles to stiffen
- Immobilization following ankle or foot trauma – particularly if the ankle is splinted in an downward or plantarflexed (equinus) position
- Nerve injury, which can cause an imbalance of muscles in the leg causing the gastrocnemius muscle to tighten.

## Physical Examination

A gastrocnemius equinus contracture (Figure 1) occurs when tightness in the outer calf muscle (gastrocnemius) leads to limited ankle dorsiflexion (motion through the ankle joint itself). To compensate for this tightness and allow the foot to settle on the ground, a compensatory motion will often occur in the joint in front of the ankle, the transverse tarsal joint, which is made up of the talonavicular joint and the calcaneal-cuboid joints (Figure 2). The hallmark of a gastrocnemius equinus contracture is that it will correct (i.e ankle motion will become full) when the knee is bent because the pressure is taken off the gastrocnemius muscle, since it attaches above the knee joint.

Figure 1: Limited motion through the ankle joint

Figure 2: Compensatory motion through the joints in front of the ankle joint



## Treatment

Calf muscle contracture, or “equinus” can occur from tightness that is isolated to the gastrocnemius muscle or the result of tightness in both of these muscles together, and it is important to distinguish between these two causations because treatment to remedy the problem and prevent long term consequences can differ significantly. While physical therapy, stretching exercises, and even daily splinting can sometimes be effective in preventing or alleviating this condition, often the problem remains refractory to such management and a surgery may be required to release these tissues in a manner that allows restoration of normal ankle/foot upward motion (dorsiflexion). When the problem is isolated to tightness of the gastrocnemius tendon, the surgery to release this contracture is called a gastrocnemius recession or “Strayer” procedure. When indicated, the operation can be very effective in resolving the various clinical complaints a patient might have that are associated with tightness of this muscle and remain non responsive to non-operative therapy. Before any surgery is considered, a regular calf stretching program (with the knee straight, as in Figure 3) should be recommended for at least a few months as in many cases this non-operative measure can result in resolution of symptoms.

Figure 3: Calf stretch with back knee strait



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**BELOW YOU WILL FIND FURTHER INFORMATION ON GASTROCNEMIUS EQUINUS AND CALF STRETCHES THAT YOU CAN DO AT HOME TO HELP WITH STRETCHING YOUR CALF.**

### **CALF STRETCHES**

<http://www.stretching-exercises-guide.com/calf-stretches.html>

I am often prescribing calf stretches for people with tight calf muscles. I see them in the clinic with problems such as plantar fasciitis, peroneal tendinitis, achilles tendinitis and tendinosis, hallux valgus, tibialis posterior tendonitis, and the list just goes on.

A person requires about 15 degrees of dorsiflexion to walk, more to walk quickly, and even more to run.

Calf muscle tightness is such a common problem that a lot of people don't realize how tight they are until I measure them. Posture or movement problems, high heels, and hereditary factors can all contribute to having tight calves. Like all joints, unless you move the ankle through it's full range of motion on a regular basis, you will start to lose mobility at the ankle.

The feet are the bottom of the kinetic chain. As the foot moves, it influences movement at the knee, hip, and lower back. If the foot is moving abnormally in order to compensate for tight calf muscles it can cause a slew of aches and pains from your feet to your spine.

#### **CONTENTS BELOW:**

What is the calf muscle?

Why should I stretch my calf?

If I don't stretch my calves, what type of injuries may I sustain?

Why is the calf muscle often tight?

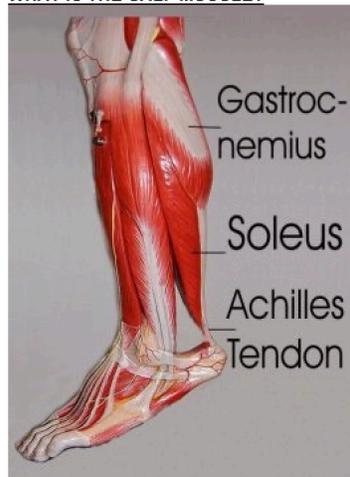
List of stretches for the calf

Stretching exercises using The Stick

Stretching exercises using a foam roller

Stretching exercises using a towel

## WHAT IS THE CALF MUSCLE?



The calf is actually two muscles: the gastrocnemius, and the deeper muscle, soleus. Both of these muscles insert into the Achilles tendon at the back of the ankle. The calf, because of the configuration of the ankle and relatively long lever arm is a very powerful plantar flexor. The gastrocnemius originates from above the knee so in order to stretch it the knee must be fully extended. The soleus muscle is deep to the gastrocnemius and originates below the knee; therefore, the knee need not be extended in order to stretch the soleus.

## WHY IS THIS STRETCH IMPORTANT?

It is important to keep the calf muscles lengthened in order to walk properly, and run properly. One must be able to bring the foot up 15 degrees in order to walk normally. If the ankle cannot move that far, then compensatory movements must occur at other joints such as the forefoot or knee. This can cause toeing out, excessive forefoot pronation, excessive hind foot inversion, excessive rotation at the knee, etc. Injuries, tendonitis, fasciitis, and joint degeneration can occur because of these compensatory movements. For running, even more mobility is required.

For any sport that requires prolonged walking, running, or jumping, flexibility in the calves is imperative.

## WHAT TYPES OF INJURIES MIGHT I SUSTAIN IF I DON'T STRETCH MY CALVES?

Tight calf muscles can contribute to any of the following disorders:

- Hallux rigidus
- Hallux valgus
- Achilles tendonitis/tendinosis
- Plantar fasciitis
- Shin splints
- Patellar tendonitis/tendinosis
- Patellofemoral pain syndromes
- Iliotibial band friction syndromes
- Mechanical back pain
- Headaches

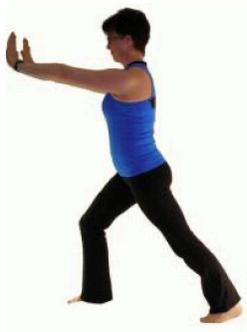
## WHY IS THE CALF MUSCLE OFTEN TIGHT?

The calf muscle is notorious for shortening if not taken through its range of motion on a regular basis. Anyone who has had their ankle in a cast can attest to that.

- If we wear high heeled shoes our calf remains shortened for long periods of time. If you keep a muscle in a shortened position it will eventually shorten to accommodate that new length.
- The calf muscle is a postural muscle. The calf must contract for long periods without fatiguing in order to hold us upright. This lends it to tightening quickly.
- Calf muscles will tighten up in athletes if training doesn't include stretching.
- Some people may have a hereditary predisposition to tight calves.

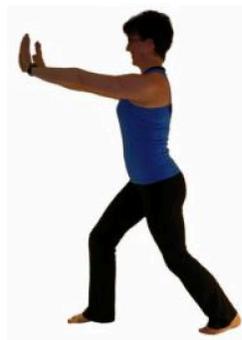
## **CALF STRETCHES**

### **1. STANDING CALF STRETCH (GASTROCNEMIUS)**



Stand about three feet from a wall and put your right foot behind you ensuring your toes are facing forward. Keep your heel on the ground and lean forward with your right knee straight. Rotating the toes in and out slightly will target the medial and lateral parts of this muscle separately. Hold this for 30 to 60 seconds.

### **2. STANDING CALF STRETCH (SOLEUS)**



Stand away from a wall and put your right foot behind you and be sure your toes are facing forward. Lean forward at the ankle while bending the right knee and keeping your heel on the ground. Because the knee is flexed, tension is taken off the gastrocnemius and placed on the soleus. Hold this for 30 to 60 seconds.

### 3. WALL CALF STRETCH



Stand about two feet away from a wall. Place the ball of your right foot against the wall while your heel remains on the ground. Slowly and gently lean into the wall while keeping your knee straight. Hold this for 30 to 60 seconds.

### 4. DOWNWARD DOG YOGA STRETCH



Get down on all fours with your hands under your shoulders on the floor. Walk your hands forward slightly on the floor. Spread your fingers apart to allow for a broad base of support. Push your hips up toward the ceiling and tighten your abdominal muscles. Keep your heels on the ground and gently try and straighten your knees. Hold this for the appropriate time.

### CALF STRETCHING EXERCISES USING "THE STICK"



Sit on the floor with your forefoot butted up against the wall. Using The Stick, quickly roll over a 3 or 4 inch area of the calf muscles for about 10 seconds. Repeat this over other areas of the calf until you have covered the entire calf. You may feel discomfort with this but not pain. If you complain of pain, then see your physical therapist or family doctor for investigation.

## CALF STRETCHING EXERCISES USING A FOAM ROLLER



Sit on the floor with your legs stretched out in front of you. Place the foam roller under the lower half of your lower right leg. Cross your left leg over your right. Push up with your arms and roll back and forth on the foam roll. Slowly roll yourself over the foam roll back and forth working your way up the muscle toward the knee. Do not cross over the knee. Perform this with your toes pointing inward and outward.

## CALF STRETCH EXERCISES USING A BELT



Sit in a chair upright with straight back and head centered over your shoulders. Loop a strap or towel around the ball of your right foot. Straighten your right knee and pull the strap tight to target gastrocnemius. Hold this. To target the soleus, perform the same stretch, only with the right knee bent. This calf stretch can also be performed sitting on the floor or on your bed.

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