

## Patient Guide to Muscle Strains

Tracy A. DeAmicis, MD  
Edward G. McFarland, MD  
Andrew J. Cosgarea, MD  
Brian J. Krabak, MD  
*Johns Hopkins Sports Medicine*

### What is a muscle strain?

Your *muscles* are responsible for all of the movements of your body. A *muscle strain*, more commonly called a "pulled" or "torn" muscle, is an injury where the muscle actually tears or rips. Usually, a muscle tear is unpredictable and it happens when the muscle is stretched too fast. Most often it occurs while the muscle is working, such as when running, working, or playing a sport (Figure I). When the muscle tears, it usually hurts and causes pain and inability to continue the activity.



Figure I



Figure II

### How do muscles make your body move?

Muscles are designed to move bones, because bones cannot move by themselves. The muscle itself is like a tube or sack that has special tissue that can get shorter or longer. At one or both ends, the muscle becomes solid where it becomes a tendon. The tendon attaches to the bone. When a muscle shortens, it pulls on its tendon, which then pulls on the attached bone. (Figure II) The muscle can shorten fast or slow, depending upon how fast you need to move the extremity or body part. Like an engine in a car, muscles provide the power to move your body parts.

## What happens when a muscle is strained?

When a muscle is strained, its softer part (called "muscle fibers") stretch and pull and can even tear apart. Muscle strains most commonly occurs where the muscle becomes a tendon, the so-called *muscle-tendon junction*. For example, the gastrocnemius muscle in your calf will frequently rupture at its junction with the Achilles tendon. (Figure III) When this junction is disrupted, the muscle stretches away from or even detaches from the tendon and can no longer create enough power to move the bone. A muscle strain is more likely to happen to a muscle that is weak, inflexible, tired, or in one that has not been properly warmed up before exercise. Muscle strains often occur in athletes engaging in high speed activities, such as sprinters, where hamstring injuries are common. Other common areas for muscle injuries are groin muscles in soccer and chest muscles in weight lifters.



Figure III

## How will I know if I strained a muscle?

The signs of a muscle strain depend upon how severe the injury is to the muscle. In general, when it tears, there is a sudden onset of pain and you will know that you have had an injury. Muscle strains are graded as mild (first degree), moderate (second degree), or severe (third degree). A mild strain involves mostly stretching and limited tearing of the muscle fibers. It feels like the muscle is "knotted up." There is some discomfort when you use the muscle, but there is usually little loss of strength. A person with a mild strain can often continue activity, but may have some limitation.



Figure IV

A severe strain (or grade III strain) is a complete rupture of the muscle (Figure IV), which is usually accompanied by a "snap." The injured person will not be able to continue activity or use the muscle at all. A grade III strain usually is accompanied by significant pain when it happens, and the individual is usually not able to continue participating in the activity. The site

of injury may become swollen and a bruise may result from bleeding of the torn muscle. Once the swelling goes down, there will be an obvious gap in the muscle when one feels along the muscle.

The signs of a moderate strain are somewhere in between mild and severe. The person often feels a "pull." There may be some pain, weakness, swelling, bruising, tenderness, and inability to continue the activity.

## **How do I treat a muscle strain?**

Immediate treatment for a strained muscle is to stop the activity that caused it. Ice packs should be applied to the area (see "Patient Guide to Ice Techniques"). It is recommended that you initially ice your injured muscle for about 20 minutes two to three times a day. As your muscle heals, you can ice it less. For pain and swelling, we recommend aspirin, Tylenol, or anti-inflammatory medicines (Naprosyn, Ibuprofen, Aleve, Motrin, Celebrex, Vioxx, etc.). You should use these medications with caution if you have a history of stomach or kidney problems.

It is a good idea to rest after the initial injury. However, do not rest for too long. You should begin to move the joints and the muscle as soon as possible to prevent stiffness, atrophy, and weakness. Once you can stretch and move without any pain, you can begin some light stretching and muscle movement. When you feel ready, you can gradually resume activities in moderation, but you should start slowly. Sometimes it is useful to seek help from a physical therapist, athletic trainer, or personal trainer when recovering from a muscle strain, especially more severe strains. You will know when you can return to full activity when you can move fully, when your strength is equal to the same muscle on your other side and when you can be active with little to no pain. It is a good idea to warm up the muscle before you stretch and before you exercise, both during and after you have recovered from the injury.

## **How long does it take to recover?**

Recovery depends on many factors, such as the muscle involved and the severity of the injury. Milder strains will recover quicker than severe ones. Typically, it takes about two weeks to return to normal activity after a mild strain, and can take up to two months or longer to recover after a severe strain.

## **How can I prevent a muscle strain?**

Scientific studies have shown that a heated muscle is less likely to be strained. This can be done by warming up before exercise. Start your workout with some light walking or jogging. Flexibility is also important in preventing injury and re-injury of an already strained muscle. You can increase flexibility with stretching. There are no scientific studies that show that stretching prevents injury to muscles. However, most sports specialists, athletic trainers, and conditioning

coaches believe that stretching is of benefit. Stretching can be done before or after exercise, but it is best done once you are warmed up. In general, know your body and its limits. If you are just beginning to exercise, start gradually. If you have been exercising for a while, be smart and remember to warm up and stretch before exercise. It is worth the time to keep your muscles from being injured.

### **What are muscle cramps?**

Muscle cramps are not really tears of the muscle, but are due to fatigue of the muscle. Cramps in athletes typically occur early in the season or early in competition. The muscle "cramps up" or "knots up" and is painful. These cramps often occur when it is hot outdoors, and are common in football and basketball. The best treatment is to rest and stretch and to drink plenty of fluids. Usually the athlete can return to play once the cramps subside.

Cramps sometimes occur to people in their sleep. If these happen rarely, then they are usually not a concern. However, if they occur regularly, then it is recommended that you discuss the problem with your physician.