

Calf Muscle Pain: Gastrocnemius Strains

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Abstract

Calf strains are common injuries seen in primary care and sports medicine clinics. Differentiating strains of the gastrocnemius or soleus is important for treatment and prognosis. Simple clinical testing can assist in diagnosis and is aided by knowledge of the anatomy and common clinical presentation.

Peripheral nerves send messages from the brain and spinal cord to the rest of the body. They help do things such as sense that the feet are cold and move the body's muscles for walking. Peripheral nerves are made of fibers called axons that are insulated by surrounding tissues. Peripheral nerves are fragile and easily damaged. A nerve injury can affect the brain's ability to communicate with muscles and organs. Damage to the peripheral nerves is called peripheral neuropathy. It's important to get medical care for a peripheral nerve injury as soon as possible. Early diagnosis and treatment may prevent complications and permanent damage.

Keywords: Muscle strain; Calf; Gastrocnemius; Soleus; Platelet Rich Plasma (PRP)

Introduction

Calf strains are a common injury. The "calf muscle" or triceps surae consists of three separate muscles (the gastrocnemius, soleus, and plantaris) whose aponeuroses unite to form the Achilles tendon. The clinical history and physical exam along with imaging studies allow localization of the injured muscle. Differentiating strains in the gastrocnemius and soleus is particularly important for an accurate prognosis, appropriate treatment, and successful prevention of recurrent injury.

Calf strains are generally regarded as common injuries, particularly in athletes, although specific data on injury rates are sparse. In one study of soccer players, calf strains represented 3.6% of injuries over a 5 years period.

Description

Calf pain

The calf is comprised of two muscles the gastrocnemius and the soleus. These muscles meet at the Achilles tendon, which attaches directly to the heel. Any leg or foot motion uses these muscles.

Calf pain varies from person to person, but it typically feels like a dull, aching, or sharp pain, sometimes with tightness, in the back of the lower leg. Symptoms that might indicate a more severe condition include:

- Swelling.
- Unusual coolness or pale colour in the calf.
- Tingling or numbness in the calf and leg.
- Weakness of the leg.
- Fluid retention.
- Redness, warmth, and tenderness of the calf.

If you have any of these symptoms in addition to calf pain, you should visit your doctor.

Calf pain can result from a number of causes, including overworking the muscle, cramps, and foot conditions. While most cases of calf pain can be treated at home, other causes may require immediate medical attention.

Treatment

Protection: Apply soft padding to minimize impact with objects.

Rest: Rest is necessary to accelerate healing and reduce the potential for re-injury.

Ice: Apply ice to induce vasoconstriction, which will reduce blood flow to the site of injury. Never ice for more than 20 minutes at a time.

Compression: Wrap the strained area with a soft-wrapped bandage to reduce further diapedesis and promote lymphatic drainage.

Elevation: Keep the strained area as close to the level of the heart as is possible in order to promote venous blood return to the systemic circulation.

Immediate treatment is usually an adjunctive therapy of NSAIDs and cold compression therapy. Cold compression therapy acts to reduce swelling and pain by reducing leukocyte extravasation into the injured area. NSAIDs such as Ibuprofen/paracetamol work to reduce the immediate inflammation by inhibiting COX-1 and COX-2 enzymes, which are the enzymes responsible for converting arachidonic acid into prostaglandin. However, NSAIDs, including aspirin and ibuprofen, affect platelet function (this is why they are known as "blood thinners") and should not be taken during the period when tissue is bleeding because they will tend to increase blood flow, inhibit clotting, and thereby increase bleeding and swelling. After the bleeding has stopped, NSAIDs can be used with some effectiveness to reduce inflammation and pain. A new treatment for acute strains is the use of Platelet Rich Plasma (PRP) injections which have been shown to accelerate recovery from non-surgical muscular injuries. It is recommended that the person injured should consult a medical provider if the injury is accompanied by severe pain, if the limb cannot be used, or if there is noticeable tenderness over an isolated spot. These can be signs of a broken or fractured bone, a sprain, or a complete muscle tear.

Symptoms

With a peripheral nerve injury, you may experience symptoms that range from mild to seriously limiting your daily activities. Your symptoms often depend on which nerve fibers are damaged:

Motor nerves: These nerves regulate all the muscles under your conscious control, such as those used for walking, talking and holding objects. Damage to these nerves is typically associated with muscle weakness, painful cramps and uncontrollable muscle twitching.

Sensory nerves: Because these nerves relay information about touch, temperature and pain, you may experience a variety of symptoms. These include numbness or tingling in the hands or feet. You may have trouble sensing pain or changes in temperature, walking, keeping your balance with your eyes closed, or fastening buttons.

Autonomic nerves: This group of nerves regulates activities that are not controlled consciously, such as breathing, heart and thyroid function, and digesting food. Symptoms may include excessive sweating, changes in blood pressure, the inability to tolerate heat and gastrointestinal symptoms.

The lower leg is a vital biomechanical element during locomotion, especially during movements that need explosive power and endurance. The calf complex is an essential component during locomotive activities and weight-bearing. Injuries to this area impact various sporting disciplines and athletic populations. Calf Muscle Strain Injuries (CMSI) occur commonly in sports involving high speed running or increased volumes of running load, acceleration and deceleration as well as during fatiguing conditions of play or performance.

Calf strain is a common muscle injury and if not managed appropriately there is a risk of re injury and prolonged recovery. Muscle strains commonly occur in the medial head of the

gastrocnemius or close to the musculotendinous junction. The gastrocnemius muscle is more susceptible to injury as it is a biarthrodial muscle extending over the knee and ankle. Sudden bursts of acceleration can precipitate injury as well as a sudden eccentric overstretch of the muscle involved.

Gastrocnemius strains

Calf strains are most commonly found in the medial head of the gastrocnemius. This injury was first described in 1883 in association with tennis and is commonly called tennis leg. The classic presentation is of a middle aged male tennis player who suddenly extends the knee with the foot in dorsiflexion, resulting in immediate pain, disability, and swelling. Pain and disability can last months to years depending on the severity and effectiveness of initial treatment. The gastrocnemius is considered at high risk for strains because it crosses two joints (the knee and ankle) and has a high density of type two fast twitch muscle fibers. The combination of biarthrodial architecture leading to excessive stretch and rapid forceful contraction of type two muscle fibers results in strain.

Conclusion

Acute treatment is aimed at limiting hemorrhage and pain, as well as preventing complications. Over the first 3-5 days, muscle rest by limiting stretch and contraction, cryotherapy, compressive wrap or tape, and elevation of the leg are generally recommended. Simple application of an ACE wrap, heel wedge, and crutch assisted walking would accomplish these goals. Use of NSAIDs should be restricted in the first 24-72 h due to increased bleeding from antiplatelet effects. Celebrex and possibly other COX-2 inhibitors are an option during this period due to their lack of antiplatelet effect. Acetaminophen or narcotic pain medication could also be used. Moist heat and massage early in the healing process are thought to increase the chance of hemorrhage and are generally contra-indicated. Although rare, myositis ossificans and compartment syndrome can complicate acute strains. If symptoms have not improved as expected with acute treatment, reexamination and consideration for imaging studies should be considered to evaluate for complications or surgical indications. Following successful acute treatment more active rehabilitation strategies can be started. Rehabilitative exercises should isolate the soleus and gastrocnemius by varying knee flexion as described above. Passive stretching of the injured muscle at this stage helps elongate the maturing intramuscular scar and prepares the muscle for strengthening. As range of motion returns, strengthening should begin with unloaded isometric contraction. Ten days after the injury, the developing scar has the same tensile strength as the adjacent muscle and further progression of rehabilitative exercises can begin. Isometric, isotonic, and then dynamic training exercises can be added in a consecutive manner as each type of exercise is completed without pain. Application of other physical therapy modalities, including massage, ultrasound and electrical stimulation, could also be considered at this stage.