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Spiking Your Calf

Calf Strain Prevention and Recovery



Trent went to the gym and trained on the treadmill and elliptical machine three or four times a week. He always stretched and used the weight machines twice a week. He participated in 5k runs and had begun training for a triathlon. This summer, he was playing in a sand volleyball game when he felt an “agonizing pain” in his right calf. His calf became swollen, and he had bruising across his lower leg and foot. The next morning he could hardly walk. Trent went to see his doctor and, after an ultrasound imaging test, was diagnosed with a tear in his calf muscle. He arrived in our physical therapy clinic two weeks after the injury.

The gastrocnemius is the large calf muscle that attaches to the bottom of the femur on either side of the knee. It connects to the heel via the Achilles tendon. The gastrocnemius is a two joint muscle that controls motion at both the ankle and the knee. It is part of the anatomically linked myofascia system that holds us upright called the superficial back line.

Tears of the gastrocnemius muscle are one of the more common athletic injuries. The inside and upper part of the muscle (medial head) is most frequently injured. The pain can be intense and full recovery from a partial tear can take four to six weeks. Severe tears can require weeks of bracing and, in some cases, surgery. Treatment for the first 72 hours after the injury is RICE—rest, ice, compression, and elevation. Mild tears get better with 10 to 14 days of rest and gradual return to normal activity. Moderate to severe tears of-

ten require a rehab program of physical therapy to make a full recovery.

The development of any myofascia scarring in a two joint leg muscle causes problems. This is why hamstring, calf, and long adductor (groin) muscle strains often become a recurrent problem. Early treatment to manage dysfunctional scar tissue and fascia binding is important when recovering from a gastrocnemius tear. The methods used by the therapist are dependent on the level of tissue restriction and the sensitivity of the patient. As healing proceeds, the patient is gradually introduced to a program of functional retraining exercises.

On the field of play, the gastrocnemius and hamstring muscles work as a team to control rotation and flexion/extension at the knee. During athletic activities, the gastrocnemius is called on to control ballistic movement and then rapidly relax in order to be ready for the next challenge. In the gym, you see lots of knee flexion and extension activities—bike, treadmill, elliptical—and very little in the way of rotational movement patterns. Machines are used that isolate the gastrocnemius and hamstrings with leg curls and calf raises instead of training the muscles as a cohesive unit. Most gym training never approaches the faster speeds that occur during a game of softball, volleyball, or soccer. On the next page are four activities that anyone can use to improve function in the lower extremity and make a gastrocnemius tear less likely.

Trent was treated twice a week for six weeks. The first four sessions he was gradually progressed through a program of soft tissue massage and myofascia stretching. As pain resolved, we initiated full weight-bearing exercises and, at the end of his therapy, he was pain free through all movement patterns. Trent altered his fitness program to include more rotational and explosive activities. He has become devoted to a daily program of foam roll and massage stick work.

Michael S. O'Hara, P.T., OCS, CSCS

Calculus One

Single Leg Squats



Most gastrocnemius tears happen during joint deceleration--landing after a hop or jump, or planting the foot to pivot in a new direction. Deceleration capacity is more important for injury prevention than acceleration. A big engine and small brakes are a disaster for any car. Single leg squats teach deceleration control.

Get a pair of light dumbbells and stand facing away from a standard training bench (16-17 inches tall). Keep your torso tall with a proud chest posture. Lift the left leg forward and reach the dumbbells forward as you *slowly* sit back toward the bench. Control a smooth and steady decent to the bench with the right leg. Let your hip just tap the bench and then push back up with the right leg. The dumbbells act as a counter weight to make the exercise easier. Perform two or three sets of eight to ten repetitions on each leg.

Use a TRX, or similar suspension trainer, attached at least nine feet up the wall. Grab the handles and face the attachment point. Place the feet at least hip distance apart. Squat down and from the low point of the squat jump up off the floor holding the suspension straps for stability. Land softly, allowing the ankles, knees and hips to bend simultaneously. Keep the torso upright and stick the landing. Repeat for two or three sets of ten repetitions. As you get better at this exercise, try adding a sixty degree rotation to the jump.

TRX Jump Squats



For many fitness athletes, it has been years since they have performed any jumping or hopping. They do not possess the core stability, balance, and proprioception necessary to control full body-weight jumps. The TRX permits a graduated return to jump training activities.

Use a TRX, or similar suspension trainer, attached at least nine feet up the wall. Grab the handles and face the attachment point. Place the feet at least hip distance apart. Squat down and from the low point of the squat jump up off the floor holding the suspension straps for stability. Land softly, allowing the ankles, knees and hips to bend simultaneously. Keep the torso upright and stick the landing. Repeat for two or three sets of ten repetitions. As you get better at this exercise, try adding a sixty degree rotation to the jump.

Massage Stick

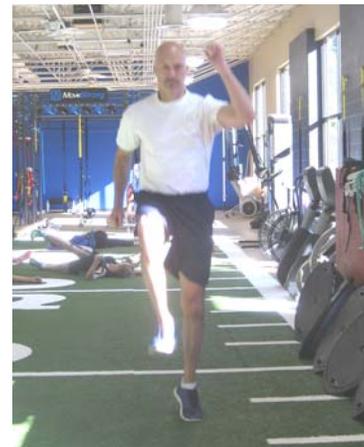
Prior athletic activities, injuries, and aging all lead to the development of fascia restrictions and scarring in the lower leg and Achilles tendon. Years ago, Ida Rolf proved that mechanical pressure can improve the integrity of connective tissue. Some regular soft tissue mobilization



of the calf and Achilles tendon will help improve the mobility and health of the lower leg.

Skipping

Reminding muscles how to work as a cohesive team is the essence of good training. Opposite arm/opposite leg skips with big arm swings and big reciprocal hip flexion-extension teach your entire superficial back line how to work together as a team. The glute, hamstring, and calf muscles all



fire in a synchronous fashion to launch the body off the ground. Skipping is anti-isolation muscle training and a basic motor pattern of human movement we should all be able to perform.

The Training Continuum

The Importance Of Year Round Training

In the field of sports performance, athletes just coming off a busy season typically allow themselves 3-6 weeks of downtime before flocking in to train.



During this time of relaxation, they become deconditioned and must almost start anew. This is also seen in individuals who train hard during 8-12 week challenges, then stop because they need a break. If we're smart, we don't stop. Why? Because it's hard to start over. Let's do a quick lesson in exercise adaptation to understand why it's so difficult to return to exercise after a break.

When starting a training program, the first two weeks are primarily filled with neurological adaptation. This means that the actual structure of the body is not changing nor is the way your body uses fuel. During the first couple of weeks, we primarily see an improvement in motor pathways for coordination and a more efficient firing of motor units. During the third and subsequent weeks, we begin to see more permanent adaptations in muscle size, power, utilization of fuel sources, etc. When we cease to give the body a training stimu-

lus (take a break), we start to lose the strength, speed, and power we worked so hard for after the two week mark. At this point, without a training stimulus, we begin to see the body climb into a state of detraining and with each passing day we lose more and more of these characteristics. Eventually, we end up where we were prior to any training.

If extended rest periods can lead to deconditioning and over-training can lead to injury, it is important that we find balance. For athletes, improvements seen from off season training can be maintained during peak season with just one intense training session per week paired with good nutrition and recovery habits. For gym members, add variety to your workouts to avoid over-training certain muscle groups and take time to recover with proper stretching and movement quality exercises. Sticking to a maximum of 1-2 weeks of relaxation after a completed season or challenge will allow athletes/gym members to maintain improvements and continue to move forward.

Whether you are an athlete or gym member, the same rules apply. Fitness is not seasonal. It's a lifestyle. For best results, follow the continuum.

-Jeff Tirrell, BS, CSCS

FIT Kids Goes To School

With September comes the start of a new school year: Math, science, reading, social studies, and very little, if any, physical education. Today's kids are expected to sit for longer hours in the classroom while recess times are shortened due to increasing educational demands. A recent article in the Washington Post by Valerie Strauss admits "... children rarely play outdoors due to parental fears, liability issues, and the hectic schedules of modern-day society...Children are not nearly moving enough, and it is really starting to become a problem."

St. John School and State Road Elementary in Fenton are taking a proactive approach to this problem by offering fitness as an after school enrichment program. Students will be exposed to a variety of fitness activities and games designed to improve necessary movement patterns and prevent injury. Students will be offered a 6 week menu of high energy activities which promise to improve core stability and strength, agility and coordination, stability and balance, and proper stretching techniques and focus.

Brett Klika, of SPIDERfit, states that, with children, exercise does a lot more than build a better body. It builds

a better brain.

"The interaction between physical activity and development of particular areas of the brain play a large role in improving attention, learning, judgment, self-control, memory, speech, and a variety of other cognitive skills."



Our goal is to make exercise fun while teaching the students the basics of human movement. As kids learn to master control of their bodies, they increase their confidence and focus which translates into better performance at school. Strauss concludes her article in bold print "***In order for children to learn, they need to be able to pay attention. In order to pay attention, we need to let them move.***" **A+**

-Amy Warner, Director of Sales and Marketing

Battle of the Bulge

How To Win the Biochemical War

Since the mid 1990's, we have known that body fat is not just an inert form of stored energy that Mother Nature created to carry us through a famine. Body fat is an endocrine organ that secretes hormones that turn genes on and off in cells throughout the body. Visceral fat, the kind stored in and around the internal organs, is the hormonal driver of metabolic syndrome, the precursor to diabetes, elevated blood fats, high blood pressure, and coronary artery disease. A recent study has revealed that body fat is capable of producing hormones that can cross the blood brain barrier and inhibit brain function. The good news is that we can fight back with another endocrine organ—*muscle*.



In 2003, researchers figured out that skeletal muscle is also an endocrine organ. Muscles produce biochemical secretions researchers call “myokines” that communicate with cells throughout the body. Myokines are an exciting biological finding as they have a remarkable restorative effect on human physiology. New myokines are being discovered on a regular basis. Some information on the most studied myokines is listed below:

Interleukin-6 (IL-6) promotes fat burning and controls inflammation. The action of IL-6 elevates tes-

tosterone and growth hormone levels, increases fat metabolism, regulates glucose, and increases muscle mass. It has been linked to a lower risk of heart disease and stroke. IL-6 is released in greater amounts as exercise activity becomes more intense.

Interleukin-15 (IL-15) is the myokine that inhibits the breakdown of skeletal muscle. The number one and two biomarkers of debility are loss of muscle mass and strength. IL-15 is released in response to resistance training.

Interleukin-8 (IL-8) triggers the formation of new and more robust blood vessels. The new vessels make it easier for muscles to receive adequate blood flow during episodes of greater work. When muscles are forced to produce energy in an anaerobic (no oxygen) state, IL-8 is released.

Lactic acid stimulates the release of testosterone and human growth hormone. It signals the muscles to increase the number of mitochondria (energy factories) in the cells. Lactic acid is created during intense anaerobic exercise activity.

In the physiological battle for better health, body fat has an advantage in this biochemical war. It never stops working. Seven days a week, twenty-four hours a day, it produces damaging chemical signals. Muscles need to be worked if we want them to keep producing beneficial myokines. The exercise stimulus that produces optimal levels of beneficial myokines will be discussed in next month's article.

-Michael O'Hara, P.T., OCS, CSCS

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