

Common Causes of Calf Pain in Endurance Athletes

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Achilles was the hero in Homer's Iliad, but he had one weakness — calf pain! Similarly, many endurance athletes suffer from disabling calf pain that limits their ability to train and race effectively. In some studies, calf injuries account for up to 30% of all sports related injuries. Endurance sports such as running and cycling place unique stress on the bones, muscles, and tendons of the leg resulting in a number of commonly seen injury patterns.

Poor training techniques such as rapid progression of training intensity, improper gear selection or fit, and poor biomechanics all contribute to this group of sports related injuries. For instance, cyclists commonly suffer from lower extremity muscular imbalances and tend to develop relatively tight hamstrings and calves. This fact coupled with a poor bike fit is responsible for the great majority of non-impact related calf injuries. Runners on the other hand suffer from repetitive impact stress to the bone and muscle/ tendon units of the calf. Poor running mechanics; specifically over-pronation, along with improper shoe selection have been implicated as major factors in this group of athletes. Sorry triathletes; you get the best of both worlds!

Identifying these factors, and correctly diagnosing the condition are both necessary in order to develop an effective treatment plan and get you back to training and racing. The following are brief descriptions of several common causes of calf pain in the endurance athlete.

Medial Tibial Stress Syndrome - MTSS:

Formerly known as Shin Splints; this is an extremely common condition that causes pain along the inner border of the lower leg. Pain is generally described as a dull non-specific ache. Symptoms are experienced on the initiation of exercise, but many times improve with continued activity and then recur after the session is complete. Many factors are associated with MTSS: Biomechanical alterations, changes in training intensity, training surface, poor stretching habits. The main cause is thought to be repetitive over-pronation, and possibly more important, the velocity of pronation. The soleus muscle acts to resist over-pronation during running. Thus, over-pronation causes repetitive contraction of the soleus as it attempts to "slow down pronation". This combined with repetitive

stress cause inflammation at the bony insertion of this muscle resulting in pain. Generally, a period of relative rest lasting from 2-6 weeks is required for healing to occur. Cross training such as swimming or cycling is encouraged. Upon your return to training; a soleus (calf) stretching program, an icing protocol, and properly fitting stability and/or cushioned shoes prevent a high likelihood of recurrence.

Tibial Stress Fractures:

Commonly confused for MTSS, stress fractures represent a much more serious condition. Symptoms are generally localized to the mid to upper third of the shin bone, are aggravated by activity, and relieved by rest. Many times the symptoms prevent running, but will allow relatively pain free walking. Fractures typically result from repetitive high impact activities, such as running; especially when there has been a sudden increase in intensity, duration, or frequency of workouts without proper recovery. Hormonal and nutritional imbalances are thought to be responsible for the high rate of these injuries found in female athletes. An evaluation of limb biomechanics and gait analysis are also important in identifying any additional risk factors such as muscular imbalance, limb length discrepancy, or excessive pronation. Strict rest from all impact activities is required for full healing. Cross training such as aqua jogging, cycling, and anti-gravity treadmills offer other options to maintain fitness during recovery.

Exertional Compartment Syndrome - ECS:

Compartment syndrome is characterized by progressive and diffuse calf pain that commences shortly after exercise begins. Additionally, numbness and tingling may be present in the foot, and calf cramping may be experienced. The pain may not subside immediately after exercise ends, and can linger for up to 24 hours. ECS is thought to occur as a result of increased pressure within the confined compartments of the leg due to increased blood pressure and muscle swelling that occurs during exercise. This prevents the normal flow of blood into and out of the leg resulting in oxygen deprivation to the muscles (pain and cramping) and nerves (numbness and tingling) of the calf. If an athlete is diagnosed with this condition, its only cures are cessation of exercise or surgery to release the tight lining of the compartments.

Tennis Leg:

Originally named because this injury was most commonly seen in middle aged recreational tennis players. Tennis leg is actually a tearing of the medial portion of the gastrocnemius muscle of the calf. It typically occurs as a sudden onset of sharp pain in the back of the calf. It typically occurs during the push-off portion of running or during the power stroke phase while cycling at high intensities. Significant pain, swelling, and bruising may develop over the first 24 hours. Full recovery can be expected with relative rest over a 6 week period. Cross training is encouraged as long as it does not elicit symptoms.

Achilles Tendinitis and Tendinosis:

Inflammation of the Achilles tendon generally presents as tenderness near the Achilles tendon insertion to the heel bone. Pain may initially improve during exercise, but typically worsens after the workout is complete. It is the result of repetitive activity causing tearing of the tendon on a microscopic level. Continued exercise without proper recovery results in an imbalance in the normal healing process and causes localized pain secondary to inflammation. Tight heel cords are a common predisposing factor along with a higher incidence seen in over pronators. Treatment includes relative rest from the inciting activity along with an eccentric stretching program shown to result in more favorable outcomes than the more common static stretches used by many athletes. If the overuse continues, the tendon itself may become chronically damaged leading to Achilles Tendinosis. Tendinosis presents as a swelling within the tendon in the mid-portion

of the achilles, and may require more involved treatment protocols to resolve completely.

Exercise Associated Muscle Cramps - EAMC:

Most athletes involved in endurance activities have experienced muscular cramps. Proposed causes include metabolic disorders, fluid imbalances, electrolyte disorders, and training in adverse environmental conditions. Interestingly, there is poor scientific evidence to support electrolyte imbalances or hydration status as the main causes. Newer theories suggest abnormal spinal reflex activity under fatigued conditions causing an excitatory effect on muscles. Risk factors in marathon runners include older age, increased body mass index, irregular stretching habits, and a family history of cramps. The key to preventing EAMC lies in preventing premature muscular fatigue during exercise. This is accomplished through proper training and conditioning programs. Additionally, a good diet with proper electrolyte intake and a regular stretching program have been shown to be associated with fewer cramps in athletes.

Summary:

The above mentioned conditions represent the more commonly seen causes of calf pain in endurance athletes, but by no means is it an exhaustive list. An evaluation with a sports medicine specialist is beneficial in providing an early accurate diagnosis, and is essential for avoiding complications and a prolonged delay of return to competition. Good luck with your "Achilles Heel"!

Dr. Bernardini is a former Division I Collegiate Academic All-American Football Player, and Track & Field Team captain. He is currently Co-Director of the Virtua sports medicine program and voted one of South Jersey Magazine's Best Sports Medicine Physicians as voted by its readers. He maintains his passion for athletics as a competitive Triathlete and three time Ironman finisher. He is the co-founder of the Jersey Devils Multisport Club, and has achieved distinction as a USA Triathlon Certified Level I Coach. He currently sees patients at his Vineland and Washington Township Offices, and has privileges in the Virtua, Inspira, and Kennedy Healthcare systems.

Call 1-856-696-0900 to make an appointment with Dr. Bernardini.



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