

Chronic Exertional Compartment Syndrome



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KEYWORDS

- Chronic exertional compartment syndrome • Chronic compartment syndrome
- Intracompartmental pressure testing • Fasciotomy • Exercise induced leg pain
- Medial tibial stress syndrome • Shin splints • Soleus bridge • Exercise neuropraxia

KEY POINTS

- Increased tissue pressure within a fascial compartment may be the result from any increase in volume within its contents or any decrease in size of the fascial covering or due to any distensibility of the fascial covering (ie, patients with thickened fascia).
- Shin splint pain and chronic exertional compartment syndrome (CECS) can be differentiated by a careful history and by exclusion of other maladies and confirmed by compartmental syndrome testing.
- Once the practitioner makes the proper diagnoses of CECS, through clinical examination and intracompartmental testing, surgical fasciotomy along with ancillary procedures should allow the athlete to return to competitive activity.

Patients who experience intense pain, a burning sensation, tightness, and/or numbness in the lower extremities during exercise activity, whereby the pain resolves quickly after cessation of activity, can often be diagnosed with chronic exertional compartment syndrome (CECS). This syndrome was first described by Mavor¹ in 1956 in which there was increased pressure within a specific muscle compartment of the leg, which causes pressure on vessels and nerves causing the symptoms.

Mubarak and Hargens² studied *acute* compartment syndrome (not to be confused with CECS) that included decreased blood flow through the intracompartmental capillaries (capillary ischemia), but continued blood flow to larger arteries and veins with palpable pulses distally.

In a study performed with magnetic resonance imaging, Amendola and colleagues³ found that CECS is not related to ischemia, but is actually due to increased fluid content within the muscle compartment. This can compromise or impair function of the muscles or nerves within a tight and constricted fascial covering.

It is also hypothesized by myself, as well as several colleagues, that the symptoms of CECS are similar to those individuals diagnosed with lumbar spinal stenosis who

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experience pain, weakness, and numbness causing them to limp. Like spinal stenosis, CECS may be the result of “temporary neurogenic claudication.” Here the small capillaries that supply the leg nerves are not getting their normal blood supply because they are compressed by increased compartment content during exercise.

In addition, several colleagues and I think that in CECS, nerve(s) and its pain receptors, such as mechanoreceptors and nociceptors are stimulated by any increased abnormal pressure against them.

Detmer and colleagues⁴ found in their study of 100 patients that most cases of CECS involve both legs, although other studies have indicated 80% or more involve both legs. It should also be noted in the study by Detmer and colleagues⁴ that the condition affected men and women pretty equally. In my private practice working with several universities and running clubs, I would concur with these findings and note that our average patient with CECS is a competitive athlete between the ages of 18 and 25. We have found equal occurrence among sprint sport athletes as in long distance runners.

Other physical findings of CECS may include mild edema or muscle herniations over the involved compartment, and muscle weakness of a specific compartment. This may include weakness of: dorsiflexion (anterior compartment), eversion/abduction (lateral compartment), plantar flexion (superficial posterior compartment), or inversion/toe flexion (deep posterior compartment).

Symptoms present during exercise also may include paresthesia to the anterior leg or ankle, or between the first and second metatarsal due to involvement of the medial terminal branch of the deep peroneal nerve within the anterior compartment.

If the patient complains of numbness or tingling to the arch or plantar aspect of the foot during exercise activity, that may be associated with a deep posterior leg compartment syndrome and not just a tarsal tunnel syndrome. In my personal experience, however, most patients do not complain of numbness, rather they complain of pain and tightness, which most often forces the athlete to curtail his or her activity level or stop to rest.

DIFFERENTIAL DIAGNOSES

The diagnosis of CECS is initially a diagnosis made by exclusion. Later on it is confirmed by intracompartmental pressure testing.

Often times, the deep posterior muscle compartments may have symptoms of medial tibial stress syndrome or chronic shin splints. Standard treatment of nonsteroidal anti-inflammatory drugs, orthotics, shin splint taping, rehabilitation, and so forth, should be initiated. The practitioner must be keenly aware of biomechanical factors causing irritation and strain of the periosteal and other soft tissues attached to the medial posterior border of the tibia, which can cause shin pain and/or stress fractures. Radiographs should be taken to rule out bone and joint injury.

If there is a concomitant accessory soleus muscle present, which takes up space in the superficial posterior compartment, this may cause CECS. Sometimes, there is an accessory peroneus quartus muscle, which takes up space in the lateral compartment. All preoperative patients with compartment syndrome should be sent for an MRI to see if there is any abnormal pathology including accessory muscles, tendon (look for partial tears) and muscle pathology, soft tissue masses, bone pathology, and so forth. Any increased muscle mass within a fascial compartment can lead to CECS during exercise and the surgeon will need to debulk or excise the accessory muscles and perform the appropriate surgery along with the fasciotomy.

Other factors that must be excluded as a cause of leg pain are claudication and/or popliteal artery entrapment syndrome. With clinical suspicion, these patients should

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