

## Chronic Exertional Compartment Syndrome & Lower Leg Pain

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Lower leg pain is not uncommon in the running athlete. Studies have shown that it is second only to the knee in causing lower leg pain and makes up around 20% of running injuries.

There are numerous causes of lower leg pain in the younger athlete. The most common of these include tibial periostitis (the old 'shin splints'), stress fractures and chronic exertional compartment syndromes. In the older athlete peripheral vascular disease should always be considered, as should spinal canal stenosis.

Tibial periostitis is an inflammation of the attachment of the deep calf (most likely the soleus muscle) to the medial tibial border. It generally comes about with increased training load on top of intrinsic factors such as poor foot biomechanics (particularly over-pronation), and calf inflexibility.

A stress fracture is defined as the failure of normal bone to cope with abnormal loads. It generally occurs in the tibia at the junction of the upper 2/3 and the lower 1/3. Similar factors may cause a tibial stress fracture that cause tibial periostitis, and there may be a continuum and overlap between the 2 conditions

Chronic exertional compartment syndrome is a condition where the fascia or covering of a muscle group becomes excessively stiff. It is normal for a muscle to swell with activity, often by up to 20% of its volume, and the fascia usually stretches enough to accommodate this. If the fascia becomes stiff – and this may occur due to ageing, genetics or trauma – then the swelling muscle becomes constricted. The blood supply then becomes compromised at a microvascular level, causing worsening pain with activity.

The features of all of these conditions may vary both on history and examination. In tibial periostitis the pain may initially warm up with activity, and there is no pain after a few minutes of running. There may, however, be considerable and prolonged post-activity pain. This is consistent with an inflammatory type history. In contrast, compartment syndrome is usually painless for the first 5-10 minutes of activity (depending on its severity) and slowly worsens throughout the run. Usually it is severe enough to make the runner stop, but generally subsides within a few minutes. This is an ischaemic or claudicant history

Stress fracture pain is largely insidious and progressive, occurring initially after exercise only, then progressing to pain during activity and even rest and night pain.

Accurate examination will further guide the clinician towards a diagnosis. In tibial periostitis the patient has widespread tenderness along the medial tibial border, generally in its mid-third. This may be quite exquisite. In a stress fracture there will be one area of more focal tenderness, generally at the junction of lower 1/3 and the upper 2/3 of the tibia. Hopping may also provoke the pain. At rest there may be minimal findings for chronic exertional compartment syndrome, although examination post-exercise may show increased tension through the affected compartment.



Fig 1. Bone scan appearance of tibial periostitis

Investigation of the problem is generally required to make a diagnosis and confirm clinical suspicions. A plain x-ray is always an appropriate test as it may demonstrate a stress fracture, and also other pathology such as a tumor. A bone scan is a helpful second line investigation for demonstrating tibial periostitis and also stress fractures. Similar information may be achieved with MRI scanning. If a compartment syndrome is suspected there may be a requirement to perform an invasive test known as a compartment pressure measurement. This involves placing a needle catheter attached to a pressure gauge into the affected compartment. Pressures are obtained both pre and post exercise to make the diagnosis.



Fig 2. Pressure testing of the anterior compartment

Treatment of the different lower leg complaints may be similar. It generally includes a period of rest with 'hands on' physiotherapy, a rehabilitation program of stretching and strengthening exercises, biomechanical assessment and occasionally an orthotic prescription. In the case of compartment syndrome, surgery may be required. This takes the form of a compartment release

Appropriate assessment and advice from a practitioner with experience in this area can greatly shorten the time to diagnosis and institution of appropriate management, short-circuiting a lengthy period of inactivity. Many patients have a long history of exertional lower leg pain that is not diagnosed as the practitioner is unaware of its significance or vascular tests are unremarkable.