

## Diagnosis of chronic exertional compartment syndrome in primary care

### Clinical Question

What do you do when you have a patient who says that they have pain and swelling in both legs when exercising, but appears to have no abnormalities on clinical examination?

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### INTRODUCTION

Chronic exertional compartment syndrome (CECS) is a disorder that typically presents as bilateral lower leg pain during exercise but is absent at rest. This is due to compression of a fascial compartment causing pain during exercise. It commonly presents in primary care but is often underdiagnosed due to a lack of awareness of the ailment by both patients and practitioners. If left undiagnosed it can lead to ischaemia and then infarction of the affected muscle compartment (Figure 1).<sup>1</sup>

### CASE REPORT

A 34-year-old male presented with a 4-week history of non-radiating, persistent 'bursting' pain of gradual onset in the posterior aspect of the right lower leg that occurred during exercise. The pain commenced after 40–60 minutes of exercise. The longer he exercised, the worse it became. When the pain first began, it would be relieved immediately at rest. Over time it remained as a dull ache for up to 30 minutes after the cessation of exercise. He also experienced paraesthesia in both the affected area and the plantar aspect of his foot. The patient had assumed that he was suffering from 'shin splints' as he had discussed his symptoms with a friend (although not with any healthcare professionals), who had experienced similar symptoms and so decided to manage the symptoms himself with ice and simple analgesics.

Having led a sedentary lifestyle, he had initially been prompted to exercise by his GP as he was at risk of cardiovascular disease. His main concern was that the pain was hindering his exercise regimen and that this may force a return to his previous inactive lifestyle.

Initially the patient was examined only at rest; no abnormalities were detected.

A number of investigations including plain X-ray, blood tests, MRI, and Doppler ultrasound scan of the lower leg were carried out. All findings were negative.

At a subsequent follow-up consultation, the individual was examined before *and* after exercise. Exercise constituted a 15-minute run at the same velocity and intensity that he would normally run. Immediately after exercise a larger muscle bulge could be palpated in the posteromedial aspect of the affected leg. Palpation of the deep posterior compartment was painful and felt tighter than the surrounding tissues. Both pain and bulge subsided within 10 minutes of cessation of exercise. Paraesthesia was experienced in the ipsilateral lower leg and heel. Foot pulses were normal and pitting oedema was absent.

Intracompartmental pressures were taken pre- and post-exercise. The pressure of the deep posterior compartment was 4 mmHg before, and 32 mmHg after exercise. This finding confirmed the diagnosis of CECS and the patient was referred to an orthopaedic surgeon for definitive management, which would be either a fasciotomy or fasciectomy.<sup>2</sup>

### DISCUSSION

CECS is often overlooked as a cause of muscle pain and there can be as much as a 22-month delay in the diagnosis of the condition.<sup>3,4</sup> It has a widely varying incidence, which has been reported to be between 10–64%.<sup>5</sup> This is because CECS can present with many different symptoms and can therefore be easily misdiagnosed. Patients often only seek medical attention at a late stage, as they believe it to be a less serious disorder.<sup>6</sup> Classically it presents as a burning, aching, or bursting pain in both legs, which occurs only during exercise and completely ceases at rest.<sup>7</sup> The symptoms are more likely to be bilateral with figures between 70–90% quoted in various studies.<sup>8</sup> The anterior compartment is most commonly affected.<sup>3</sup> Pes planus and overpronation have been found in those with CECS.<sup>9</sup> GPs should examine the patient both before and after exertion to demonstrate a normal physical examination pre-exercise and a

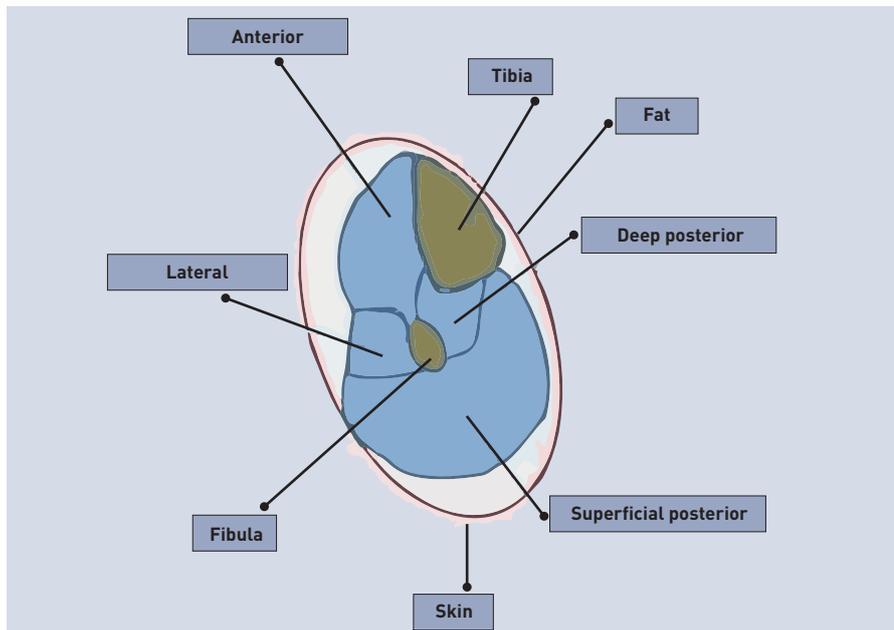


Figure 1. Compartments of the lower leg.

possible bulge in the affected compartment together with pain on palpation and possible neurovascular compromise in the affected area post-exercise. CECS is prevalent equally in both sexes with a median age of onset of 20-years-old<sup>10</sup> and is associated with diabetes mellitus.<sup>11</sup>

Dynamic intracompartmental pressure measurement remains the gold standard investigation.<sup>5</sup> However, static intracompartmental pressures at rest and then immediately after exercise can demonstrate the necessary rise in pressure,<sup>3</sup> which is 0–10 mmHg at rest to >25 mmHg after exercise.<sup>12</sup> This simple test, which is cheap and requires minimal

training, can be performed either blind or under ultrasound guidance and can lead to definitive surgical management and thus prevent further morbidity.<sup>2</sup> It is widely taught in many approved musculoskeletal courses for primary care physicians and therefore can be performed by GPs. If necessary time or equipment is not available in the primary care setting, preliminary diagnosis can be made based on history and clinical examination alone, leading to a referral to an orthopaedic surgeon for definitive investigation and management.

Most cases of CECS initially present in primary care, at a later stage of disease progression, as individuals believe the absence of symptoms at rest indicates a less serious and self-manageable disorder. The non-specific term 'shin splints' is often used by patients to cover a wide range of leg symptoms,<sup>6</sup> which may sidetrack the GP from correctly diagnosing the disorder (Box 1). It is therefore paramount that the physician sufficiently probes while taking a history. Moreover the absence of symptoms on examination at rest and negative findings on scans and X-rays, which are classically found in CECS, may distract the physician from making a prompt diagnosis and therefore further delay management. Indeed, apart from intracompartmental pressure measurement, other investigations are not cost effective, can take a significant amount of time to actually perform, and can therefore be more of a hindrance than a help. Increased education and knowledge of CECS is needed by GPs to allow early diagnosis, suitable investigation and appropriate management.

Table 1. Comparison of features of chronic exertional compartment syndrome and medial tibial stress syndrome

	Chronic exertional compartment syndrome (CECS)	Medial tibial stress syndrome (shin splints)
Nature of pain	• Burning, aching, bursting	• Diffuse pain of variable intensity
Relieving and exacerbating factors	• Pain only during exercise but totally absent at rest	• Exacerbated by exercise, relieved by rest
Most common location of pain	• Anterior compartment of the lower leg	• Middle to distal posteromedial border of the tibia
Unilateral or bilateral	• Bilateral more common	• Bilateral more common
Neurovascular changes	• Paraesthesia and/or numbness of leg and foot reported on exertion	• None
Associations	• Diabetes mellitus; recent change in footwear or exercise regimen; high heels; pes planus	• Worse in the morning; improper footwear; exercising on a hard surface, uneven terrain; pes planus
Physical examination	• Normal examination at rest. During and immediately after exercise, affected area may bulge with paraesthesia and numbness of the compartment or the foot	• Possible pitting oedema over affected area; dynamic foot hyperpronation; pain on palpation during both rest and exertion

#### Patient consent

The patient has provided written consent for the article to be published.

#### Provenance

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#### Competing interests

The authors have declared no competing interests.

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