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Compartment syndrome

Compartment syndrome occurs due to increased pressure within a confined space, or compartment, in the body. It can occur in the hand, the forearm, the upper arm, the buttocks, the leg, the foot and the tummy (abdomen). Compartment syndrome most commonly occurs in the leg below the knee. Acute compartment syndrome (occurring over a short period of time, and causing severe symptoms) is an emergency. If untreated, it can affect the blood supply to muscles in the affected compartment and can result in death (necrosis) of the muscles. Rapid diagnosis and treatment to relieve the pressure can lead to complete recovery of the affected muscles. Chronic (long-lasting) compartment syndrome can also occur. This isn't usually an emergency. It typically occurs during or after exercise, and generally gets better with rest.

What is compartment syndrome?

Compartment syndrome can occur if there is increased pressure within a confined space in the body. It usually occurs in areas of the body known as fascial compartments. Fascial compartments are found around muscles. The fascial compartment is a special tissue that forms a membrane layer around the muscle.

Compartment syndrome can occur in the hand, the forearm, the upper arm, the buttocks, the leg and the foot. There are four fascial compartments in the leg below the knee. The most common compartment syndrome that occurs affects the front (anterior) fascial compartment below the knee.

What is abdominal compartment syndrome?

Abdominal compartment syndrome can also occur. It is slightly different to compartment syndrome affecting the limbs. It occurs when there is increased pressure inside the cavity of the tummy (abdomen). It tends to affect people who are critically ill due to injury to their abdomen, or bleeding inside their abdomen, or who have other abdominal problems such as inflammation of the pancreas gland (pancreatitis). This leaflet concentrates on compartment syndrome that can affect the limbs and does not discuss abdominal compartment syndrome further.

Types of compartment syndrome

Sudden (acute) compartment syndrome

Acute compartment syndrome is a medical emergency. It's usually caused by a serious injury, such as crush injuries to the arms or legs, or major bone fractures. In acute compartment syndrome, pressure builds up quickly within a 'compartment' of the arm or leg, causing symptoms that rapidly get worse, and potentially leading to irreversible muscle damage if not treated urgently.

This leaflet focuses on acute compartment syndrome.

Gradual (chronic) compartment syndrome.

Chronic compartment syndrome (sometimes called 'chronic exertional compartment syndrome') usually comes on with exercise and gets better at rest. This isn't a medical emergency, although the symptoms can restrict people from exercising. It's called 'chronic' because, although the symptoms come and go, people usually experience them over weeks, months, or longer.

Whilst this leaflet focuses on acute compartment syndrome, there's some information about chronic compartment syndrome at the end - see the "Chronic compartment syndrome" section.

What causes compartment syndrome?

It is usually an injury to a limb that causes compartment syndrome and this can be almost any major or minor injury. It can even occur after vigorous exercise. It usually occurs after major or serious injuries, though – minor injuries causing compartment syndrome are rare. Compartment syndrome usually comes on fairly quickly after injury (within 48 hours). However, a long-standing (chronic) compartment syndrome is also possible (see below).

The initial injury usually causes swelling of the muscles and tissues within the fascial compartment of the limb. This causes the pressure within the compartment to rise. As time progresses, and as the degree of pressure in the fascial compartment increases, blood flow to the muscles in the compartment reduces. This lack of blood flow (called ischaemia) means that oxygen is not delivered effectively to the muscles and muscle damage begins to occur.

As muscle damage occurs, muscle cells start to produce chemicals which can further increase swelling and pressure within the muscle compartment. A vicious circle can be set up. Nerves within the compartment can also be compressed and damaged. If untreated, the muscle can be irreversibly and permanently damaged and can die (called muscle necrosis).

What injuries can cause compartment syndrome?

A break in a bone (a fracture) is probably the most common injury that can lead to compartment syndrome – typically, a bone fracture in the legs or arms. Compartment syndrome can also occur due to:

- Vigorous exercise.
- Penetrating injury such as stabbings or gunshot wounds.
- Crush injury.
- Burns.
- Snake bites.
- Bleeding from injured blood vessels.

- Plaster casts that are fitted too tightly.
- Medicines usually given via a drip into a vein (intravenous medicines) that inadvertently leak inside the arm around the vein.

How common is compartment syndrome?

Compartment syndrome does not occur after every injury to your arm or leg. You are at increased risk of compartment syndrome if you have a broken bone (a fracture) in your your arm below the elbow (your forearm) or your leg below the knee.

This risk is increased further if you needed an operation to fix the broken bone or if you have infection in the affected limb. Compartment syndrome is also more likely to develop after an injury if you are taking medicines to treat or prevent blood clots (anticoagulant medication).

What are the symptoms of compartment syndrome?

The main symptom of compartment syndrome is pain. Pain usually occurs even at rest and may also be worse on movement. Pain is likely to occur after any injury. However, in compartment syndrome, the pain tends to be severe and out of proportion to the injury.

For example, pain usually improves when a broken bone (a fracture) is immobilised in a plaster cast or with a splint. In compartment syndrome, pain typically increases despite immobilisation of a fracture. Nerve damage due to the compartment syndrome may also make pain worse.

Other symptoms of acute compartment syndrome include:

- Burning sensation or tightness around the affected area.
- [Pins and needles](#) in the affected arm or leg.
- Affected limb is pale, cold and may feel tense or hard.
- Reduced strength in the affected arm or leg.
- Paralysis of the affected limb can sometimes occur.

How is compartment syndrome diagnosed?

Early compartment syndrome may be difficult for your doctor to diagnose. Compartment syndrome is often suspected by your doctor if you have had a recent injury to one of your limbs and have the typical symptoms.

Your doctor may want to examine the affected limb, looking for signs of nerve and muscle damage. A specialist may also use one of the special devices that are available to provide compartment pressure monitoring within the fascial compartment. One such device involves a needle being placed in the fascial compartment to measure the pressure. Sometimes a [magnetic resonance imaging \(MRI\) scan](#) may be used to help in the diagnosis of compartment syndrome, although getting scans can delay treatment, and so doctors may recommend proceeding directly to emergency surgery if they think compartment syndrome is likely.

What is the treatment for compartment syndrome?

Compartment syndrome should be treated as quickly as possible to try to reduce the likelihood of permanent nerve and muscle damage. You may be given oxygen, using a face mask, as this may help to increase oxygen delivery to the affected muscles. You may also be given some fluids into your veins, using a drip.

The aim of treatment for compartment syndrome is to relieve the pressure within the fascial compartment surrounding the muscles. This is done by performing an operation called a fasciotomy. In a fasciotomy, the skin and fascial compartment are cut open so that compartment pressure is relieved. Any dead muscle is removed at the same time.

The wound is usually left open because, if it were closed, the pressure would be likely to build up again. The wound may be closed using stitches some days later. Sometimes skin grafting is used to close the wound or the wound is not closed and it is left to heal by itself.

Can compartment syndrome come back?

Acute compartment syndrome usually doesn't come back. If surgery is done in time, it's usually successful in relieving pressure within the compartment, allowing the muscle swelling to heal over the next few days.

Chronic compartment syndrome (see below) often tends to recur over time.

What are the complications of compartment syndrome?

Possible complications from acute compartment syndrome include:

- Permanent nerve damage.
- Permanent muscle damage and reduced function of the affected limb.
- Permanent scarring due to the fasciotomy procedure on the affected limb.
- In rare cases, loss of the affected limb.
- Infection.
- Kidney failure: as muscle dies, various chemicals are released by the muscle, which can damage the kidneys.
- In rare cases, death can occur.

What is the outlook for compartment syndrome?

Outlook (prognosis) depends on how quickly the compartment syndrome is diagnosed and treated. Complete recovery of nerves and muscles is possible if compartment syndrome is treated quickly. Quick treatment means that blood supply to the muscles can be restored before permanent damage occurs. Some experts say that compartment syndrome in the arm or leg needs to be treated within as little time as six hours to prevent muscle death (necrosis).

How to prevent compartment syndrome

Unfortunately, there is probably no way to prevent acute compartment syndrome, aside from avoiding major injury in the first place. Sometimes, with very severe injuries at a high risk of compartment syndrome, trauma surgeons will perform fasciotomies before it develops, to prevent pressure building up.

Chronic compartment syndrome

Some people get a condition called chronic (meaning long-standing) compartment syndrome. It has some similarities with acute compartment syndrome – it's caused by muscle swelling inside a compartment, causing pain – but is very different in that it's not an emergency like acute compartment syndrome is, and doesn't cause serious health issues.

Chronic compartment syndrome is caused by muscles swelling during exercise. It's most common in younger athletes, especially runners.

Long-standing (chronic) compartment syndrome in the lower leg usually affects the anterior fascial compartment (see above). It is caused by a swelling of one of the muscles of the lower leg, called the tibialis anterior muscle. The muscle can swell during exercise. It typically affects long-distance runners and hill runners. It tends to cause pain in the shin on the outer (lateral) side. Shin splints typically cause pain on the inner (medial) side. Chronic compartment syndrome below the knee is sometimes confused with shin splints. [See the separate leaflet called Shin Splints \(Medial Tibial Stress Syndrome\) for more detail.](#)

Pain from chronic compartment syndrome develops after exercising for a certain amount of time. The limb can also feel tight or tingly. Symptoms get better with resting.

Tests for chronic compartment syndrome might include:

- An X-ray, to look for other problems with the bones.
- An MRI scan.
- Sometimes, compartment pressure testing of the muscle before and after exercise – this can definitively prove the diagnosis of chronic compartment syndrome, but is invasive and slightly painful.

Treatments for chronic compartment syndrome include:

- Avoiding the activity that triggers symptoms.
- Switching exercises – eg, cross-training with low-impact exercises.
- Getting advice and training from a physiotherapist about how to change running style, to prevent symptoms.

- Taking pain relief medications, like [non-steroidal anti-inflammatory drugs \(NSAIDs\)](#).
- An operation to open up the fascial compartment around the muscle (usually only if other treatments haven't worked).

Take home message

If you have severe pain, numbness, a burning sensation, or weakness in one of your limbs after recent injury or vigorous exercise, you should immediately attend your local Emergency Department.

If you have repeated episodes of pain that come on in your legs during exercise, and go away with rest, you should speak to your GP.

Further reading

- [Compartment Syndrome](#); Wheeless' Textbook of Orthopaedics
- [McKinney B, Gaunder C, Schumer R](#); Acute Exertional Compartment Syndrome with Rhabdomyolysis: Case Report and Review of Literature. Am J Case Rep. 2018 Feb 8;19:145-149.
- [Yasir M, Hoda MQ, Ahmed T](#); Bladder Distension as a Cause of Abdominal Compartment Syndrome. J Coll Physicians Surg Pak. 2018 Feb;28(2):155-156. doi: 10.29271/jcpsp.2018.02.155.
- [Ferri F](#); Ferri's Clinical Advisor, 2018.
- [de Bruijn JA, van Zantvoort APM, van Klaveren D, et al](#); Factors Predicting Lower Leg Chronic Exertional Compartment Syndrome in a Large Population. Int J Sports Med. 2018 Jan;39(1):58-66. doi: 10.1055/s-0043-119225. Epub 2017 Nov 10.
- [Schmidt AH](#); Acute compartment syndrome. Injury. 2017 Jun;48 Suppl 1:S22-S25. doi: 10.1016/j.injury.2017.04.024. Epub 2017 Apr 24.

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