

Passion Montagne: Frostbite

Frostbite is a localised injury caused by the effects of cold when exposed to temperatures below 0°C. This phenomenon is favoured by humidity, wind, high altitude, unsuitable equipment and clothing that is too tight.

There are three stages in the mechanism of frostbite: the primary phase (cooling and freezing), the secondary phase (reheating) and the late phase (permanent lesions).

During the primary phase, in order to protect the vital organs and maintain them at a temperature of 37°C when exposed to the cold, the small vessels in the extremities close. The phalanges will then no longer be vascularised or oxygenated. If the phenomenon continues, the tissue will become necrotic. And the process will gradually spread to the next phalanx, then to the hand and foot...

At the same time, the blood already present in the extremities will stagnate and freeze, as will the cells, which will burst and die, contributing to the phenomenon of necrosis.

The first sign that frostbite is developing is a loss of feeling and the absence of pain, whereas previously we felt cold and our extremities ached. In this case, treatment must be started quickly.

The secondary phase therefore begins when the extremities can be rewarmed and there is and will be no further exposure to cold. During this process, the ice crystals formed in the tissues will melt and the blood vessels will open. This will revascularise the extremities, which will gradually turn grey, blue and purple.

Twenty-four to forty-eight hours after the start of warming, "blisters" appear, which may be very large and full of blood, which is a poor prognosis.

If there are any signs of seriousness, such as blood-filled blisters, specific treatment should be given as quickly as possible in hospital.

The late phase, which begins forty-eight to seventy-two hours after reheating begins, corresponds to the healing phase and can last for several weeks.

The final lesions and irreversible after-effects are then observed. Tissues that have been revascularised will heal, while gangrene will develop in tissues that could not be revascularised and will have to be amputated.

Despite prompt, well-managed treatment, symptoms such as cold pain and hyper- or hypersensitivity can persist for months or even years.

Victims of severe frostbite who have been able to avoid amputation may suffer from early osteoarthritis, as early as a year later, which may be accompanied by deformities of the fingers.

Frostbite can only be classified after reheating, and there are four grades.

Grades 1 and 2 have a better prognosis, do not require hospitalisation and have virtually no risk of amputation.

Grades 3 and 4 require hospitalisation, daily local care and are associated with a high risk of amputation.

In the event of frostbite, the first measures to take in the field are to drink as much as possible (even cold drinks, but no alcohol), to warm up the frozen areas by gentle massage (avoid vigorous rubbing with snow) or to warm up in the armpit or groin of a companion, to remove shoes and to change damp clothes.

As long as you are not in a warm, suitable place (refuge, bivouac, base camp, etc.) and if you risk being exposed to the cold again, you should not warm your organs for more than ten minutes and you should put your shoes back on after no more than ten minutes.

If sensitivity does not return, it will be urgent to find shelter or go to hospital.

As soon as you are in a suitable place, warm up your extremities by immersing them in water at 38 to 40°C, if possible with a little disinfectant (or hooch) for thirty to sixty minutes, and take aspirin and/or Nifedipine (10 mg) if available. Pressure dressings should be avoided.

After warming, the grade of frostbite can be determined. In the event of grade 3 or 4, the patient should be referred to hospital as a matter of urgency.

If this is not possible, for example on high-altitude expeditions, then an antibiotic (amoxycillin + clavulanic acid) should be used wherever possible, and the blisters punctured and pierced, taking care to disinfect the skin thoroughly and using sterile equipment if possible.

Whatever the case, the best treatment starts with preventive measures to limit the risk of frostbite.

So make sure you stay well hydrated (without alcohol or caffeine), wear suitable clothing, avoid wearing shoes and clothes too tightly, avoid dampness (spare underwear and socks), and take aspirin if necessary on the morning of the start.

Dr Marcos del Cuadro
Sports medicine SSMS
General Internal Medicine FMH
Vidy Sport - Vidy Med Centre www.vidysport.ch