

# Compressive cryotherapy

## A prime choice for stifle joint surgery in dogs ?

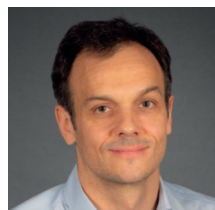
After stifle joint surgery, cryo-compressive splints can help with early functional recovery. These devices combine two simultaneous actions which are particularly indicated in the postoperative period: cold and compression. There are already widely used in humans to improve analgesia and postoperative recovery, and they are now available and adapted for the canine stifle joint.



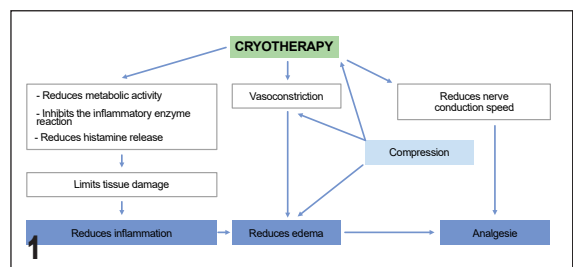
The therapeutic effects of cold have long been known and widely accepted in the management of musculoskeletal injuries, whether traumatic or post-surgery. Indeed, in the aphorisms of Hippocrates (460-370 BC), the use of ice or snow was already recommended to reduce swelling and pain (1).

Cryotherapy has analgesic, anti-inflammatory, anti-edematous and muscle relaxant effects. When cold is

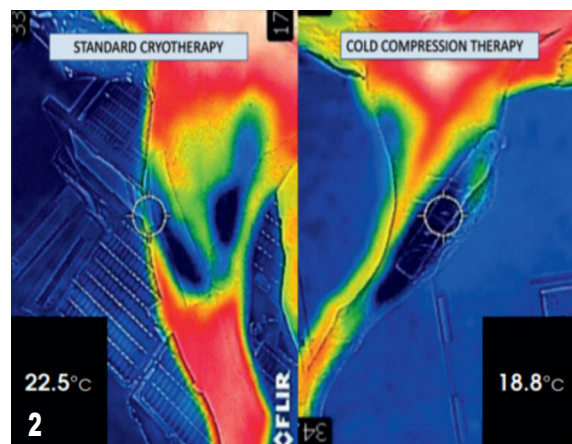
Compression also improves the conformation of the splint around the anatomical area of interest, thus ensuring a better distribution of cold and a better maintenance of the splint (3,5).



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*Simplified mode of action of compressive cryotherapy.*



*Comparison of temperature decrease following cryotherapy and compressive cryotherapy: Here, 22.5°C on average with cryotherapy versus 18.8°C with compressive cryotherapy.*

applied locally, a decrease in skin temperature (but no decrease in core temperature), intramuscular and intra-articular temperature is observed. This local hypothermia leads to a decrease in the metabolic activity of the surrounding tissues, associated with venous and arterial vasoconstriction. This results in a lower inflammatory reaction, linked to the reduction of enzyme activity, production of chemical mediators and cellular metabolism. This anti-inflammatory effect promotes cell survival, reduces secondary hypoxic lesions and decreases vascular permeability. This decrease in vascular permeability and the cold-induced vasoconstriction limit the formation of post-traumatic edemas. Finally, the analgesic effect of cryotherapy, partly related to the reduction of edemas, is also due to the reduced excitability of nociceptors and to nerve conduction velocity. This analgesia seems to appear when the skin temperature reaches approximately 10 to 15°C and stays so 15 to 30 minutes after application (2-5).

During local compression, a decrease in blood flow and edema is also observed. These effects work synergistically with cryotherapy. Indeed, the combined actions of compression and cold accelerate, accentuate and favor the penetration of the local temperature decrease while encouraging lymphatic drainage.

## Indications for compressive cryotherapy

are mainly acute post-traumatic injuries: sprain, muscle straining, dislocation, fracture, hematoma, ecchymosis, edema, as well as immediate post-operative care. In humans, the use of compressive cryotherapy still remains rather empirical. However, many studies show that its use following musculoskeletal trauma or in postoperative care significantly improves functional recovery and seems more effective than the simple application of an ice bladder. These effects are particularly significant after knee surgery, such as cranial cruciate ligament repair or total knee prosthesis. A decrease in postoperative pain, in the use of analgesics and an improved range of motion are widely noted. In some studies, these benefits were observed up to one month postoperatively (2,3,5-7).

In dogs, the expected results are comparable. After four sessions of postoperative compressive cryotherapy, a recent study showed a significant improvement in the range of motion and degree of lameness, as well as a significant decrease in pain score (Glasgow scale), compared to a control group. These results were

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**1. Clinical outcome after application of compressive cryotherapy in postoperative stifle surgery (4 times at 6-hour intervals) versus control group:**

In dogs, the splint used postoperatively promotes :	24 hours after surgery	42 days after surgery
significant improvement in range of motion.	●	●
significant decrease in pain scores measured by Glasgow scale.	●	●
significant improvement in degree of lameness		●

observed up to 42 days post-surgery (Tab. 1). Further compressive cryotherapy sessions after surgery are thus recommended.

**Practical use : a specific split**

Immediate application of the splint is clearly preferred means of a protective piece of jersey supplied with the able, i.e. as soon as possible after the trauma or in the immediate postoperative period. To be as effective as possible, the splint should be applied immediately after the operation and before the animal wakes up (Fig. 3). It should be used during the inflammatory phase, i.e. the first three to five days, in two to



Placing a cryo-compressive splint before the dog wakes up postoperatively.

Video of the fitting of a splint by Valerie Guigardet (Vetokinesis Center, Physiotherapy, 01320 Chalamont).

<https://www.youtube.com/watch?v=Mt6q44HTS0M&t=4s>.



three daily sessions of 10 to 20 minutes each. The tolerance and efficacy of the device appear to be satisfactory (see video).

The contraindications of cryotherapy are rare in veterinary medicine. In humans, they include the following: skin sensitivity disorders, allergies to cold, Raynaud's syndrome, cryoglobulinemia, diabetes and metabolic diseases (risk of skin lesions on fragile skin). The main risk of cryotherapy is the appearance of skin lesions during over-prolonged or unprotected application. It is therefore recommended to avoid direct contact between the skin and the cooling gel by splint, and to limit the duration of use to about 20 minutes, while monitoring the area.

The splint that is currently available in veterinary medicine is perfectly adapted to the conformation of the dog's stifle and should therefore be used in the post-operative stabilization of a cranial cruciate ligament rupture. It comprises a cryopack (to be kept in the freezer) and an



Specific compressive cryotherapy splint for dogs;

inflating bulb to inflate it by means of 5 to 10 presses (Fig. 4).

The splint is available in three sizes, with a right and a left version for each size. This makes treatment possible for all patients between 15 and 50 kg. These splints are available

**2. Characteristics of splints available at Novetech Surgery®, Alcyon or Mikan**

Designation	Sizes	Orientation	References	Characteristics
COMPRESSIVE CRYOTHERAPY SPLINT	S	RIGHT	AC-GDS01	15-25Kg Length : 26 cm
		LEFT	AC-GDS01	Thight circumference : 29 cm
	M	RIGHT	AC-GDM01	25-35Kg Length : 28 cm
		LEFT	AC-GDM01	Thight circumference : 31 cm
	L	RIGHT	AC-GDL01	35-45Kg Length : 30 cm
		LEFT	AC-GDL01	Thight circumference : 35 cm

for sale directly from Novetech Surgery® or via Alcyon and Mikan (Tab. 2).

Compressive cryotherapy is very useful for the management of postoperative pain and inflammation. It is part of a multimodal approach to pain management that minimizes the potential side effects. The development of dog-specific splints should facilitate their use and thus improve the postoperative management of animals.