

Comparison of two cold compression therapy protocols after tibial plateau leveling osteotomy in dogs

Von Freeden N, Duerr F, Fehr M, Diekmann C, Mandel C, Harms O. Comparison of two cold compression therapy protocols after tibial plateau leveling osteotomy in dogs. Tierärztliche Praxis Kleintiere 4/2017



The use of an associated compression device potentiates the effects of cryotherapy. This technique is particularly interesting for patients in the early stage of rehabilitation after knee surgery

Functional rehabilitation is one of the fastest growing fields in canine veterinary medicine. It is frequently used to facilitate recovery after cruciate ligament surgery. Cryotherapy is often used in humans and animals to reduce pain and inflammation in the immediate post-operative period. Its beneficial effects are due to local vasoconstriction, which leads to a reduction in blood flow, capillary permeability, the formation of edema, local bleeding and nerve conduction, hence its analgesic properties. When associated with intermittent dynamic compression, it is known as cold compression therapy (CCT).

Various studies and meta-analyses in humans and dogs have demonstrated the benefits of CCT, as well as its superiority over simple cryotherapy, particularly in patients in the early stages of rehabilitation after knee surgery.

The objective of the present study was to compare the effects of two different CCT protocols on pain and functional recovery in dogs having undergone tibial plateau leveling osteotomy (TPLO).

> Materials and methods

This randomized, placebo-controlled, blinded study was conducted in Hannover, Germany, on 27 adult dogs that had suffered a ruptured anterior cruciate ligament (ACL) between June 2015 and April 2016. They all underwent a complete physical and orthopedic examination. Each joint was examined by MRI before surgery to check for partial or total ACL rupture and to rule out other pathologies. All animals followed a similar anesthetic/

analgesic protocol and underwent conventional TPLO (3 bilateral and 24 unilateral procedures) performed by the same surgeons and assistants. They were randomly divided into three groups of 10. Dogs in group 1 had one CCT session before and immediately after surgery; those in group 2 had four CCT sessions at 6-hour intervals in the postoperative period; dogs in group 3 received a placebo instead of CCT (room temperature gel pack and non-activated compression pump).

A single observer blindly measured the circumference of the femorotibial joint before surgery and at d1, d10 and d42 postoperatively. He also assessed certain pain-related parameters: joint range of motion (ROM), degree of lameness, and pain score (modified Glasgow scale).

> Results

The two groups that received CCT showed a significantly greater ROM and lower Glasgow pain scores than the control group 24 hours after surgery. At d10, the degree of lameness was significantly lower in both CCT groups than in the control group. At d42, there was a significantly greater ROM in both treated groups. The dogs in group 2 also showed significant improvement in the degree of lameness and pain score. However, there were no significant differences in parameters between the two CCT groups at any point of the experiment.

> Conclusion and clinical relevance

CCT in the immediate pre- and postoperative periods showed similar short- and long-term benefits to those obtained with the previously established protocol (i.e. CCT in the postoperative period). This new protocol seems more practical to implement, while emphasizing the importance of postoperative rehabilitation in dogs.

THE EXPERT THINK



> Veterinary Dr Ludivine Jacquemin-Bietrix
University Degree in Rheumatology in Elderly Subjects Inter-university Degree in Geriatric Physiotherapy and Rehabilitation, President of GEREPE (Groupe d'étude en Rééducation

et Physiothérapie at AFVAC)

Member of the Board of Afvephyr (Association française des vétérinaires exerçant en physiothérapie et rééducation). Anicura TRIOVet, Rennes FRANCE (35)

As with any injury, the body responds by causing an inflammatory response after surgery. A set of physiological processes triggers the tissue repair phase. This inflammatory response is responsible for increased local temperature, edema and a lack of cellular oxygenation. These phenomena can cause pain and may hinder the recovery of the operated limb.

Cryotherapy is the use of "cold" for therapeutic purposes. In physiotherapy, it is used in the acute phase of inflammation: 48-72 hours postoperatively, after intense exercise in the event of osteoarthritis or during a painful episode. Its two main physiological effects are a decrease in nerve conduction speed (analgesic effect) and vasoconstriction (analgesic and anti-inflammatory effect; anti-edematous effect and prevention of post-traumatic bleeding; relaxation of muscle tension [spasms]). Several studies have also shown that the use of a compression device can potentiate the effects of cryotherapy.

Compressive cryotherapy has several significant advantages: it is easy to implement, safe, and inexpensive with no serious adverse effects. Since dogs' knee joints respond well to this treatment modality and TPLO is an intervention increasingly practiced in veterinary clinics, the study by Von Freeden et al. is highly relevant in the management of anterior cruciate ligament ruptures in dogs.

Although this study concerned a small sample of dogs, it was well conducted since it was randomized, placebo-controlled (use of a non-refrigerated and non-compressive splint) and had blinded evaluation. In addition, each dog underwent the same management protocol and was operated by the same surgeon.

Beyond simply trying to prove the efficacy of compressive cryotherapy, the objective of this study was to compare the results of two different protocols proposed in the context of TPLO surgery in 27 dogs: group 1 had 2 CCT sessions, one just before and one just after surgery; group 2 had four postoperative CCT sessions 6 hours apart. Each session lasted 20 minutes and was performed using a cryotherapy splint with an integrated pump.

The evaluation of the effects of each protocol focused on postoperative pain and functional recovery. Several parameters were monitored 24 hours before, as well as d1, d10 and d42 after surgery: joint angles, degree of lameness, joint circumference, pain score on the VAS (visual analogue scale) and pain score on the GPS (Glasgow pain scale).

The conclusion of this study is particularly interesting for veterinary surgeons practicing TPLO. It underlines that a compressive cryotherapy protocol composed of two sessions, one just before and one just after surgery, has the same benefits on both pain and functional outcomes as a protocol composed of four postoperative sessions, both in the short term and in the long term.

This finding makes this physiotherapy technique much easier to implement in the clinic: two sessions only, one on an already anesthetized patient and the other on a still anesthetized patient, thus not requiring monitoring of the animal.

It now remains to be established which of these two sessions is the more beneficial and whether a single pre- or post-operative session could suffice. These protocols should also be tested in the context of other veterinary surgical procedures. Experience shows that regular home sessions over a longer post-operative period also give satisfactory results and offer an additional perspective for the implementation of compressive cryotherapy.

In conclusion, since CCT reduces postoperative inflammation and pain and promotes faster functional recovery, it may also help reduce the administration of analgesic and anti-inflammatory drugs after each intervention.

FOR MORE INFORMATIONS

1. Koyonos L, Owsley K, Vollmer E, Limpisvasti O, Gambardella R. Preoperative cryotherapy use in anterior cruciate ligament reconstruction. J Knee Surg 2014;27(6):479-84.
2. Murgier J, Cassard X. Cryotherapy with dynamic intermittent compression for analgesia after anterior cruciate ligament reconstruction. Preliminary study. Orthop Traumatol Surg Res 2014;100(3):309-12
3. Raynor MC, Pietrobon R, Guller U, Higgins LD. Cryotherapy after ACL reconstruction : A meta-analysis. J Knee Surg 2005;18:123-9.
4. Waterman B, Walker JJ, Swaims C, Shortt M, Todd MS, Machen SM, Owens BD. The efficacy of combined cryotherapy and compression compared with cryotherapy alone following anterior cruciate ligament reconstruction. J Knee Surg 2012;25(2):155-60.