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Postoperative cryotherapy – it's more than just cold

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ABSTRACT: Physiotherapy and physical rehabilitation therapies are increasingly becoming a popular method of treatment used by veterinary professionals for animals recovering from musculoskeletal and spinal disorders. Many of the rehabilitation therapies applied to veterinary patients have been extrapolated from human clinical and physiotherapy practice; however, further research and clinical studies are required to establish the specific rehabilitation requirements for the broad spectrum of orthopaedic and neurological conditions seen in small animal practice.¹

With great advances in veterinary diagnostic and treatment modalities, comes the ability to provide specialist patient management for diseases such as spinal and orthopaedic conditions. These advances and specialist skills also assist to provide outstanding patient care for those clients with increased expectations of veterinary services, and increased awareness of complementary therapies.²

The author suggests that, with an increased awareness of cryotherapy's mode of action and the important role it plays in recovery and rehabilitation, the VS and RVN can implement this simple, physiotherapy modality into their surgical practice to improve and maximise patient care.

Physiotherapy aims to restore normal body mobility and function following an injury or trauma, or compromise resulting from a musculoskeletal disease or a degenerative condition.³ Physiotherapy interventions can be applied to maximise physical potential by reducing pain, maintaining muscle mass and promoting the healing process.⁴

Within veterinary practice, physiotherapy has become an integral part of orthopaedic and surgical patient rehabilitation, where patients are provided with specialist postoperative aftercare to encourage a successful recovery and to regain optimum function.

The RVN's role

Veterinary nurses (RVNs) play a pivotal role in the recovery and rehabilitation phase as they are often primarily involved in administering patient care and formulating holistic care plans. This makes it essential for the RVN to have a thorough knowledge of the physiotherapy modalities available for the orthopaedic patient, to ensure that it is receiving appropriate and optimum nursing care.

It is also important for the RVN to have a good knowledge and understanding of the effects and contraindications associated with such treatments to ensure patient safety.

RVNs who are involved in animal physiotherapy can undertake courses, continued professional development (CPD) or simply collaborate with local chartered veterinary physiotherapists to expand their skills and knowledge with evidence-based, physiotherapy practice.⁵ By expanding their knowledge and skills through further specialist studies and research, the RVN can implement these skills in the veterinary practice environment to provide gold standard nursing care for patients.

Pathophysiology

Orthopaedic surgery can be invasive and traumatic, especially to the soft tissues that are extensively dissected around the surgical site.⁶

During the immediate postoperative period, the patient may endure an acute inflammatory phase in and surrounding the surgical site; with symptoms of

surgical site pain, heat, oedematous swelling, increased muscle tone, spasm and poor use of the affected limb.^{7 & 8}

Thermotherapy and cryotherapy are rehabilitation techniques involving the use of heat and cold respectively, applied as an additional method of treating musculoskeletal injuries and discomfort following orthopaedic surgery.

These techniques can be applied around the surgical site to provide further analgesia along with benefits of reducing oedematous swelling and improving mobility.⁹

Both methods provide the patient with an additional form of localised analgesia, which may prove beneficial if providing further systemic, analgesic drugs is a concern for the patient.⁶

Thermotherapy has indications for use in acute muscular pain and conditions, such as tendonitis and muscle spasms or managing painful, chronic pathology such as osteoarthritis.

Tissue temperature is increased and an analgesic effect is achieved by increasing blood flow, increasing cellular metabolism and encouraging muscle relaxation.⁹

On the other hand, cryotherapy decreases tissue temperature which minimises painful stimuli by reducing cellular metabolism, muscle spasm and by slowing the inflammation process.¹⁰

Cryotherapy is the treatment of choice during the immediate postoperative period, as opposed to using thermotherapy, which is more appropriate for long-term, chronic pain management.

A good understanding of both thermotherapy and cryotherapy is essential as they both produce different physiological effects and incorrect

application could prove detrimental to the surgical site or affect the healing process (Table 1).^{9 & 11}

Cryotherapy has been chosen as the topic for this article because of the numerous benefits it provides for patients following major orthopaedic surgery.

Cryotherapy in practice

When administering cryotherapy, analgesia is generated via a cold-induced neuropraxia, a local anaesthetic effect caused by the cooling of the skin's thermoreceptors, which inevitably decreases nociceptor activation and conduction, both locally and centrally.⁹

This may prove beneficial to support orthopaedic patients who are already receiving analgesic drug therapy to manage post-surgical pain; cryotherapy can be implemented to provide additional pain relief for a balanced, multimodal analgesia protocol.⁶

Cryotherapy does not induce the unwanted side effects that may be associated with administering additional systemic, analgesic drugs; this would potentially make cryotherapy a viable and safe method of providing extra analgesia for orthopaedic patients during the postoperative period.

Sharp (2010) explained that cold penetrates soft tissue much more deeply and the effects of cold appear to last much longer, in comparison to heat.⁸ This will prove to be beneficial for orthopaedic patients as a long-lasting and safe additional method of analgesia, throughout the duration of their recovery.

By understanding how cryotherapy acts upon the soft tissues and as an analgesic, the RVN can gain an appreciation for the importance and benefits of applying this therapeutic modality during the postoperative period.

The RVN should also be competent to recognise signs of developing complications, such as oedema and inflammation, which can be common following orthopaedic surgery. The RVN and veterinary surgeon (VS) can then assess the patient and implement nursing interventions, such as cryotherapy, to provide analgesia and maximise patient comfort.

Methods of cryotherapy

Cryotherapy can be administered via a variety of techniques to achieve the desired therapeutic effects for the surgical patient.⁸; cryotherapy may also prove to be a favourable method of treatment within veterinary practice, as obtaining ice involves little or no cost.¹²

However, some methods of cryotherapy involve the use of specialist equipment, such as the cryotherapy cuff, which is used for applying compression as well as cold therapy.⁸

Choosing the most appropriate method will depend on the desired clinical and physiological goals, along with other factors such as activity or exercise targets, the region on the patient requiring treatment and the stage of tissue repair.¹¹

For example, the cryotherapy cuff will be most suited for use on a patient's limb following orthopaedic surgery, where it can be wrapped around the entire circumference of the limb; whereas using a cold pack or ice may be more suitable for other regions of the body, such as the spine or neck region.⁸

Commercial cold gel packs or ice wrapped in a damp cloth are examples of effective cold packs that can be applied to surgical sites to provide topical cryotherapy.^{8 & 11}

Sharp has stated that cold packs are a simple cryotherapy method to adopt and they will provide rapid cooling of superficial tissues, followed by cooling of the deeper muscular layers.

Care must be taken to ensure that commercial cold packs are never left with a patient as they contain a toxic gel which may be ingested when breached or chewed.⁸

Ice must never be applied directly to the skin when implementing ice packs, as this may cause cold burns and frostbite to the patient's skin.^{8 & 9}

Table 1. Comparison of Pathophysiological Effects⁹

	Heat (Thermotherapy)	Cold (Cryotherapy)
Pain	Decreased	Decreased
Spasm	Decreased	Decreased
Cell Metabolism	Increased	Decreased
Blood Flow	Increased	Decreased
Inflammation	Increased	Decreased
Oedema	Increased	Decreased
Extensibility	Increased	Decreased

“Cryotherapy should be considered as a practical and vital postoperative stage of the orthopaedic patient's recovery protocol”

All ice packs should be wrapped in a thin, damp cloth and the skin observed frequently throughout the treatment for developing cold reactions.¹¹

It is vital for the RVN to monitor the patient during cryotherapy applications as veterinary patients are unable to describe the sensation or pain during treatment; prolonged or incorrect administration of ice may compromise the skin's condition, resulting in frostbite and delayed healing.¹¹

Some authors suggest that cryotherapy applications should be applied for 10–15 minutes, up to four times a day; whereas others imply that treatments can be applied for much longer and more frequently.

The RVN should discuss cryotherapy treatment plans with a chartered physiotherapist and the VS to ensure that the patient is receiving appropriate treatment and frequencies for their condition without compromising the surgical site.⁹

Ice massage

Ice may only be applied directly to the patient's skin during a technique known as ice massage which is usually applied in short strokes to stimulate local mechanoreceptors and flaccid muscles in soft tissue injuries.⁸

Heinrichs (2004) has explained that ice massage is ideal for treating small, irregular areas of tissue damage and treatment should only last for five to ten minutes.¹¹

This ice method may also be implemented alongside stretching exercises and massage, allowing deeper muscles to become stretched and stimulated in cases of muscular hypertonicity and contracture.¹³

Cold compression therapy (CCT)

CCT is another cryotherapy approach and has been shown to be a popular method of postsurgical treatment for orthopaedic patients.¹⁴

Specialist cryotherapy cuffs are wrapped around a patient's limb whilst iced water is instilled into the cuff via a water container and a hose; the hose can be disconnected and the cuff left *in situ*, enabling the patient to mobilise and exercise.

Compression of the limb is induced when the cuff fills with iced water, resulting in a close contact between the cold surface and the patient, along with a further reduction in localised swelling resulting from increased external pressure.^{6 & 10}

Johnson (2009) explains that this technique is tolerated well by veterinary patients and is highly effective in preventing postoperative pain and oedema formation during the first few days following surgery.¹⁴

Sharp (2010) has also stated that research has proved that using a cold compression unit provides better cryotherapy results opposed to using ice packs.⁸

Studies on patients following tibial plateau levelling osteotomy (TPLO) surgery or tibial tuberosity advancement (TTA) surgery to correct cranial cruciate ligament rupture have evaluated the effects of CCT on postoperative pain, swelling, stifle joint range of movement and overall lameness of the limb.

All patients that received CCT had a significant reduction in postoperative pain and swelling, along with an increased range of motion and improved mobility throughout the immediate postoperative period.⁶

As a consequence of the increasing awareness of postoperative patient comfort revealed by such studies, it has also been concluded that treatments such as CCT should be considered as a major component of a patient's multimodal analgesia protocol.

The RVN should utilise evidence gained from research to understand how modalities such as CCT can have a positive impact on a patient's recovery and pain levels postoperatively and implement this evidence-based practice towards patients in their care.

Conclusion

Cryotherapy should be considered as a practical and vital postoperative stage of the orthopaedic patient's recovery protocol to provide the patient with a smooth, pain-free and potentially quicker recovery following major surgery.

It may be reasonable to suggest that cryotherapy is not used as often as it should within general veterinary practice. However, it most certainly has a place in veterinary orthopaedics and its benefits must not be overlooked in the management of painful postsurgical conditions.

The author suggests that, with an increased awareness of cryotherapy's mode of action and the important role it plays in recovery and rehabilitation, the VS and RVN can implement this simple, physiotherapy modality into their surgical practice to improve and maximise patient care. [\[m\]](#)

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