



# **Management of Osteoarthritis in Small Animals Mini Series**

**Session Three: Physiotherapy and  
rehabilitation in animals with  
osteoarthritis**

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- **Rehabilitation**

Rehabilitation can be performed by means of a variety of techniques, both manual and technology assisted.

1. Physical agents

Physical agents that are commonly used in physiotherapy include cryotherapy, heat, therapeutic ultrasound, electrical stimulation, low level laser, extracorporeal shockwave therapy, magnetic fields, etc.

- Cryotherapy (cold): Local cold application causes a reduction in blood flow to the tissues (vasoconstriction), decrease in oedema, haemorrhage, histamine release, local metabolism, muscular activity, nerve conduction velocity, pain, spasticity and response to cell injury. This therapy is indicated in situations with acute tissue damage (together with rest, compression, and elevation to decrease oedema). However it is essential to avoid frostbite, so it should not be applied directly over the skin. If the packs used contain ice, they should be wrapped with a towel or a tea towel when applying and the skin should be checked for changes in colour (getting cyanotic). Commercially available packs containing silica gel can also be used. A cheap and often available option at home is to use a pack of frozen peas or similar, always wrapped in a towel. Cryotherapy is generally applied in the **first 24-72 hours** after an acute injury. Treatment should last for **10-20 minutes, every 2-3 hours** if possible. There are also systems commercially available that provide cold and compression simultaneously, increasing the benefits of cryotherapy.



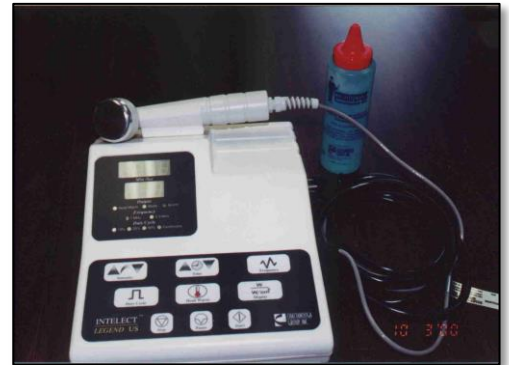
- Heat: The applied heat can penetrate <2cm in the tissues (superficial heat) or >2cm deep in the tissue, and it is called deep heat.
  - Superficial heat: Is the most commonly applied therapy and it is performed with heat packs. Local application of heat reduces blood pressure, muscle spasm and pain, while it increases local blood flow, muscle relaxation, and soft tissue elasticity. This therapy is indicated in subacute and chronic injuries, when decreased range of motion is secondary to joint stiffness and pain. It is however contraindicated in situations with acute inflammation or active bleeding, and in febrile patients. It is recommended that packs are warm and not too hot, and therapists should try it in their own skin before their application

on a patient. It is important to avoid electric heating pads or infrared lamps, as there is a high risk of causing burns.

Warm packs are applied at least **48-72 hours** after surgery, and they are applied for **10-20 minutes** several times a day (depending on client's availability), but usually **2-3 times a day** is adequate. They usually precede other physiotherapy techniques. The warm packs should be taken off if white or red spots are seen in the skin.

- *Deep heat:* This can be obtained by warm packs in very small animals. However, to be able to provide heat to deeper tissues, the most commonly used technique is the therapeutic ultrasound (TU). TU raises the local blood flow, the macrophagic activity in the area, the nerve conduction velocity and pain threshold, and it reduces muscle spasm. Ultrasound waves are not efficiently transmitted through the patient's hair or through air so it is recommended that fur is clipped and a conducting gel is applied on the skin.

In small animals a frequency of **1-3 MHz** and a power of **0.5-2 W/cm<sup>2</sup>** are used for **5-10 minutes**. If the patient is uncomfortable, the power should be decreased or the treatment stopped. It is suggested that the area to be treated should not exceed 4 times the size of the transducer. Therapy is administered once a day for a maximum of 10 days, although this protocol depends on the condition to be treated.



- Therapeutic ultrasound (see above)
- Electrical stimulation: This apparatus stimulates the motor and sensitive neurons. There are 2 variations:
  - *Neuromuscular electrical stimulation (NMES):* This is often used to treat muscle weakness. It causes muscle contraction by depolarizing the motor nerve with an electrical current. The parameters of the treatment (intensity, pulse duration, frequency, on/off cycle and ramp varies depending on the condition and goals, but the recommended parameters are: **frequency 25-50Hz, pulse duration 100-400µs, ramp up and down 2-4sec, on/off ratio 1:3 – 1:5.**

Generally NMES recruits muscle fibers in the opposite order to voluntary contraction so usually the muscle contraction obtained is not as strong as the voluntary contraction in healthy individuals. NMES has been reported to decrease muscle mass loss, increase muscle strength and improve general muscle use. The electrodes should be placed over the muscle and a coupling medium used.

- *Transcutaneous electrical nerve stimulation (TENS)*: This is used to provide sensory-level stimulation, which reduces pain sensation through the gate theory of pain inhibition. During TENS, the electrodes are placed over the area of pain or over the peripheral nerve or nerve root that innervates the painful area. Recommended parameters include a **frequency of 30-150 Hz, pulse duration 50-100  $\mu$ s, intensity to obtain a comfortable sensory response.**

Electric stimulation should be used with caution in areas with low sensation, or directly over wounds. Contraindications for its use include stimulation directly over the heart or the carotid sinus, in patients with a pacemaker, over an area with infection, cancer or thrombosis, over the trunk during pregnancy or in patients with seizures.

- *Low Level Laser Therapy (LLLT)*: This therapy is based on the application of photons, which have positive effects at a cellular level, such as oxygen and ATP production, synthesis of collagen, growth factor production or changes in cell membrane permeability. LLLT has been reported to stimulate angiogenesis, healing of nerves and connective tissues, decrease pain by production of endogenous opiates and changing nerve conduction velocities, etc. There are different types of lasers, according to their power, being class 3b and class 4 lasers, those used in rehabilitation. Laser therapy may be beneficial in the treatment of wounds, connective tissue injuries, musculoskeletal injuries, inflammatory pathologies and in OA. However it is not recommended in patients with epilepsy, or over open growth plates or gonads. Laser is contraindicated in the cornea, endocrine glands, areas with active bleeding or cancer, or in pregnant uterus.
- *Extracorporeal shockwave therapy (ESWT)*: This therapy is based on the application of acoustic waves that transform into mechanical waves in areas containing fluids. This has been widely used for the treatment of renal calculi. However, this therapy can also provide analgesia in patients with bone conditions or tendinitis.

It can be interesting to use in animals with chronic OA that do not tolerate NSAIDs, as 2 sessions 2 weeks apart have been reported to improve clinical use of the affected limb and increased joint ROM. Benefits include increased bone, tendon and ligament healing, faster wound healing, antibacterial properties and pain relief. ESWT is contraindicated in patients undergoing surgery recently (< 8 weeks), having implants, with acute inflammation, infection or active bleeding, etc.

- Magnetic fields: This is a popular therapy in veterinary medicine as it is believed that magnetic fields may increase local blood flow, they may stimulate the release of endorphins or provide anti-inflammatory effects.

## 2. Massages

This therapy is indicated to relax muscles, improve joint and muscular function, reduce oedema, mobilize adhesions, warm up the muscle prior to other exercises, and to accelerate muscle recovery after exercise. However, they are contraindicated in cases with skin inflammation, infection, fever, tumours or bleeding disorders.

There are different types of massages the therapist can use: patting, effleurage, pétrissage, tapotement, friction, ischemic compression or trigger point pressure release.

## 3. Therapeutic exercises

These exercises are an essential part of the osteoarthritic patient's rehabilitation program as they increase the joint range of motion and flexibility, improve limb function, augment muscle mass and strength, and they help decrease the risk for reinjury.

There are 4 types of therapeutic exercises:

- **Passive exercises**: These exercises, such as passive range of motion (PROM) or stretches, are directed to improve the extensibility of the soft tissues, increase joint range of motion (ROM), facilitate tissue relaxation, mobilize joints, modulate pain and reduce soft tissue inflammation. ROM can be decreased secondary to pain or stiffness.



Before starting mobilizing the joints, it is important the patient is relaxed; on occasions a relaxing massage is required to calm down the patient. Joint ROM is evaluated and measured with a goniometer, which would allow to objectively evaluate the progress of therapy. Warm pack or light exercise before PROM would help to warm up the tissues. After the exercises, cryotherapy can be applied to decrease inflammation and pain.

- **Assisted exercises.** These are used in animals that can stand but are still quite weak. The objective of these exercises is to improve muscle strength, stimulate proprioception and train the patient to more active exercises.

- *Standing:* The patient is encouraged to stand up while being helped with a sling or towel under the abdomen. The patient is allowed to bear as much weight as possible.
- *Weight shifting / wobbler boards:* These exercises stimulate the use of the affected limb.
- *Physiotherapy balls:* They stimulate proprioception at the same time that they strengthen the fore and hindlimb musculature.



- **Active exercises.** They help patients increase muscle strength and mechanical function. These exercises include:

- *Slow lead walks:* Always using a short lead and very slowly in order to encourage the patient to use the affected limb. These walks can be started as 5 minute-walks, 2-3 times a day for 2 weeks. If the animal is bearing weight on the limb, the length of the walks can be progressively increased by 5 minutes every other week. Slight slopes could be introduced to start strengthening the musculature.
- *Treadmill:* This can be submerged in water (underwater treadmill-UWTM) to increase resistance and joint range of motion. The UWTM sessions can



be undertaken **1-2 times per week**.

- *Swimming*: Body and limb movements are different from walking on the treadmill, but this therapy is very recommended in animals with OA. If it is used postoperatively, it is essential the clinician makes sure the implants are stable (6-8 weeks), there is no infection nor an ESF has been applied.
  - *Sitting/standing exercises*: These exercises help strengthening the hindlimb musculature without hyperextending the hip (quite painful in animals with hip dysplasia/OA). The patient can start performing **5-10 repetitions, 1-2 times per day**.
  - *Wheelbarrowing / dancing*: They encourage use of the affected limbs (especially in non-weightbearing lameness, i.e. femoral head and neck excision), but it is important to monitor pain and fracture stability in these patients.
  - *Cavaletti poles*: They help improve joint range of motion. This therapy is very useful in dogs with elbow dysplasia from 2 weeks postop.
- ***Strengthening and speed exercises***. They help strengthening the musculature, especially in chronic conditions, and after 6-8 weeks after surgery.
    - *Weights*: A variety of sizes can be used in dogs of different sizes, such as 0.25Kg in small breed dogs, 0.5Kg in medium size dogs, 1Kg in large breed dogs, and 2Kg in giant dogs.
    - *Shake hands* helps strengthening the forelimb muscles. Weights could also be added to increase the work. This exercise can be started with 5-10 repetitions, 2-3 times a day.
    - *Controlled play with a ball* first in the crate, progressing into a small room, and a bigger space with the lead.

## **RECOMMENDED READING**

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