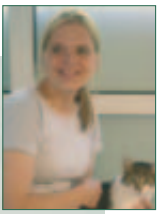

The orthopaedic patient: conservative treatment, physiotherapy and rehabilitation

Dr. Barbara Bockstahler
DVM, FTA Physical Therapy and Rehabilitation

University of Veterinary Medicine,
Vienna, Austria

Author's Profile

Barbara Bockstahler studied veterinary medicine in Vienna, Austria, where she later managed a veterinary clinic for small animals. In addition, since 1999 she has worked at the clinic for Acupuncture and Physiotherapy of the University of Veterinary Medicine, Vienna, which was originally founded as part of the First Medical University Hospital and later annexed to the Surgery and Ophthalmology Clinic in 2000. Dr. Bockstahler was certified as a Specialist for Physical Therapy and Rehabilitation Medicine in 2004 and has conducted intensive research on gait analysis in dogs since 2003.

Introduction

Recently the great progress in the surgical and conservative treatment of patients suffering from joint diseases has created a demand for additional therapies with special regard to post-operative rehabilitation as well as to the conservative treatment modalities available. In humans the methods of physical therapy and therapeutic exercises are an integral part of rehabilitation after surgery as well as conservative treatment options for patients suffering from orthopaedic and neurological disorders. In recent years a lot of physiotherapeutic methods used in human medicine have been adapted to companion animals. And, researchers all over the world have performed numerous studies to prove the benefits of physiotherapy in small animals.

Goals of physiotherapy

For our patients, especially for dogs suffering from orthopaedic disorders like osteoarthritis, veterinarians as well as the pet-owners feel a need for therapeutic modalities which are appropriate for the long-term treatment and which provide possibilities to improve the quality of life in these patients. The goals of physiotherapy for companion animals suffering from orthopaedic mobility disorders are:

- Pain management
- Improvement in the range of motion (ROM) of affected joints
- Maintaining and rebuilding muscle mass
- Strengthening of muscle force
- Improvement of the overall body condition
- Weight management of overweight patients

Pain management: The use of nonsteroidal anti-inflammatory drugs (NSAIDs) is a very common and useful way to decrease pain in dogs suffering from degenerative joint diseases. In general, the administration of NSAIDs, but also of other analgesics like Tramadol (e.g. Ultram®, Ortho-McNeil) is useful and sometimes mandatory. Each physiotherapist should strongly recommend the use of pain relievers whenever needed; they are an important factor in integrated pain management. Although the new generations of NSAIDs provide a safe method of pain reduction with minimal side effects, long-term treatment could pose problems in some animals. Common side effects are for example gastro-intestinal problems. In such cases physiotherapy methods like thermotherapy, massage and transcutaneous electrical nerve stimulation (TENS) provides effective modalities for pain relief.

Thermotherapy: The administration of cold to painful joints leads to a decrease in local blood flow and a decelerated nerve conduction velocity. It also has anti-inflammatory effects and can therefore be used to influence pain in a positive way.[1,2] Cold is used especially if signs of inflammation of a joint are present or after therapeutic exercises to prevent swelling and pain.

The use of heat leads to hyperaemia due to vasodilatation and an acceleration of the nerve conduction velocity.[3] Heat can be used for pain relief, and also before any therapeutic exercises, to help improve the flexibility of the joint capsule, tendons and ligaments.

Figure 1: Kneading: this massage grip leads to an increased blood and lymphatic flow and is used for the treatment of deeper layers of the muscles. Figure in: Bockstahler B, Millis D, Levine D, eds. Essential facts of physiotherapy in dogs and cats. BE VetVerlag, Germany, 2004

Massage: The benefits of massage include the release of muscle tension, improved blood and lymphatic circulation, and muscle flexibility.[4] All hand grips, like stroking, kneading (fig 1) or circular pressure, which are well-known from classic human massage techniques, can also be used in companion animals.

Transcutaneous electrical nerve stimulation: Good results in pain management have been achieved by the use of low frequency currents. The most common method used in physical therapy is the transcutaneous electrical nerve stimulation (TENS). The analgesic effect of this technique has been explained by Melzack and Wall[5] and is based on the principles of the gate control theory. TENS also leads to a release of endogenous endorphins and to the relaxation of muscles which

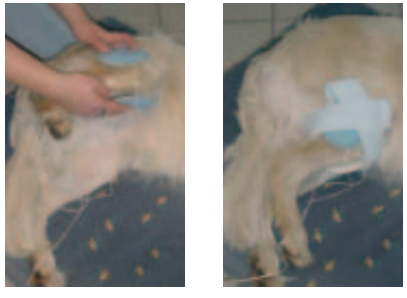

Figure 2a: Treatment of the stifle joint with a TENS unit especially developed for animals. The electrodes are placed medial and lateral to the joint

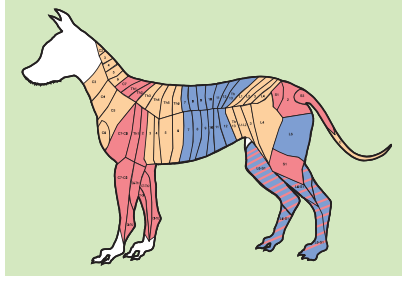

Figure 2b: Segmental treatment options with TENS. Figure in: Bockstahler B, Millis D, Levine D, eds. Essential facts of physiotherapy in dogs and cats. BE VetVerlag, Germany, 2004

again has an analgesic effect. In a study performed on dogs Johnston et al. proved the positive effect on lameness after a single TENS treatment.[6] The use of electrical stimulation units developed for humans is possible, but units designed for the use in animals are available. In general the treatment can be performed directly on the painful areas (fig 2a), as well as by stimulating the segmental nerves (fig 2b).

Extracorporeal Shock Wave Therapy (ESWT) is a relatively new treatment modality for dogs. In canine orthopaedics ESWT presents a new treatment option for various orthopaedic conditions like osteoarthritis. Good results in using ESWT have been reported by several veterinarians.[7,8] Nevertheless, the number of controlled clinical studies are still very limited. Shockwaves are sound waves characterised by a very fast and steep rise in pressure followed by a period of negative pressure. Even if the mode of action of shockwave therapy is not completely clear yet, the following hypothesis has been postulated by researchers: short-term pain reduction may be based on a release of endorphins. Long-term pain relief may be caused by mechanical and chemical effects on a cellular level where shockwaves can stimulate both the healing process and the modulation of pain signals.[9]

Improvement in the range of motion (ROM) of affected joints: An accurate flexibility of joints within physiological borders is an important requirement for normal biomechanical function of the musculoskeletal systems.

Figure 3: Passive range of motion exercise of the carpal-joint. The joint is carefully flexed and stretched to maintain the flexibility. Figure in: Bockstahler B, Levine D, Millis D, eds. Essential facts of physiotherapy in dogs and cats. BE VetVerlag, Germany, 2004

The ROM can be changed by a number of pathologies: for example pain, periarticular swelling or osteoarthritis.

Exercises to improve or maintain the ROM are some of the most important components in the treatment of dogs with degenerative joint diseases. For this purpose passive (fig 3), as well as active exercises, i.e. sit to stand exercises, or stair climbing, are useful.

Maintaining and rebuilding muscle mass, strengthening of muscle force and improvement of overall body condition: Most patients suffering from orthopaedic disorders show moderate to severe muscle atrophy. It is well known that muscles have an important function as 'shock absorbers' and for supporting the joint function. A decreased amount of muscle mass results in an abnormal stress on joints and the risk of further joint damage. Furthermore, a great number of patients are in a poor overall body condition as they are not able to walk for a long period of time, or they take insufficient daily exercise, or they have reduced mobility. The goals of active exercise are for example to improve the active pain-free ROM, to reduce lameness, and to build-up muscle mass and strength, as well as building up their daily function. A lot of different exercises are used to reach these goals. Examples are: the use of balance boards, swiss balls and physiorolls, exercise programmes including slow leash walks, walking or jogging and stair climbing. It is recommended to take several short walks spread out over the day rather then one long forced march. In this way you can assess how long the animal can exercise without feeling pain. The daily exercise period can be increased by 10% per week. If the animal starts to experience pain while exercising, the exercise rate has to be reduced by at least 30%. The implementation of an underwater treadmill (fig 4) is perhaps the most important exercise method: the physical properties of water can be utilised for the physical therapy. The body bears less weight in water[10] and permits a pain free and more comfortable movement of joints and the water resistance is useful for muscle strengthening and cardiovascular training.

Weight management: The treatment of overweight dogs with orthopaedic disorders is particularly challenging. Being overweight can predispose an animal to the development of musculoskeletal diseases or aggravate exis-

Figure 4: Dog at work in an underwater treadmill.

ting problems, caused by the immense exertion put on joints, tendons and ligaments. A reduction of weight can lead to an improvement of lameness. It is clear that overweight patients with orthopaedic disorders require special treatment. In our experience a combination of weight loss and physiotherapy has provided the best results. Special exercise programmes also lead to weight loss in the patient. Close involvement of the owner with the course of therapy will also aid owner-compliance. For practical reasons the feeding of commercially available weight loss diets have proven to give good results. These diets support weight loss and offer an ideal balance of nutrients until the animal has reached its normal weight.

The physiotherapy treatment should be started at the same time as the weight loss programme. The success of therapy will greatly depend on setting up an exercise programme individually designed for the patient. The owner should play an active role in the complete therapy programme. In addition to the therapy performed in the clinic there has to be homework given to the owner as well (such as massage, thermotherapy or electrotherapy). A study including obese, osteoarthritic adult dogs, was recently performed at the University of Veterinary Medicine, Vienna, Austria.[11] In this study all dogs received a weight reduction programme (Restricted Calorie Formula, Eukanuba Veterinary Diets, The Iams Company). One half of the patients also received additional physiotherapy treatment. Both groups of dogs lost approximately 1% body weight per week and showed improved mobility (force plate controlled), but dogs with the additional physiotherapy showed better results. The diet was well accepted by all dogs included in this study.

Can we treat cats with physiotherapy?

In general: Yes! Most cats presented with orthopaedic and neurological diseases can gain advantages from physiotherapy. In creating a treatment protocol you have to consider that cats need therapies which are especially adapted to their behaviour and handling potential. For example, motion exercises (fig 5) should involve the natural play instinct of these animals, such as playing with laser pointers. Therapies like range of motion exercises (fig 6) and stretching can be performed with most patients, and massage is also well accepted by cats.

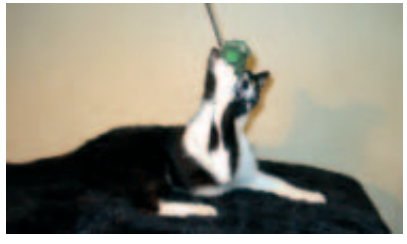

Figure 5: Playing with a toy

Figure. 6: Passive Range of Motion Exercise: Carpal Flexion

Furthermore electrotherapy (fig 7) is a possible treatment modality in most patients. In the treatment of cats the involvement of the pet owner is especially important. Good owner-education, together with appointments in the clinic, enables quick rehabilitation and improvement of the clinical signs in cat patients.

Figure. 7: Transversal Stimulation with the PT2000 Tens unit (www.submedvet.de).
Figures 5-7 in: Bockstahler B, Millis D, Levine D, eds. Essential facts of physiotherapy in dogs and cats. BE VetVerlag, Germany, 2004

Involvement of the pet owner

The success of physiotherapy strongly depends on the involvement of the pet owner. In companion animals, especially those with chronic disorders, it is absolutely necessary to inform the owner that life-long treatment is often required. To improve the compliance of the owner, and also for preventing unrealistic expectations, a treatment plan, and the prognosis and the expected time of treatment, has to be discussed. The owner's active participation in the treatment as well as regular appointments in the clinic will improve the outcome. A lot of physiotherapy modalities are suitable for treatment at home, like some of the easy hand grips for massage, passive range of motion exercises and TENS (fig 8). It is important to remember that not only the animal, but the owner as well, has to be willing to perform the therapy programme. The time required for these treatments must be compatible with the owner's work schedule.

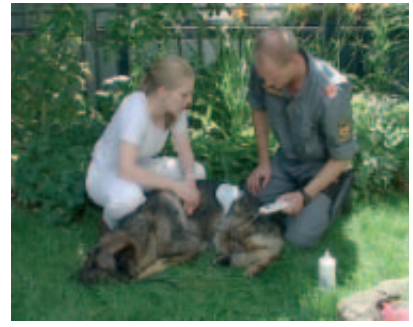

Figure 8: Instruction of the pet owner in the use of TENS at home. Figure in: Bockstahler B, Millis D, Levine D, eds. Essential facts of physiotherapy in dogs and cats. BE VetVerlag, Germany, 2004.

The home environment of the osteoarthritic patient

If possible, the home of the owner should be adapted in accordance to the needs of the patient. A lot of dogs with joint disease show decreased daily functions like climbing stairs or jumping into the car and their bed. Furthermore walking on slippery grounds is often a severe problem for these patients. Inexpensive carpeting can be a temporary solution in these cases. Their sleeping area should be soft and warm, but firm enough that the patient can get up easily. Installing a step or a ramp helps the animal to climb into the car or into its bed if needed.

Development of a treatment plan:

A complete physical examination is necessary to develop a successful physical therapy regime. It should include a clinical orthopaedic, neurological and special physiotherapeutic (e.g. measurements of the ROM and the thigh circumference) examination. Each therapist involved in the physiotherapeutic treatment should have a comprehensive knowledge of the clinical features and treatment of the underlying disease, and to avoid any aggravation of the symptoms by inadvertently selecting inappropriate methods.

It is impossible to establish a standard treatment protocol because of the fact that each patient has its own individual needs. The first step in developing a treatment plan has to be consideration of which goals can be achieved and the time in which they can be achieved. Furthermore the chosen modalities will depend on their availability in the clinic and also on financial aspects and owner compliance.

General remarks:

The methods of physiotherapy provide a lot of additional therapeutic modalities helping to improve the quality of life for our patients. The described methods in this article are useful for orthopaedic patients and they can also be used for neurological patients. For example dogs undergoing decompressive spinal cord surgery benefit from rehabilitation programmes. In these patients some of the described methods are useful but further treatment options such as exercise to improve balance and coordination have to be performed. Further information to this topic can be found in the literature.[12,13]

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Further reading; Bockstahler B, Levine D, Millis D, eds. Essential facts of physiotherapy in dogs and cats. BE VetVerlag, Germany, 2004. ISBN 3-938274-09-3