Rehabilitation of Geriatric, Arthritic, Obese, and Critical Care Patients

Deirdre Chiaramonte, DVM, DACVIM

New York, NY

Physical therapy or physiotherapy is a health profession focused on clinically-administered, specialized physical activity designed to help an individual to develop, maintain and/or restore maximum movement, range of motion, and function in his or her life. Animal rehabilitation is no different. As we know the benefits of rehabilitation include 1) increased blood flow in the treated area, 2) increased lymphatic drainage in the affected/treated area, 3) earlier resolution of inflammation, pain and complications, 4) increased collagen production, 5) promotion of normal function (joint and muscle), 6) prevention of muscle atrophy, 7) increased strength, range of motion, endurance and performance, and 8) positive psychological effects, which all contribute to improved and prolonged quality of life.

The care of geriatric animals has evolved in veterinary medicine. Animals are living longer. We have come to understand many changes involved such as decreased metabolic rates and decreased immune competency. With aging muscle, cartilage and bone mass are lost. Cardiac output decreases, body weight percent of fat increases, skin loses elasticity and thickens, and urinary incontinence develops.

When physical rehabilitation is anticipated, the patient must be fully assessed. After a complete physical examination, including a neurological and orthopedic assessment, the patient is referred to the rehabilitation therapist. At this point it is imperative that objective, standardized measurements be taken and recorded. This will serve as the basis for measuring progress. Objective outcome measures direct treatment at the beginning, middle and the end of treatment and evaluates the success of our treatments.

Range of motion measures the osteokinematic motion of the joint. This measurement is taken with a goniometer. A goniometer is a measuring device that has two arms, one stationary and one moveable. The center point is placed at the center of the joint. The stationary arm is placed proximally while the moveable arm is placed over the distal segment. Ideally the same person should measure every dog. For PROM measurements the patient should be relaxed and details recorded such as: positioning, sedated or anxious, total ROM versus comfortable ROM, and before or after warm-up and therapy. Muscles, ligaments, bones and skin normally restrict joint movement. If ROM is less than anticipated, determine and treat the limiting tissue. Caution should be used when treating post-operative or painful areas.

To assess muscle 'strength' in dogs we use observation, palpation, function, comparison to other leg and girth measurements. Girth measurements are an indirect method of attaining muscle mass, which is correlated with strength. To assess functional mobility we look for postural (a) symmetry, compensatory movements, if muscle tremors are present, if movement is smooth and time needed to perform function. Using standardized technique, obtain Gulick tape measurements. It is important to practice with this instrument to gain consistency. One should obtain the actual measurement and then calculate percent difference to opposite leg.

Osteoarthritis (OA) or degenerative joint disease (DJD) may initially present as stiffness, difficulty rising or reluctance to perform activity. It is characterized by varying amounts of joint pain and dysfunction depending on the severity and course of the disease. Later stages of OA may show signs of decreased ROM, muscle atrophy and lameness. Patients with OA have decreased quality of life; limited activity, reduced performance, muscle atrophy, pain, discomfort, and joint stiffness with decreased ROM. Clinical signs may be worsened by long periods of rest, recumbency, weather changes, or excessive periods of exercise. Traditional management of OA has included anti-inflammatory and analgesic drugs, changes in lifestyle and surgical management. More recent therapies include weight loss, therapeutic exercise and physical modalities to reduce the severity of clinical signs and the reliance on medication to control pain and discomfort. A rehabilitation plan should aim to increase muscle mass and prevent muscle atrophy while controlling discomfort.

For pain control TENS can be used while heat is applied, although heat is contraindicated if swelling or edema is present in the limb or joint. PROM, joint compressions and low level light laser are also performed. Tissue warming promotes blood flow to the area, promotes tissue and collagen extensibility and decreases pain, muscle spasms and joint stiffness. Heating agents such as moist hot packs, circulation warm water blankets and warm water baths heat the skin and tissues one to two centimeters deep. Deep tissue ultrasound can be used to penetrate tissues up to five centimeters deep. Stretching should be done immediately after heat. Massage can also be used to increase blood flow to muscles to warm the area before activity and to decrease stiffness after activity. Low impact exercise (walking) should be implemented on a consistent daily basis. Hydrotherapy is one of the best activities for dogs. The buoyancy of the water is significant and limits the impact to the joints while promoting muscle strength, tone and joint motion. Cryotherapy can be applied to painful areas for 15 to 20 minutes to control post exercise inflammation. An exercise program should be tailored to fit the condition of the patient and owner. The animal should not be forced to exercise during times of exacerbation as the inflammation may increase. In the early stage of rehabilitation, it is better to provide three 20-minute sessions compared to one 60-minute session.

Client education is very important. The initial amount of exercise in the aging, arthritic dog should be easily tolerated. Activity can be slowly increased as the rehabilitation program progresses. Avoid sudden burst of activity to help avoid acute inflammation (no

weekend warriors). Exercise amount can be increased by 20 percent weekly. Exercise periods should be evenly spaced throughout each day and over the week. Following exercise a 10-minute cool down period is recommended. A slower paced walk may be initiated for five minutes followed by ROM and stretching. Environmentally, warm dry environments are better than cold damp environments for these patients. Soft, well-padded beds or waterbeds are beneficial. Patients should have non-slip footing to avoid slipping and falling. Minimize stair climbing through the use of ramps.

Many of these patients sometimes need support and protection. Walking aids such as slings, towels and overhead lift systems allows assisted ambulation. Additionally many of these animals get foot ulcers because they drag their feet. These patients benefit from the use of booties. If foot ulcers develop laser therapy can speed-up healing of damaged tissues. These animals should be on non-slip flooring and use elevated food and water bowls.

To encourage hind limb targeted strengthening, especially of muscles supporting osteoarthritic joints, therapeutic exercises are very important. Walking in circles (affected limb on the inside), cookies at the shoulder and hip, butt-rubbing, stepping exercises (cavaletti rails), dancing, loving on the stairs, etc. can be performed in the clinic as well as added to a home exercise program. To encourage front limb targeted, strengthening therapeutic exercise consider the above and add wheel barrowing, walking down hills/stairs, play bow and commando crawling. Slowly increase active muscle strengthening exercises to tolerance. On joints without a lot of tissue cover, or ones that are very arthritic, and on muscle-wasted hips, use modalities with caution, as these animals may be much more sensitive (i.e. it is possible to burn the periosteum or heat up a metal implant). If lameness occurs, rest and restart therapy at a lower level of intensity.

In veterinary patients, and more importantly, obese and geriatric patients the heart and respiratory rate must be monitored. The supply of oxygen to exercising muscle is paramount to the performance ability. During exercise the nostrils dilate to reduce upper respiratory tract resistance. If this is not enough, the animals pant. Increased ventilation, tidal volume, alveolar perfusion, heart rate and stroke volume (cardiac output) propel peripheral oxygen perfusion. In geriatric dogs especially, is it essential to have prior knowledge of their disorders that will hinder an effective workout. Commonly, geriatric patients have upper respiratory disease (laryngeal paralysis) or lower respiratory disease, cardiac disease, anemia, and obviously musculoskeletal disease. Muscular fasciculation's will signal muscular endurance. The patient may display greater signs of fatigue with increased respirations, heart rate, anxiety and compensatory movements, i.e. they may start shuffling or dragging their toes. At home owners should take note of the pet's response to the activities of their daily routine.

Obesity is the most common nutritional disorder in dogs and cats in the United States; estimated at 25-45% of the pet population. Close to 90% of pet owners give their animals treats. Many veterinarians fail to acknowledge obesity as a disease. Recently a pet insurance provider listed their top ten veterinary claims. Obesity was nowhere on the list, however, obesity contributed to almost all of the claims. In one study an overweight owner was three times more likely to have an overweight pet. Additionally veterinarians are uncomfortable discussing obesity if the owner is obese. Most clients fail to realize when their pet is obese and especially fail to perceive risks associated with obesity in their pet.

The primary reason for development of obesity is animals consuming more energy than they are expending. This occurs when animals have excessive dietary intake of calories (all food and treats) or when there is a decrease in energy expenditure (illness or injury, i.e. osteoarthritis). Some medical conditions (hypothyroidism, etc.) and medications (steroids, etc.) contribute to obesity.

Dogs and cats are subject to the same detrimental affects of obesity as humans with the end result being premature death and earlier onset of obesity-related diseases such as diabetes mellitus, osteoarthritis and some cancers. In a recent study of canine diet and health, dietary calorie restriction was clearly shown to increase longevity in a group of paired sibling Labrador retrievers. The lean-fed dogs were fed 25% less food than their littermate starting at eight weeks of age. The lean-fed dogs lived on average two years longer and had reduced incidence of hip dysplasia, osteoarthritis, and diabetes mellitus.

Traditionally the veterinary profession used actual body weight to assess body mass. In 1997 a novel system was devised to estimate body condition score (BCS) of animals. It is an assessment of the animal's weight and its relative proportions of muscle and fat. The assessment is made visually on the basis of amount of soft tissue cover over the body however it strongly correlates to DEXA analysis, which quantitates lean body mass, percent fat and bone density. Areas most noted are hips, abdomen/caudal abdomen and ribs. Each animal is graded by comparison with a standardized chart on a scale of one to nine (or one to five).

Scoring BCS is extremely easy, fast and inexpensive, yet overlooked many times. The animal is too thin if you can see and palpate ribs, vertebrae and pelvic bones. These are categorized as a 1-3/9. Too heavy is when you can't see or feel the ribs or vertebrae. The waist has disappeared with massive fat overlying the body. These are categorized as 6-9/9. The ideal BCS is a 4/9 or a 5/9. These animals have ribs that are easily palpable, an easily noted waist and having an abdominal tuck. This scoring system is easy to teach the clients and preferred in lieu of weight assessment in pounds/kilograms, especially as home personal scales are difficult to use in large dogs.

A secondary scale, assessing muscles is also being used. Muscle Condition Scoring (MCS) uses 1/3 to indicate severe muscle wasting, 2/3 for moderate muscle wasting and a 3/3 for normal muscle mass.

Many pet owners, when asked to assess the BCS of their pet, incorrectly assess their pet as normal, even when shown a visual chart. The problem is more prominent in overweight pets as it has been determined that only one out of seven owners of overweight

pets correctly recognize their pet as overweight. It is very important to honestly and openly discuss the pet's weight at each visit. A BCS, MCS and target ideal body weight will best evaluate the patient.

The beginning of a weight loss program is aimed at increasing the activity level of the patient while decreasing the animal's daily calorie consumption. Modalities that use heat (heating pads or low level light laser) need to be used with caution, as heat is a poor heat conductor. Monitoring the patient's heart and respiratory rate are very important in obese animals. Therapeutic exercises, such as cavaletti rails, small inclines and declines, stair steppers, and balance trainers are very good. The UWTM creates buoyancy to alleviate weight and joint trauma while exercising. Land treadmills can be used as well. Ideally, the patient should lose one percent body weight per week. The owners should be motivated by weight loss increasing their pet's sense of well-being, decreasing the load on the arthritic joints, helps their pet avoid obesity related health risks and increases their pets life expectancy.

Critical care patients run the gamut of treatment options depending on why they are hospitalized. At our hospital almost every patient can benefit from massage. Massage is the non-invasive, inexpensive therapeutic manipulation of soft tissues by rubbing or kneading and is one of the most effective means of stress reduction, increasing circulation, attenuating edema, enhancing tissue oxygenation, enhancing range of motion, mobility and breaking down scar tissue. In veterinary medicine four common techniques are used. Effleurage is a light stroking to relax the patient. Pétrissage uses deep kneading and muscle squeezing. Cross-fiber massage is deeper, concentrated on restrictive scar tissue and aimed at promoting normal range of motion. Lastly, tapotement, percussive manipulation of soft tissue, is used to enhance postural drainage. This is especially helpful in patients with pneumonia. In paretic animals NMES can be used when exercised induced muscular contractions are not happening. TENS and low level light laser can be used on painful areas and if pressure sores or their precursors arise, laser may be used as well. Some of our critical patients benefit from being placed in our overhead lift system to mimic normal positioning and to take weight off of recumbent laden muscles. Downed animals are at risk for pressure sores. The initial symptom is easily blanched skin. Frequent turning of these animals helps prevent these sores.

Static magnet therapy is becoming more popular in veterinary medicine. Proposed therapeutic mechanisms involve local increased blood flow, release of endorphins and anti-inflammatory effects Magnets are embedded in wraps, collars and bedding. Unfortunately there is little evidence they have clinical effects, however they are cheap, easy and cause no side effects. They can be combined with other therapies but must be placed directly over the affected joint. They are contraindicated with pacemakers.

Neutraceuticals are rarely contraindicated in any of these patients. Experimental, clinical and historical use of glucosamine and chondroitin sulfate supports safety and efficacy in veterinary patients. Recently two studies reported in the Journal of the American Veterinary Medical Association showed favorable effects of omega-3 fatty acids supplements. The studies showed that compared to the placebo group, the dogs receiving omega-3 fatty acids had a significantly improved ability to rise form a resting position and play by 6 weeks after beginning supplementation, and improved ability to walk by 12 weeks. Also, the dogs receiving fish omega-3 fatty acids had improved weight bearing on the affected limbs as assessed by force plate analyses. There were no adverse side effects reported from the omega-3 supplements. Polysulfated glycosaminoglycan (Adequan®) is primarily a chondroitin sulfate, which can be administered intra-muscularly twice a week for up to 4 weeks. Adequan has been shown to decrease the amount of degradative enzymes, which stimulate inflammation and cartilage erosion as well as promote repair and regeneration of cartilage.