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Therapeutic Exercise

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Therapeutic exercise is a key component of any rehabilitation program and should be included as part of the concurrent care of any patient whether that patient has two or four legs. Physical therapists have been utilizing therapeutic exercises with great success since the conception of the profession in the beginning of the twentieth century and it has been demonstrated to be fundamental in improving function, performance and disability. Therapeutic exercise can consist of a variety of exercises inclusive of balance, strengthening, range of motion, endurance, and plyometric activities. The goals of therapeutic exercises include the restoration of movement, improvement of function and strength, improvement in gait and balance, and the prevention and the promotion of health, wellness, and fitness. Specific exercises are aimed at restoring strength, power and work, or endurance, or a combination. Therapeutic exercises are also utilized to increase range of motion, decrease pain, improve balance and proprioception, and restore function.
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Therapeutic exercises are one of the creative and pleasurable components of canine physical rehabilitation. Exercises are a crucial part of a rehabilitation program and should be a component of every patient's program regardless of the diagnosis or problem. The length of the exercises and the types of exercises will vary according to the condition treated, the age and condition of the patient, the realistic goals, and the resources available. One beneficial aspect of therapeutic exercise is that equipment is not always necessary. Creativity and ingenuity can go a long way with exercise. For example, unilateral standing for a person falls under the category of therapeutic exercise and two-legged standing for a dog is considered therapeutic exercise.

Therapeutic exercise has many benefits—inclusive of strengthening, conditioning, cardiovascular healthy, pulmonary health, weight loss and maintenance, balance and proprioception, range of motion gains, and the advancement of a healthy lifestyle.

Therapeutic exercise should be prescribed and performed as part of the patient's treatment program as well as part of the home exercise program. It may also be part of a prevention and wellness program. As part of a comprehensive plan of rehabilitation, therapeutic exercise is meant to advance the progression of rehabilitation and the goals of the patient. For example, a dog that has undergone a total hip replacement and is taking part in a comprehensive rehabilitation program will need a variety of therapeutic exercises to restore their function. After the initial evaluation and a determination of the problem list, goals will be set for the dog. The goals will differ from each dog and from each diagnosis and will change as the dog progresses. A dog having undergone a total hip replacement will need to increase strength, range of motion, balance, and proprioception. Depending on the stage of rehabilitation and progression, the exercises and activities will vary. In the early stages of rehabilitation, the dog will need more of a focus on range of motion, balance, and walking activities. Of course, this is part of a comprehensive plan of treatment. Early on in the rehabilitation process, additional treatments may include cryotherapy, moist heat, laser therapy, joint mobilization, and massage. The therapeutic exercise will be aimed at the specific goals of the patient at the time of the treatment. Early on in the progress of a postoperative total hip replacement, exercises should be aimed at balance and proprioception, proper gait, and range of motion. As the dog progresses, exercises should focus on strength and endurance training, and a restoration of function. So if one of the goals of the dog is to return to walking 4 miles each day with the owner, this should be addressed.

Principles

Physiologic, anatomic, biomechanical factors affect muscle performance. Pathology/pathophysiology and disease affecting the cardiovascular, endocrine/metabolic, integumentary, musculoskeletal, neuromuscular, and pulmonary systems can also affect muscle performance.[1] Deleterious effects of diseases of these systems can affect muscle performance and

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thus necessitate a need for therapeutic exercises. For example, a dog may be brought in to a veterinarian clinic for the treatment of pneumonia. After crate rest and 3 or 4 days of treatment, the dog will undoubtedly experience a decrease in strength, endurance, and balance secondary to the immobility. Assuming the dog is medically stable, the dog is a candidate for physical rehabilitation to address the deficits in balance, strength, and endurance. Human research has demonstrated that in bed rest for as little as 3 days deficits in muscular strength may persist for weeks. In addition, reambulation is not adequate to restore the strength lost. Specific exercises are required to help with the restoration of function.[2] Many of our neurological or critical care patients are often immobile for a significant period of time and require necessary exercises to restore them to function.

The components addressed by therapeutic exercise include strength, endurance, power, and balance. *Strength* is defined as the maximum force that a muscle can develop during a single contraction.[3] *Endurance* is the ability of the muscle to maintain forces continually or to perform an activity repetitively.[4] *Power* is the rate of performing work and is measured in work over time. *Balance* is defined as a state in which the body remains in a particular position while resting.

Individual patients will require different components. For example, an agile dog recovering from an iliopsoas strain will need to focus on all of the components but some will have a stronger focus. The dog will require more strength and power through plyometric training. Plyometric training will focus on the power needed to get over the jumps associated with agility. The dog's program with canine hip dysplasia will need to focus more on balance and endurance than to be able to stand and walk without issues.

Safety

Exercises performed with the dog should always be safe and in no way cause any harm or potential harm. The dogs should not experience soreness after the activity and should be monitored for 24 to 48 hours after the activity for pain, soreness, and inflammation. As a prophylactic measurement to reduce any potential pain or inflammation, cryotherapy should be performed after the activity. In many cases, it is normal for a patient to experience some degree of soreness and inflammation after activity. Many postoperative cases experience this but it should be alleviated with an immediate application of ice following the exercise. The soreness should not be present longer than 2 hours after activity. If it is, the exercise may have been too intense or the condition requires further examination.

Specific Types of Exercises

Balance exercises appear to be one of the easiest exercises for a dog to perform but are actually quite difficult, especially for the dog having issues with balance. Balance exercises may be used with a range of conditions. Balance requires an individual to maintain a position, to stabilize during voluntary activities such as walking, and to react to external forces.[5] Good and functional balance requires coordination among the motor, sensory, and biomechanical systems and is affected with an array of conditions—neurological, orthopedic, vestibular, visual, and biomechanical.

Figure 1 Assisted standing device in a dog post ventral-slot procedure.

Balance activities may be initiated with the dog standing and gentle resistance given to the standing balance. The goal is not to push the dog over but to have them maintain their balance as resistance is offered. This is very appropriate for dogs dealing with weakness secondary to arthritis, systemic illness, trauma, or orthopedic surgery. In the initial phases, the dog may only be able to stand on its own with a support with a harness (Fig. 1). The dog in this photograph underwent a ventral slot procedure and had been working on independent standing with a harness. The dog was assisted to a standing position and allowed to stand for as long as it was able. When the dog fatigued, the harness was supported. This was repeated 10 times two times a day. It is also very beneficial for the older dog that requires strength with balance. Resistance is given in different directions and to the forelimbs and hindlimbs until the dog becomes fatigued. The principle is based on something called rhythmic stabilization. The goals are to slowly build resistance in any position or range of motion, coordinate transitions between antagonists, and ensure the resistance promotes stability.[6] The goal is never to promote movement. Fatigue will be evident if the dog sits down or leaves the area. The intensity may then be increased by lifting one leg at a time and holding for 3 to 10 seconds. The intensity may be further increased by offering resistance while the dog is on three legs. Lifting the opposite forelimb and hindlimb and holding for a few to 10 seconds will also work on balance as well as strengthen the epaxial musculature and abdominals.

Different surfaces will challenge the dog's balance and is fundamental to balance training (Figs. 2 and 3). Balance training should mimic the varied and unpredictable events that occur in the individual's daily activities.[7] For example, it is inevitable that a dog will encounter slippery floors, uneven surfaces, and attempts at squirrels. As the dogs are in the rehabilitation process, it is imperative to mimic these events to provide the strength and stability needed. Walking on uneven surfaces, such as cushions, mats, or egg-crate foam, will assist in dynamic balance, or to maintain their balance while walking. Walking up and down inclines and declines