

Physical Rehabilitation for the Intervertebral Disc Disease Patient

Liz LaFond, DVM, DACVS, CCRP
University of Minnesota
Saint Paul, MN

Patients recovering from injuries to the spinal cord have specialized needs during the recovery process and may benefit greatly from a tailored rehabilitation program. This talk will focus primarily on the principles of rehabilitation for injury secondary to intervertebral disc disease but will cover concepts that can be applied to many injuries and medical conditions.

Neurological injury

Dysfunction of the nervous system can cause abnormal or absent motor function and can impair sensation. Recovery of function in the CNS occurs as surviving tissue takes on the functions of the axons that have been damaged rather than by regeneration of neural tissue. This neuroplasticity can be enhanced by the application of appropriate rehabilitative exercises. In contrast to CNS nerves, damaged peripheral nerves may regenerate relatively quickly if in the proper environment and depends in part on the severity of injury.

Secondary effects of central and peripheral nervous dysfunction can be more debilitating than the original injury. For example, a patient with disc disease and subsequent neuropathy may develop muscle and tendon contractures (adaptive shortening of tissues) that prevent normal function. These secondary impairments develop based on the neurologic dysfunction present and can be anticipated by performing a thorough neurological evaluation. A well-designed physical rehabilitation program applied during the neural tissue healing time can prevent debilitation from these secondary effects.

Principles of rehabilitation interventions

Each physical rehabilitation intervention is prescribed to achieve specific objectives. These objectives are based on a patient's condition and the choice of intervention will depend on the nature and severity of impairment. Additionally, the needs of the patient and objectives of therapy will change over time as neural tissue heals. Objectives that may be considered by the therapist include: pain control or modulation; strength building or prevention of muscle atrophy; maintaining and improving joint range of motion; and restoring neuromuscular function. It is imperative that the rehabilitation practitioner consider what needs to be accomplished for a particular patient at that point in time.

Passive range of motion and stretching exercises

Passive range of motion exercises (PROM) involve no muscle contraction and therefore will do nothing for strength-building. PROM must be combined with active activities to achieve strengthening and to round out the rehabilitation program. Joint health can benefit from PROM as it limits cartilage damage and avoids collagen loss caused by tissue immobilization. Passive range of motion exercises that include additional pressure at the end of the available ROM result in tissue stretching. Like PROM, stretching exercises involve no muscle contraction and therefore cannot aid in strengthening. Stretching can help to improve flexibility of joints and periarticular tissues.

Active exercises

Active exercises are excellent for building strength and enhancing coordination. They can be modified based on the degree of neurological impairment to require different levels of coordination and nervous system input. For some patients, assisted standing for short periods of time may be a huge challenge. As the patient's condition improves, introduction of activities that challenge balance and include obstacles may enhance coordination and stimulate neuronal firing. It is important to understand the level of difficulty of specific activities as it may be counterproductive to introduce some challenging activities too early in the rehabilitation process.

There are a number of commonly used active exercises. Assisted sitting, standing and walking can provide early stimulation for balance control in moderately to severely affected patients and may even be important psychologically in recumbent patients. Exercises requiring a patient to sit and rise from sitting repeatedly can be very effective for coordination and strength building, but are actually fairly advanced activities that require significant baseline coordination and strength. Ambulation activities can vary from short walks on a flat surface to hill or stair walking. Techniques that can be used to increase the challenge of active exercises include: underwater treadmill walking (to increase resistance while at the same time providing buoyancy); obstacles such as cavaletti or weave cones; and substrate variation such as wading in water or walking through sand, high grass or snow. As a patient's level of function improves, there is virtually no limit to the degree of challenge that can be introduced with active exercises.

Therapeutic modalities

Cold packing and hot packing are two of the most universal rehabilitation therapy techniques available. In general, if there is active inflammation, such as immediately following traumatic injury or surgery, cold packing is highly beneficial for decreasing inflammation and controlling pain. In the chronic phase of an injury, there may be times when cold therapy is indicated to treat a “flare-up” or following aggressive physical therapy. Heat therapy will help to increase the elasticity of tissues and therefore can be very beneficial immediately prior to stretching that is prescribed to overcome tissue contracture. Both heat and cold can provide pain control when used appropriately. Other therapeutic modalities such as neuromuscular electrical stimulation (NMES) or therapeutic ultrasound can be beneficial in isolated situations but may not be readily available in all practices and require specific training.

Assistance devices

Patients with neurological dysfunction are often at risk for developing injuries secondary to abnormal ambulation or self mutilation. Booties are an example of a simple assistance device that can protect tissues that are not designed for weight bearing. Orthotics or splints can also provide protection and have the additional benefit of providing support for a weak distal limb. They can be designed to reposition a limb into a more functional position or assist certain movements. Non-slip mats can help provide traction during exercises and prevent additional injury. Support harnesses for the front or hind end can make it easier for the care-giver to assist a patient with early walking activities. Carts can provide a means for non-ambulatory patients to ambulate on their own.

Summary

There are many simple activities that, when prescribed and applied appropriately, can greatly benefit the neurologically impaired patient. It is paramount that the therapist takes into consideration the specific objectives of a prescribed therapy and modifies the therapy regularly as the needs of the patient change. Complex cases may be best served to be treated by someone who is well versed in veterinary rehabilitation therapy.