

Physiotherapy - Conservative/Postoperative

## Rehabilitation after Surgery for Intervertebral Disc Disease: A Case Report

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Rehabilitation after surgery for intervertebral disc disease is one of the most common reasons why dogs are referred to a physical therapist. Physical therapy is the treatment of choice, especially in this indication, to help the patient to a faster recovery.

The specific rehabilitation program for a dog recovering from herniated disc surgery depends largely on the patient's neurological status. Two phases of treatment can generally be distinguished.

1. In the immediate postoperative period (days 1-3), the main goals of physical therapy are to alleviate pain in supplement to analgesic medications, reduce inflammation in the surgical region, alleviate tension, and to maintain joint mobility.
2. In the days and weeks that follow, treatment still largely centers around pain control, but also focuses on preventing atrophy and improving movement patterns.

### Signalment and History

Mixed breed female dog, spayed, 7 years old, 12 kg

The dog was presented at the outpatient clinic of the Surgery and Ophthalmology Department of the Veterinary Medical University (VMU) of Vienna in May 2003. At that time, the patient was unable to stand. The findings of the neurological exam were as follows:

### Magnetic Resonance

Magnetic resonance scans were obtained for additional diagnostic evidence. MRI findings: L-1/2 intervertebral disc protruding right paramedian with associated spinal cord compression, disc degeneration across the entire thoracic and lumbar spine, and low-grade spondylosis of the lumbar spine.

### Diagnosis

Herniated intervertebral disc at L1/2 in conjunction with spinal cord compression, disc degeneration and spondylosis.

- Patellar and tibial cranial reflexes slightly diminished on both sides.
- Flexor reflex slightly increased on both sides.
- Proprioception moderately depressed on both sides
- Deep sensibility slight reduced on the left, normal on the right.
- Normal perianal reflex.

Head and neck mobility was normal. There was moderate pain on palpation of the thoracolumbar junction.

### Surgical Treatment

Hemilaminectomy was performed via a right dorsolateral access at L1/2. There was significant hematoma with a moderate amount of soft disc material protruding from the ventral and lateral aspects, especially around the spinal nerves.

### Postoperative Care

The initial postoperative medications were Borgal®, Durogesic® 25 mg and Solu-Dacortin® 25. The steroidal antiphlogistic drug was gradually discontinued while the rest of the medications were continued.

While still hospitalized in the surgery ward, the patient was referred to our clinic for physical therapy on the day after surgery.

### Postoperative Findings

The neurological status at this time was identical to the preoperative status. No muscle atrophy was detectable, but the muscle tone was slightly reduced in both hind limbs. Bowel and urinary function were normal. The only abnormalities were minor swelling around the incision and a slight degree of tenderness in the region of the thoracolumbar junction.

### Physiotherapeutic Treatment Program

As mentioned before, the main objectives of physiotherapeutic intervention in the first few days after surgery are to

1. Provide adjuvant pain control
2. Reduce inflammation
3. Alleviate tension and
4. Preserve joint mobility

## Adjuvant Treatment of Pain and Inflammation

Cryotherapy (see glossary) is very useful for treating pain and inflammation, especially in the first few days after surgery. To administer the treatment, wrap a commercial cold pack in a towel and apply it lateral to the surgical wound for 15 minutes several times (3 to 6 times) each day.

## Alleviation of Muscle Tension

Muscle tension mainly occurs in the back region, but considerable tension and hardening may also be seen in the upper arm and thigh muscles. A gentle back and leg massage can alleviate tension and prepare the muscles for subsequent range of motion exercises (see below). Patients with increased muscle tone should be massaged very cautiously. Only gentle and superficial touch techniques should be used. Be extremely careful when manipulating the tissues around the incision in the initial postoperative period.

The massage techniques described below have proven to be effective in patients recovering from disc surgery.



Fig. 4. Kneading the muscles with the hands.

The following grips were proven to be useful:

### Stroking

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### Kneading (Petrissage)

Depending on which technique is used, kneading can have either superficial or deep tissue effects. Superficial kneading decreases muscle tone, and deep tissue manipulation increases muscle tone. Moreover, kneading greatly increases the local blood flow, helps to dissolve adhesions, and stimulates the flow of lymph.

Different kneading techniques are used. To treat superficial tissues, grasp the skin and subcutaneous tissue in both hands and lift from the underlying structures. This gently stretches and mobilizes the skin. Now slowly release the skin fold and slide the hands forward to the next segment and grasp another fold of skin there. Work from a caudal to cranial direction when treating the back (Fig. 2), and from distal to proximal when treating the limbs (Fig. 3).



Fig. 1. Stroking massage in the croup region.



Fig. 2. Lifting a fold of skin on the back.

By kneading deeper tissues, the muscles can be treated directly. First, grasp a muscle group in both hands by placing the thumbs on one side of the muscles and the fingers on the other.

Now, knead the muscles by alternately squeezing them and releasing the pressure (Fig. 4).

Word of caution: Deep massage can cause considerable pain. Therefore, always increase the pressure cautiously while monitoring the patient's reaction.



Fig. 3. Lifting a fold of skin on the leg.

## Maintaining Joint Mobility

Maintaining joint mobility is especially important in patients who are unable to stand. One way to do this is through passive range of motion (PROM) exercises. It is important to treat all joints, including the toe joints.



## PROM Exercises

Procedure: With one hand holding the limb cranial to the target joint and the other slightly distal to the joint, gently move the joint in all physiological directions, i.e., through its normal range of motion (ROM). Always start with flexion since this is more pleasant for the patient than extension. Flex the joint to a comfortable end-point, then briefly hold the position. Under no circumstances should this maneuver induce pain and discomfort! Afterwards, gently put the joint through extension. Repeat the flexion and extension procedure approximately ten times for each joint (Fig. 5a-f).



Fig. 5a-f. Passive range of motion exercises for tarsus, knee and hip.

Later rehabilitation measures are selected in accordance with the patient's progress. The mixed breed female dog's neurological status on the fourth postoperative day was as follows: slightly increased patellar and tibial cranial reflexes on both sides, slightly decreased flexor reflex, and normal deep sensibility.

From the fifth postoperative day on, the patient was able to stand assisted and could actively move her hind legs. The muscle tone had also improved.

## Therapeutic Exercises

### Assisted Standing

This exercise is recommended for patients who are able to bear a portion of their body weight but are unable to stand independently. The objective of assisted standing is to improve muscle strength, endurance and proprioception.

After inserting a towel below the dog's caudal abdominal region, pull up on the ends of the towel to support the dog and lift it to a standing position. Check to make sure the dog's legs are planted squarely on the ground without knuckling. Now, slightly slacken the pull on the towel and allow the dog to support as much of its body weight as possible. As soon as the hind legs begin to buckle, pull up again on the towel to bring the dog back to a standing position.

### Bicycling Movements in Lateral Recumbency and Standing

This exercise is used for preservation/improvement of joint ROM and for gait patterning training.

Bicycling movements are normally done with the patient in a standing position, but can also be done in lateral recumbency if the patient is unable to stand.

Grasp the midsection of the patient's foot with one hand and guide the leg through gentle and flowing circular movements, similar to riding a bicycle. Maximally flex and extend all joints while doing so (Fig. 6a-g). When exercising the patient in a standing position, make sure to pull the sole of the foot across the floor while applying gently pressure.

## Cryotherapy

The application of cold initially leads to vasoconstriction, thus reducing the blood flow in the treated area. During the course of an inflammation, swelling occurs due to the combined effects of cellular changes and hypersecretion of vasodilators that widen the blood vessels. One of the effects of cryotherapy is to reduce the cell metabolism in the affected region.

Vasodilatation occurs as a secondary response approximately 20 to 40 minutes after the application of cold; this is called the hunting response. Other effects of cryotherapy can be attributed to neural mechanisms: the impulse conduction velocity decreases and cold receptors are stimulated, thus activating the gate control system and reducing the nerve refractory period.

Cryotherapy alleviates muscle spasms via several different mechanisms. Its analgesic effect is of major benefit; various neural mechanisms also play a role.

## Therapeutic Exercise

Therapeutic exercises are an essential part of physical therapy. The goals of therapeutic exercise are to improve or maintain joint mobility (range of motion) and limb function and to build muscle mass and increase muscle strength. Primary distinctions are made between passive, active assisted and active exercises.

Passive exercises such as passive range of motion (PROM) exercises and stretching help to preserve or improve joint mobility, to improve the elasticity of muscles, tendons and ligaments, and to enhance body perception.

Active assisted exercises are mainly used in patients with proprioception deficits or in animals that cannot support their own body weight independently. These exercises include assisted standing and exercises using gymnastic balls and balance boards.

Active exercises build muscle mass and increase muscle strength. Examples include leash walks, Cavaletti rail exercises, and underwater treadmill training

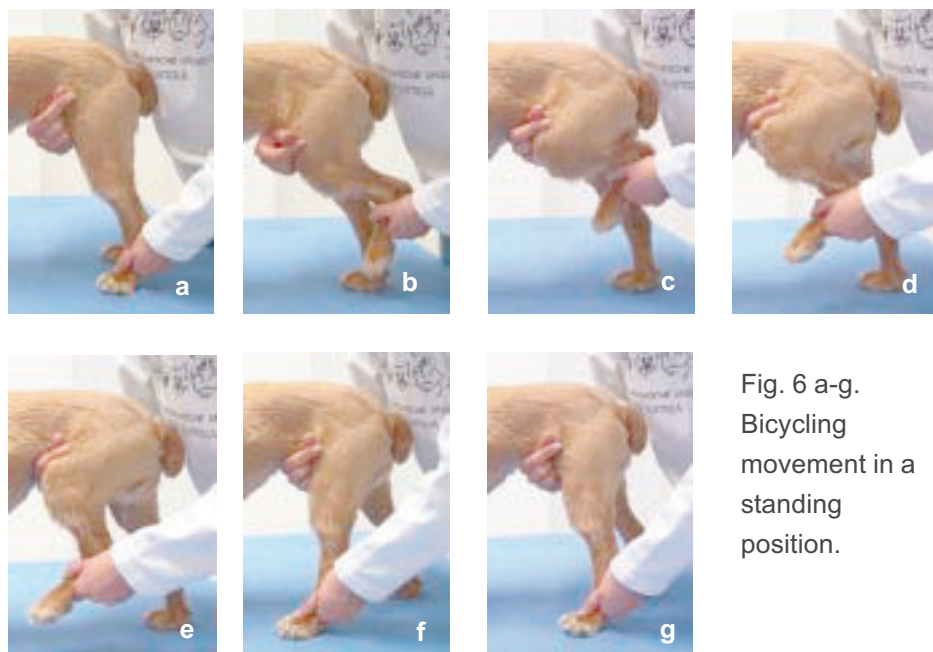


Fig. 6 a-g.  
Bicycling movement in a standing position.

## Weight-Shifting

Weight-shifting exercises are also used for proprioceptive training as well as to maintain or build muscle mass. The patient must be able to stand unassisted in order to do these exercises.

The therapist must first stand facing the dog. While supporting the dog's body with one hand, now gently push against the hip region with the other hand to disturb the animal's balance.

The better the patient's proprioceptive capacities, the stronger the patient's balance can be offset.

Transcutaneous electrical nerve stimulation (TENS) was used for supplementary pain therapy in parallel to the therapeutic exercises. Treatment was carried out using the PT 2000 TENS device manufactured by S+BmedVET (Babenhausen, Germany).

Procedure: After wetting the skin cranial and caudal to the incision the electrodes (E-pads) were applied. One electrode was placed to the right

and the other to the left of the spinal column. This procedure allows direct stimulation of the spinal region where disc problems occurred.

To keep the back muscles from contracting, the device was adjusted for low-intensity stimulation (1) on Program 2.

Since the patient did not tolerate the initially selected treatment mode, we began with a user-defined mode (vibration pulse). The animal then adjusted to treatment within a few minutes.

## Course of Treatment

The patient was discharged from the hospital six days after surgery. We prescribed a program of home treatment, and the dog was to be brought in to the clinic regularly for daily check-ups. Electrical stimulation and therapeutic exercises were done on an outpatient basis during these visits. The animal owner was instructed to do the range of motion exercises at home three times daily.

Four days after discharge, the dog was able to take a few steps on her own. Her neurological status was also better at that time, but severe ataxia of the hind limbs could be observed.

As soon as the dog was able to walk, the owner was instructed to take her out for frequent short walks on grassy

terrain and to do the bicycling movements with the dog in a standing position several times daily.

The frequency of treatment at the outpatient clinic was decreased to once every 3 to 4 days. Electrical stimulation therapy could be discontinued once the pain had subsided.

Two weeks after surgery, the dog had completely regained her ability to walk, although a slightly staggering gait and mild ataxia were still evident. These problems gradually subsided in the course of the next eight weeks.

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