

Physical Rehabilitation for Veterinary Practices

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The goal of rehabilitation is to **decrease pain, inflammation, and swelling**, as well as **increase range of motion, strength, and overall mobility**.

Physical rehabilitation for veterinary patients expedites return to normal function, pain relief, and encouragement of optimal health for patients suffering from orthopedic, neurologic, and chronic diseases. Patients that use rehabilitation programs range from overweight pets and those recovering from injuries and surgeries to senior pets with chronic, debilitating conditions and agility, field trial, hunting, and service dogs.

Physical rehabilitation can be an invaluable addition to a veterinary practice with relatively low overhead costs. This article provides an overview of physical rehabilitation modalities and focuses on incorporating these modalities into practice; a follow-up series on physical rehabilitation modalities will provide further information on indications for certain therapies, training for veterinary staff, and treatment plans for patients.

CRYOTHERAPY Description

Cryotherapy (or cold therapy) is the application of a cold agent to an affected area of the body, such as a surgical site, to provide therapeutic effects by reducing tissue temperature. Research has shown that cryotherapy is effective in the first 72 hours after acute injury or surgery.¹

Benefits

Cold therapy provides:

- Analgesia
- Vasoconstriction
- Decreased blood flow to the affected area
- Reduced cellular metabolism
- Reduction in edema, muscle spasms, and initial immune response to injury or surgery²⁻⁴

Indications

- Indications for use of cold therapy include any injury or procedure that causes inflammation, pain, or decreased range of motion and neurologic disorders, such as spasticity.^{2,3} Specific surgical procedures where cryotherapy is indicated postoperatively for pain and swelling include:
 - Femoral head and neck ostectomy⁵
 - Tibial plateau leveling osteotomy (TPLO)^{6,7}
 - Tibial tuberosity advancement (TTA).

Additional disorders where cryotherapy is used to address pain and inflammation include:

- Tendon and ligament injuries⁵
- Fracture repair⁸
- Osteochondritis dissecans (OCD)
- Osteoarthritis.⁹

Implementation

Cold agents may include ice, gel packs, cold compression devices, multiple towels immersed in ice water, or simply a bag of frozen vegetables.²

Ice or Gel Pack: When using a plastic bag filled with ice or a gel pack, cover it before application with a thin, wet layer of fabric to improve temperature exchange between the tissue and cold agent. Do not use a thick layer of fabric, such as a towel or blanket, because therapeutic temperatures may not be reached in deep tissues.²

Towels in Ice Water: Multiple towels must be used because a single towel will not maintain adequate therapeutic temperatures long enough to be effective. An effective method of using towels is to immerse 2 towels in ice water and alternate application when the towel being used becomes too warm for therapeutic effectiveness.²

Cold Compression Devices: These devices are commercially available and use a combination of controlled pressure with a continuous flow of cold water to help minimize swelling and pain postoperatively.



For chronic conditions, we recommend 10 to 15 minutes of warm packs before a session and, at the end of a session, 10 to 15 minutes of cold packs.

HEAT THERAPY

Description

Heat therapy is used to achieve effects opposite to those of cryotherapy; however, both modalities are used to provide analgesia and decrease muscle spasms.² Since cold therapy should be performed for the first 72 hours, heat therapy should only be initiated after 72 hours and continued for a period based on the individual patient, typically 5 to 7 days. Beginning heat therapy too early can lead to worsening edema, swelling, and potential seroma formation.

Benefits

Heat therapy provides:

- Analgesia
- Decreased muscle spasms
- Increased impulse conduction and fibrous tissue elasticity
- Vasodilation
- Decreasing blood pressure if heat is applied for long periods of time.^{2,3}

Indications

Indications for heat therapy include:

- Chronic inflammation

- Decreased range of motion
- Pain
- Muscle tension
- Preparation for additional exercises including stretching and therapeutic ultrasound.^{2,3}

Specific procedures or disorders that benefit from heat therapy include:

- Cranial cruciate ligament (CCL) rupture
- Fracture repair⁸
- OCD management
- Tendon and ligament injury management⁵
- Neurologic disorders, such as intervertebral disk disease (IVDD)¹⁰
- Osteoarthritis⁹
- Spondylosis.⁵

Implementation

The best way to incorporate heat therapy in private practice is to use superficial heating agents that transfer heat to affected tissues.

Superficial heating agents include hot packs, heat wraps, towels immersed in hot water, and application of warm water.^{2,3} Many of these items can be found in pharmacies.

Hot/Warm Packs: Most hot packs contain gel of some type that can be reheated and reused many times.² The veterinarian or technician conducting therapy should heat the pack in a microwave or boiling water to a temperature tolerated by the therapist's skin. A hot pack should never be placed directly on the skin or incision site, but should be placed in a cloth or towel prior to application.³

Heat Wraps: Heat wraps are used to provide analgesia. Some products claim to provide up to 8 hours of heat and can be adjusted to fit most dogs and cats.² Caution should be taken when leaving these applied as they may cause skin burns.

Towels in Hot Water: Use of towels immersed in hot water is a modality that can be easily performed. Multiple towels should be immersed in hot water, put in a plastic bag, and placed on the affected area. Towels must be alternated to maintain therapeutic temperatures. Another method is to dampen the towel and warm it in the microwave.

Warm Water Application: Warm water application is performed by filling a bathtub with warm water and placing the patient in the tub, taking special care to not allow the patient's head to submerge.³ Water temperature should be warm, typically 90°F to 95°F, but lower if exercises will be performed in order to avoid overheating. Do not submerge fresh surgical incisions until they have healed.

PASSIVE RANGE OF MOTION

Description

Passive range of motion (PROM) refers to exercises that move joints through their available range of motion without weight bearing muscle contraction.^{3,11,12}

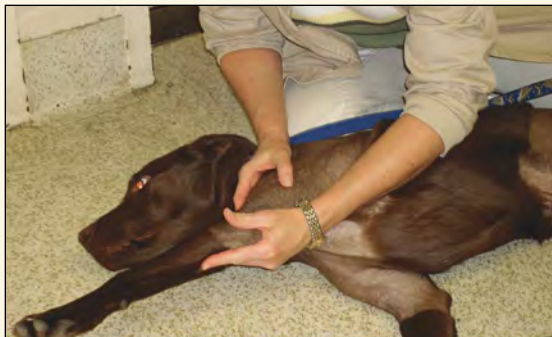


Figure 1. PROM should be performed with slow, steady movement.



Figure 2. Therapy balls can help support weak animals or shift more body weight to an isolated leg

Benefits

PROM provides:

- Prevention of joint and muscle contracture
- Analgesia
- Increased blood flow and lymphatic flow
- Increased synovial fluid production to decrease articular cartilage degradation^{11,12}
- Prevention of joint degeneration and muscle contracture during the acute rehabilitation phase for patients undergoing hemilaminectomy to treat IVDD.

PROM, however, will not prevent muscle atrophy or increase strength or endurance.

Indications

Indications for PROM are most commonly related to surgical procedures or soft tissue injuries to extremities where active weight bearing is prohibited. Other indications include paralyzed animals.^{3,12}

PROM provides therapy for specific disorders, such as:

- Loss of full range of motion¹³
- CCL rupture stabilization using TPLO¹⁴ or TTA
- Hip or shoulder disorders¹⁵
- Fractures⁸
- Distal femoral physis fractures in juveniles.⁵

Implementation

Comfort is of the utmost importance when performing PROM therapy.

- The patient should be placed in lateral recumbency on a soft, padded surface, or allowed to stand comfortably.
- The therapist should grasp the limb above and below a joint, but close to the joint to reduce the forces placed on it.^{3,11} The joint should be slowly and gently flexed and extended to the full limit of the patient's range of motion (**Figure 1**). All joints in the limb should be flexed and extended to achieve full therapeutic benefit.
- Additionally, adduction and abduction of the limb may also be performed to provide PROM to the shoulder and hip joints. Manipulation of the full limb in sequence, in a motion similar to riding a bicycle, allows PROM of all joints and tissues.^{3,11} This motion should be slow and steady.
- PROM exercises are typically performed for 15 to 20 minutes, up to several times a day, depending on the indication.

BALANCE THERAPY

Description

Weight shifting can be used to improve balance once the patient has regained the ability to stand on its own or with the assistance of a sling or therapy ball (**Figure 2**). This therapy is focused on helping the animal understand that the affected limb(s) is no longer painful.

Benefits

Weight shifting exercises:

- Increase muscle mass
- Improve proprioception
- Allow early return to function¹¹
- Rebuild core muscle strength.

Indications

Indications for weight shifting therapy include:

- Loss of proprioception
 - Muscle atrophy
 - Pathologic weight shifting.¹⁶
- Therapy is beneficial for specific disorders, such as:
- Loss of proprioception and balance
 - Neurologic disorders that affect limb function⁹
 - Loss of weight bearing due to fractures⁸ or wounds
 - Immobilization of a limb after ligament repair (eg, CCL).^{5,16}

Implementation

Weight shifting therapy is performed by placing the animal on a nonslick surface in a standing position.

- The therapist places his or her hands on the animal's side and gently helps the patient shift its weight from side to side and front to back, encouraging use of the affected limb or muscles in a controlled manner.
- If the patient is unstable when standing, a sling or exercise ball may be placed under its abdomen or thorax to provide support.^{3,11}
- If the patient is stable, the therapist can allow the patient to become slightly off balance by gently pushing the patient's hip or shoulder or lifting the normal



Figure 3. Wobble boards help support the patient as it maintains its balance.

limb. The patient must correct its balance by shifting weight to the affected limb.^{3,11,16}

Balance or wobble boards may also be used to improve balance and proprioception.¹³ The patient's forelimbs or hindlimbs are placed on the board and swayed back and forth to encourage weight shifting from side to side or front to back. A larger board allows all four limbs to be placed on the board (**Figure 3**).^{3,16,17}

WALKING EXERCISES

Description & Benefits

Walking exercises are essential to any animal's rehabilitation program. Walking exercises provide:

- Increased range of motion
- Improved gait, muscle mass, and strength
- Improved circulation in blood and lymphatic vessels
- Increased endurance
- Prevention of joint degeneration.^{16,18}

Indications

Walking exercises are indicated early in rehabilitation for animals refusing to use their affected limb due to muscle weakness, decreased range of motion, circulation disorders, neurologic deficits, and proprioceptive deficits.^{16,18}

Walking exercises may improve

specific disorders, including:

- Stabilized fractures⁸
- Surgically repaired joint disorders,^{19,20} such as OCD lesions
- Femoral head and neck ostectomy¹⁹
- Stifle joint disorders, such as CCL rupture repaired by TPLO^{20,21,22}
- Soft tissue injuries, such as superficial or deep digital flexor tendon rupture.²³

Implementation

Leash walking can be performed once the patient's ambulatory status permits exercise. To begin, the patient should be walked slowly to allow the patient adequate time to place each limb on the ground and shift its weight to that limb. As the patient improves and increases strength in the affected limb, the therapist may increase the walking speed and eventually allow running while still on a leash.^{2,16} Running off leash should not occur until fractures have healed or proprioceptive deficits have improved, which can take weeks to months.

Stairs/Incline: Walking up a gradual incline or short flight of stairs helps increase mass and strength of the hindlimb muscles as well as improve flexion, extension, and range of motion. The patient may initially be led up and down a flight of stairs with 2 or 3 steps, with the number of steps increased as the patient improves.^{3,16}

Weight Shifting: For stronger patients, weight shifting can be combined with walking exercises. Walking patients in large circles will make the interior legs carry more weight. Walking in a figure-8 pattern will shift weight on all 4 legs and increase the amount of body weight carried on each leg.

Sit-To-Stands: Sit-to-stands can be performed and build the quadriceps and hamstrings. For maximum benefit, the dog must sit with both legs under its rump. This can be encouraged by performing sit-to-stands with the animal between the therapist's legs or by having the dog sit in the corner or against a wall (**Figures 4 and 5**).

CAVALLETTI RAILS

Description & Benefits

Cavalletti rails are rails that are raised above the ground a certain distance for patients to walk over (**Figure 6**).^{3,11,16} Benefits of cavalletti rails include increasing stride length, range of motion, proprioception, balance, and limb use.^{3,16}

Indications

Indications for cavalletti rails include:

- Orthopedic injuries, such as fractures and ligament ruptures
- Loss of proprioception in neurologic patients
- Joint and muscle pain
- Decreased range of motion
- Gait abnormalities
- Non-weight-bearing limb(s).



Figure 4. Sit-to-stands should be performed with a leash and a sling if patients need assistance with standing.



Figure 5. Sit-to-stands should be performed with the animal between the therapist's legs or in a corner to assure both legs flex underneath the body.



Figure 6. Cavalletti rails can be made from PVC poles and cones with slits cut in them at different heights.

Cavalletti rails are specifically indicated for:

- OCD
- Elbow dysplasia^{5,16}
- Total hip replacement¹⁹
- Femoral head ostectomy
- Fractures requiring immobilization⁸
- Severe muscle atrophy
- Rehabilitation after neurologic injuries.¹⁰

Implementation

Rails should be placed at different distances and heights based on the animal's disorder, goals for treatment, and patient's ability. The pace the animal is walked over the rails determines the cardiovascular component of the exercise, height determines range of motion in the joints, and distance between the poles dictates the proprioceptive challenge.

The patient should walk slowly through the rails initially. Speed, duration of therapy, and changes in elevation and length between the rails can be made once the patient becomes acclimated. Increases in height and distance between rails will increase the flexion and extension of the limbs and help increase proprioception and awareness.^{3,11,16}

LAND TREADMILLS

Benefits

Goals for treadmill walking are aimed at reducing pain, making the patient bear weight on the affected limb to strengthen muscles, increasing proprioception and range of motion, producing a normal gait, and providing cardiovascular and endurance benefits.^{3,11,16}

Indications

Indications for treadmill walking include:

- Orthopedic injuries
- Decreased range of motion
- Muscle atrophy
- Abnormal gait
- Decreased proprioception.

Specific disorders that may benefit from treadmill walk-

ing include:

- Painful hips due to hip dysplasia⁵
- Disuse of a limb due to surgical repair of fractures⁸
- Ruptured ligaments, such as CCL ruptures^{20,21,22}
- Neurologic disorders that cause loss of proprioception, balance, and limb function.⁹

Implementation

Canine treadmills can be purchased from numerous veterinary equipment providers. Prices range from just under a thousand dollars to a few thousand dollars. Human treadmills are less expensive, ranging from a few hundred to a few thousand dollars. Modification of human treadmills for small animal patients can include addition of side walls and a brace to which a harness can be attached to support the patient if they fall.¹⁶

Treadmills should be used carefully, with at least 2 handlers and a leash (Figure 7). The handlers may position themselves in front of the patient to encourage forward motion and behind, above, or beside the patient to provide support, and possibly aid in gait and range of motion.^{3,16}



Figure 7. Land treadmills should be used with at least 2 handlers.

Training is important and usually successful in a short period of time. Speeds should be started off slow, generally less than 1 mph, until the animal has adapted. Some treadmills also have elevation settings; incline walking can help increase strength and range of motion.¹⁶ Sessions can last from a few minutes to more than 30 minutes, especially in cases where endurance is a goal.

HYDROTHERAPY

Description

Water is effective as a rehabilitation tool due to its buoyancy, which results in an effect of decreased weight.^{3,24} Water's hydrostatic pressure, where water is exerted equally on all surfaces of the object immersed, also provides an optimal environment for rehabilitation. These forces of water reduce the weight being supported by the patient's limbs, allowing them to ambulate and perform specific exercises more easily than outside a buoyant environment.

DOS & DON'TS of Physical Rehabilitation

DO	sanitize cold packs between patients to prevent nosocomial infections in your hospital.
DO	cover incisions with vitamin A and D ointment or a triple antibiotic ointment when using cryotherapy or heat therapy to prevent the damp layer from potentially infecting the fresh surgical site.
DO	pay attention to the temperature of the heat modality being used in order to prevent burns.
DO	alternate towels frequently to maintain therapeutic temperatures for cryotherapy or heat therapy.
DO	use good footing for leash exercises.
DON'T	flex or extend a joint past a comfortable level.
DON'T	cause stress or discomfort to the patient by pushing too hard or fast during exercises.
DON'T	raise cavalletti rails too high, causing the patient to jump over them.
DON'T	face a treadmill toward a wall as it discourages forward movement.
DON'T	leave patients unattended during hydrotherapy or allow them to become fully submerged.

Benefits

Benefits of hydrotherapy include:

- Reduction in edema and fluid pooling due to hydrostatic forces
- Improved muscle mass and strength due to resistance of water
- Improved range of motion
- Increased endurance, weight loss, and decreased pain.²⁴

Indications

Indications for hydrotherapy include:

- Orthopedic disorders
- Neurologic disorders
- Muscle atrophy
- Decreased joint function and range of motion.^{3,24}

Specific disorders where hydrotherapy is indicated include:

- Fractures⁵
- CCL rupture²²
- Total hip osteotomy¹⁹
- IVDD¹⁰
- Fibrocartilaginous emboli
- Arthritis.^{5,24}

Implementation

Most veterinary practices have a large bathtub.

- Fill the tub with water to a level determined by the size of the patient and affected limb.
- Place the patient in the tub and allow them to walk around (**Figure 8**).
- The therapist may stand at the head of the tub and entice the patient to move around by offering treats or playing with a ball or toy.^{3,24}
- Canine life vests are commercially available, but do not replace the need for constant supervision while the patient is in the tub (**Figure 9**).

Based on one study, when water levels are filled to the level of the hip and shoulder, the animal only bears 38% of its body weight on its limbs.²⁴ However, lowering the water level creates resistance and increases the amount of work the legs perform, building muscle strength.



Figure 8. Hydrotherapy can be performed using a bathtub and food or toys to encourage the patient to walk in laps in the water.

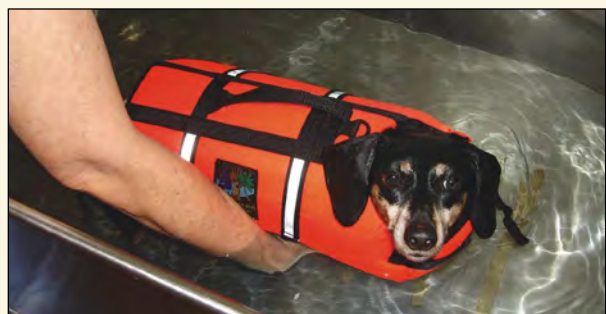


Figure 9. Canine life vests can be fitted to any size and shape.



CONTINUING EDUCATION

Certification programs in physical rehabilitation for veterinarians and veterinary technicians are offered by University

of Tennessee and University of Florida. There is also a new veterinary medical specialty, the American College of Veterinary Sports Medicine and Rehabilitation, for veterinarians seeking board certification. Evidence-based rehabilitation modalities are important and further research will enhance our current understanding of the benefits of physical rehabilitation in small animals.

If the patient has access to a pool or pond, these may also be used for walking or swimming once the patient becomes adapted to hydrotherapy.

TAILORING REHABILITATION

Rehabilitation is an essential aspect of the recovery plan for small animal patients. Protocols should be tailored for the individual patient based on its disorder and the goals desired from rehabilitation. All therapy sessions take patience and practice; some exercises or modalities may work better for different patients' temperaments and specific conditions. Rehabilitation changes as the animal improves and recovers; the therapist must be educated about physical rehabilitation, creative and flexible with protocols, and adjust them for each situation. ■

CCL = cranial cruciate ligament; IVDD = intervertebral disk disease; OCD = osteochondritis dissecans; PROM = passive range of motion; TTA = tibial tuberosity advancement; TPLO = tibial plateau leveling osteotomy

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