

# Physical Rehabilitation for Veterinary Patients Following Soft Tissue Musculoskeletal Injury

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Soft tissue musculoskeletal injuries such as strains and sprains are being recognized more frequently in veterinary patients but are probably still under-diagnosed. Athletes and working animals are likely most commonly affected. These patients 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 tissue injury and repair and explore rehabilitation for the most common soft tissue musculoskeletal injuries encountered in veterinary medicine.

## Physiologic response to injury and disuse

The primary tissue types making up the musculoskeletal system include bone, ligaments and tendons, cartilage, and muscle. Acute injuries occur when there is a sudden stress that is too great for the tissues to overcome. Chronic injuries occur when cumulative stresses are greater than the ability of the tissues to repair themselves. Musculoskeletal tissues have different responses to injury or immobility and varying ability to heal

### Muscle

Decrease in contraction strength is directly related to the degree of injury to muscle and the development of fibrous tissue. Most injuries involving muscle occur near the musculotendinous junction where tissues are weakest. With proper management muscle can regain the majority of its pre-injury strength in a relatively short period of time (weeks).

### Tendons

In general, a consequence of ligament injury is joint instability, while tendon injury leads to a loss of power and muscle function. Tendons heal very slowly, regaining 50-80% of pre-injury strength after *one year*. Tendons without a sheath have better contact with blood supply and heal better than those housed in a tendon sheath.

### Ligaments

Like tendons, ligaments heal very slowly. There is variation in how different ligaments heal (collateral ligaments tend to heal well, while cruciate ligaments heal almost not at all). Both ligaments and tendons need to undergo some stress in order to regain normal architecture (fibers are laid down in the direction of experienced stress).

## Sprains and strains

Damage to muscle or tendon fibers are strains whereas damage to ligaments are defined as sprains. Both strains and sprains are classified based on the degree of tissue damage.

Muscle strains: Grade 1 muscle strains occur when there is minimal disruption of individual muscle fibers whereas grade 4 muscle strains represent complete disruption of a muscle. Grade 4 injuries may require surgical treatment in order to oppose ruptured muscle ends.

Tendon strains: Repetitive microinjury is an important component in the pathophysiology of tendon strains. This type of strain is common in athletes, especially if exercising while under-conditioned. Essentially, healing tissue is broken down from additional use before tissue strength can be regained. Strains can also occur with acute mechanical overload.

Ligament sprains: Sprains are classified as grade 1 when there is minimal fiber disruption resulting in minimal joint instability and grade 3 when rupture is complete. Grade 3 ligament injuries often require surgical stabilization prior to rehabilitation.

## 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 tissues heal. It is imperative that the rehabilitation practitioner consider what needs to be accomplished for a particular patient at that point in time.

## Cold and heat

Cold packing is the mainstay of acute soft tissue musculoskeletal injuries. Cold and heat therapy 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, especially in the acute phases of strains

or sprains. 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. The practitioner must keep in mind the deleterious effect on tissue distensibility that cold therapy has and it should be used with that in mind when tissue stretching is an objective. 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.

### **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 impairment to require different levels of coordination and nervous system input. As the patient’s condition improves, introduction of activities that challenge balance and include obstacles may enhance coordination, stimulate neuronal firing and emphasize the development of normal function. 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. Additionally, over-challenging healing tissue before its time may delay healing or lead to a suboptimal outcome.

There are a number of commonly used active exercises. In general, for soft tissue musculoskeletal injury, activities are devised to challenge in a controlled manner the tissues that are injured while protecting tissues that may be at risk for compensatory injury.

### **Summary**

With careful adherence to the principles of tissue healing, patients with soft tissue musculoskeletal injuries can be successfully rehabilitated. There are many simple activities that, when prescribed and applied appropriately, can greatly benefit the 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.