

Diagnosis and Treatment of Muscle and Tendon Injuries In Dogs

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There are generally four broad categories of injuries that cause lameness in dogs. My approach to a limping patient is to try to rule out each category when developing a list of rule-outs for the cause of lameness. These categories include:

- Orthopedic injuries (bone and joints)
- Neurologic injuries (think root signatures and peripheral nerve injuries)
- Immune-mediated and infectious causes (immune-mediated polyarthritis, etc.)
- Muscle and Tendon injuries

Orthopedic injuries are generally ruled in or out via radiography. Neurologic causes for lameness are frequently identified via a good neurologic exam. Immune and infectious causes are challenging and may require arthrocentesis and blood titers. Muscle and tendon injuries are frequently frustrating and difficult to diagnose. There are 5 broad mechanisms of injuries that may occur to muscle and tendons:

- Contusions
- Lacerations
- Ruptures
- Strains
- Contracture/Fibrosis

Physical exam findings will often guide the clinician to consider muscle or tendon injuries as the cause of lameness. Patients are often partial to non-weight bearing lame, there may be swelling of the muscle present, muscles and tendons will be painful on manipulation and palpation, there may be decreased or increased range of motion in the joint, and disuse atrophy may be noted.

Radiographs may be useful when a muscle injury is suspected. Although there may be concurrent injuries to bones and joints, muscle and tendon injuries frequently show subtle or no radiographic changes. It is important to obtain radiographs, however, to aid in ruling out other causes of lameness.

Ultrasound is an underutilized but very valuable tool when tendon injury is suspected. For those not familiar with the radiographic appearance of the tendon in question, use of the contralateral limb (if it is clinically normal) may be of value in comparing tendons and assessing for changes. Mineralization noted on radiographs can also be better delineated as to which tendon has these changes. Frequently supraspinatus tendinopathies are misinterpreted on radiographs as biceps tenosynovitis. Ultrasound will help determine which tendon is affected. I have frequently noted mineralization in one of these tendons with secondary inflammation of the other indicating two tendons showing injury.

Computed Tomography (CT) and MRI are sometimes utilized when muscle and tendon injuries are suspected. Whereas CT is not the best diagnostic tool for soft tissue injuries, contrast CT studies and non-contrast studies will show changes in the muscles of suspect. Use of MRI is

often not easily obtained due to cost and accessibility; however, MRI is extremely valuable in noting muscle and tendon changes.

Bicipital tenosynovitis is an inflammatory condition of the tendon of origin of the biceps brachii muscle. Inflammation of the tendon is typically due to repeated stress or trauma to the tendon. Clinical signs may be either a gradual onset or a progressive lameness that worsens with activity. Diagnosis is aided by palpation of pain over the tendon of origin with the shoulder flexed and the elbow extended. Radiographs may demonstrate mineralization of the tendon, periarticular osteophytes, and/or sclerosis of the intertubercular groove. Arthroscopy is a valuable tool aiding in diagnosis.

Supraspinatus tendinopathy is an underdiagnosed problem that is frequently misdiagnosed as biceps tenosynovitis. Supraspinatus tendon inflammation is frequently noted in large breed and sporting dogs. The injury frequently occurs bilaterally, although one leg is usually significantly more painful than the other. Injury is caused by chronic repetitive strain or trauma. Diagnosis is based on pain on palpation and manipulation of the shoulder and muscle atrophy. Radiographs and ultrasound may demonstrate mineralization of the tendon of insertion on the humerus. Secondary biceps tenosynovitis is commonly seen concurrently.

Iliopsoas injury is a rupture or strain injury of the tendon of insertion on the lesser trochanter of the femur. Mineralization may be noted, but more often radiographic changes are not present. Ultrasound of the tendon is valuable in demonstrating disruption or injury to the tendon. Simultaneous extension and internal rotation of the hip joint with palpation of the medial aspect of the proximal femur will demonstrate pain in patients with this injury.

Calcanean tendon disruption is easily diagnosed by palpation of thickening of the calcanean tendon where 2 of the 3 tendons insert at the proximal calcaneus (tuber calcanei). With the patient in lateral recumbency and both the stifle and tarsus held in 90 degrees of flexion, laxity in the calcanean tendon may be noted when a partial or complete disruption is present. Patients typically present with a plantigrade stance of the affected leg.

Infraspinatus contracture is most commonly seen in hunting and working dogs and is frequently due to acute trauma. Lameness is usually acute, and a characteristic gait abnormality typified by a circumduction of the limb develops within a few days. Atrophy of the infraspinatus muscle is noted and pain on extension of the shoulder with muscle tightness is often observed. Radiographs are usually normal, and ultrasound may be helpful in diagnosis.

Treatment of muscle and tendon injuries depends on the muscle injured. Treatment for biceps tenosynovitis involves strict activity restrictions and NSAID's. When medical management is not helping, biceps tenodesis surgery may be indicated. For supraspinatus tendinopathy strict rest, NSAID's, and PRP/stem cell injections have shown positive results. Iliopsoas injury usually responds to restricted activity, NSAID's and light physical therapy. PRP injections of the iliopsoas have also demonstrated efficacy. Calcanean tendon injuries require surgery to repair the ruptured tendon(s) followed by immobilization in a cast and restrictions for 2-3 months. Infraspinatus contracture responds favorably to transection of the contracted tendon with good return to normal activity in a short time.

For any injury to muscle or tendon, the most important aspect of therapy is strict activity restrictions for an extended period of time. Damaged tendons generally heal slowly and in the

case of calcanean tendon ruptures, only return to 80% of their original tensile strength at best (this may take up to 1 year to fully heal to this point). Exercise restrictions are most important to allow tendons to re-orient their fibers upon healing to prevent scar tissue formation. Scar tissue decreases the functional ability of the muscle to produce tension by up to 50% making the tendon functionally shortened. Accurate apposition and alignment of a sutured tendon is important to minimize scar tissue formation.

Premature mobilization of the tendon before it heals also promotes scar tissue formation. At the same time, prolonged immobilization of a muscle also decreases tensile strength and may result in scar tissue formation. Controlled activity and physical therapy are valuable tools for finding the balance between allowing the tendon to heal while minimizing scar tissue formation.

The focus of physical therapy should be on endurance activities such as slow, short, controlled leash walking and low impact activities such as swimming. Strength training activities should be avoided until the muscle is fully healed. Progressively longer leash walks to rebuild strength is the best way to transition a recovering patient back to activity before unrestricted activity resumes.

Other modalities such as laser therapy, therapeutic ultrasound, underwater treadmill walking, etc. may be employed under the guidance of a trained rehabilitation specialist. Muscle massage, cryo- and thermotherapy, and range of motion exercises are easily taught to pet owners but must be demonstrated correctly for owners to avoid further muscle injuries while gaining maximal benefits.