Rehabilitation of the Shoulder and Elbow

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To successfully treat forelimb problems, one must first know correct anatomy and common problems that arise. This lecture will focus on common problems of the shoulder and elbow. The shoulder joint is a diarthrodial joint connecting the scapular glenoid and the humeral head. Its primary motion is flexion and extension. Clinically, the shoulder is the most challenging of the six main joints in canines. The elbow is a complicated, unforgiving joint where the humerus, radius, and ulna meet. Motion of the elbow is also flexion and extension. Diagnosing forelimb lameness can be very challenging, as it is often difficult to localize the lesion on physical exam because the patient demonstrates increased sensitivity in the shoulder and elbow from referred pain, anxiety, compensation and/or improper restraint techniques. Radiographic examination of these joints is many times within normal limits due to the soft tissue nature of the injury. Advanced diagnostics are often helpful for definitive diagnosis. Common causes of forelimb lameness include supraspinatus tendinopathy, bicipital tenosynovitis, medial shoulder instability and elbow dysplasia.

Obtain and document a detailed history. When the owners are describing the lameness, ask which limb(s) are involved, how severe the problem is, if it is worse with rest or with exercise. Ask about onset (acute or chronic) and duration of the problem. Has the problem has been progressive (better or worse) intermittent or static. Have any treatments been tried - what worked and what didn't. Ask what their goals are for the visit. Important to know if they want to avoid surgery or try non-surgical approaches first. It is much easier to satisfy their goals for the appointment and even if you can't, you can acknowledge it and address potential alternative plans.

After the general physical exam, focus on the affected front limb. Your examination should be systematic every time. Start by spreading the toes and palpate each one thoroughly. Look for excessive nail wear, and examine the webs and pads. Palpate the phalange and metacarpophalangeal joints during flexion and extension. Flex and fully extend the carpus and elbow and palpate each for pain, effusion, crepitus, instability, heat, and increased or decreased range of motion. Examine the shoulder joint in flexion, extension, rotation, and then in hyperextension and hyperflexion. Palpate the tip of the acromion process of the scapula letting your thumb fall into the joint. Apply direct pressure to the biceps tendon to identify bicipital tenosynovitis. Observe the animal at a walk and jog. With classic forelimb lameness the head and neck are raised when the lame leg is put to the ground. This throws the weight of the head off the lame leg. Weight is shifted to the hind legs so hind legs are carried further under the body than usual and the back may be arched. The animal may take short steps with the hind legs.

Supraspinatus tendinopathy

The supraspinatus muscle extends and helps stabilize the shoulder. The muscle inserts via the supraspinatus tendon to the greater tubercle. Several degenerative disorders affect the insertion of the supraspinatus tendon such as tears, calcification, and overuse. Dogs present with a history of unilateral, chronic, weight-bearing lameness that is exacerbated with activity. Atrophy of the supraspinatus muscle is frequently identified and pain can be elicited by direct palpation over the tendon and during shoulder flexion. Depending on severity of the injury, treatment options can include manual therapy, modalities, or therapeutic exercise. Conservative management includes rest, NSAIDs, cryotherapy, pulsed ultrasound and PROM exercises. Extracorporeal shockwave therapy may be used. NMES can be applied in the early stages of treatment, particularly to the supraspinatus muscle to help impede muscle atrophy until the patient is weight-bearing consistently. Isometric exercises such as three-legged standing, and wobble-board exercises can be added in the initial stages of treatment. Cryotherapy and low level light laser can be used to help control pain and discomfort. Downhill walking, cavaletti rails, paw shakes, etc. can slowly be added. If signs of lameness are present after an exercise session, decrease the amount of activity or give a short rest.

A review of frequently modalities

Cryotherapy is used after exercise throughout the rehabilitation program. Effects of cryotherapy include vasoconstriction, decreased blood flow, reduced cellular metabolism and permeability, attenuation of traumatic or exercise induced edema and decreased muscle spasm and analgesia. Cryotherapy can be accomplished by use of commercial ice packs or preparing a homemade pack (frozen mixture of two parts water and one part alcohol in a double sealed plastic bag). Apply for 15-20 minutes immediately after surgery. Cryotherapy can be used three to four times a day to minimize inflammation, edema, and pain. Monitor the skin periodically for signs of white or pale skin. Cryotherapy should not be used on patients with poor or absent pain sensation.

The application of low power light to injuries stimulates healing and reduces pain. Laser is used to increase the speed, quality, and strength of tissue repair, resolve inflammation and provide pain relief. The main advantages of laser therapy are related to enhanced wound care, tissue repair, anti-inflammatory properties and the ability to assist with pain control.

Transcutaneous electrical nerve stimulation (TENS) is primarily used to alleviate pain. This modality is very useful immediately post-operatively and during therapy for pain relief. TENS stimulates the faster sensory nerves with an electrical impulse, causing an overload of interneurons, which limits the ability of sensory nerves to transmit pain signals to the brain. This produces short-lived analgesia not lasting more than an hour. Ultrasound gel helps with conduction.

Bicipital tenosynovitis

The biceps brachii muscle flexes the elbow and extends and stabilizes the shoulder joint during standing and during the weight-bearing phase of locomotion. Bicipital tenosynovitis involves the biceps muscle and its tendon that crosses the joint. The injury is repeatedly stressed by landing on forelimbs, overstretching the muscle, and quick turns. When the area is continually reinjured, the tendon weakens and develops micro tears leading to joint instability. Many of the dogs have difficulty with quickly turning to the affected side, are reluctant to jump and agility dogs may drop bars. These dogs have a shortened stride and a weight-bearing lameness that becomes worse with activity. Pain may be elicited by direct palpation over the biceps tendon especially when the shoulder is flexed and elbow is extended. Arthroscopy is the best method to diagnose. Conservative management includes avoidance of strenuous activity for up to three months, cryotherapy and pulsed therapeutic ultrasound. Extracorporeal shockwave therapy can also be used to decrease inflammation. Pulsed ultrasound can be followed by deep friction massage and stretching of the biceps tendon. Exercises should be slowly added and begun with isometric exercise such as three-legged standing and stabilization exercises. Cavaletti rails increase proprioception. Sessions should end with cryotherapy to decrease inflammation and help decrease discomfort. Low level light laser can be incorporated as well.

Medial shoulder instability

The exact cause of medial shoulder instability is unknown. The suspected cause is chronic repetitive activity or overuse leading to degeneration of the tissues. Degeneration leads to decreasing the tensile strength of the tissues, predisposing them to fraying. This injury is common in agility dogs that repeatedly undergo intense bodily stress. These dogs may present a shortened stride or a lameness that is worse after exercise. Decreased range of motion during extension is common and abduction causes pain and spasms. Arthroscopy provides definitive diagnosis. Mild MSI is classified as 35 to 40 degrees of abduction and moderate MSI as 45 to 65 degrees of abduction. Severe MSI is anything greater, which is rare.

Mild cases of MSI are treated conservatively with rehabilitation including slings and hobbles for a period of two to four months. Moderate to severe cases of MSI are treated with extracorporeal shockwave therapy and/or synthetic ligament replacement, similar to human rotator cuff repairs, using a fiber tape known tightrope. Post-operatively, shoulder support with non-weight bearing slings are used for the first eight weeks, followed by shoulder support hobbles for the next 12 weeks. Rehabilitation therapy begins immediately post-operatively and continues for up to six months. Inflammation is critical to the healing process, and any treatments that decrease inflammation are contra-indicated (NSAIDs, acupuncture, low level light laser to the affected shoulder, etc.) in the first six weeks. Pain medication (tramadol, codeine) is advised. Hobbles should be worn to prevent inadvertent valgus movements. During the first two weeks, the hobbles should be removed once or twice a day to perform PROM to the elbow, carpus and digits. Shoulder PROM should be avoided until six weeks post-op. After two weeks exercises should be started to encourage flexion and extension. Electrical stimulation can be applied to the shoulder muscles for pain management and atrophy reversal. As the patient progresses to showing good shoulder stabilization (usually around four weeks post-op), core stabilization and proprioception exercises such as cavaletti rails and wobble board exercises are added. Awareness is important to prevent re-injury. Other exercises can include weave pole walking, handstands, hill walking, and eventually the underwater treadmill. At about six weeks post-op, more strenuous exercises are slowly introduced; low-height straight-line jumping, trotting through weave poles, commando crawling through obstacles, and short leash-runs can be added. A gradual return to before-injury activities is done over the next six to twelve weeks. Owners are advised to anticipate good shoulder function by three to four months post-op, with full return to function requiring five to six months of work.

Elbow dysplasia

Elbow dysplasia is the leading cause of lameness in dogs. These developmental abnormalities lead to malformation and degeneration at the elbow. Fragmented medial coronoid process (FMCP), osteochondrosis dissecans (OCD) of the medial condyle of the humerus, and ununited anconeal process (UAP) are all referred to as elbow dysplasia.

FMCP is the most common disease of the elbow. It results from abnormal biomechanical stresses to the medial coronoid process resulting in the process fragmenting. The excessive loading is thought to generate a rotation of the medial coronoid into the radius. This can be traumatic (TFMCP) or the more recognized congenital form affecting skeletally immature large and giant breed dogs (osteochondrosis – FMCP). No matter the etiology, this fragment should be removed via arthroscopic surgery as left untreated with a continued lameness, osteoarthritis will develop. The often-damaged articular cartilage should be debrided so the body can form fibrocartilage to fill in the defects. Treatment is aimed at medical and surgical management followed by rehabilitation therapy.

Osteochondrosis (OC) osteochondrosis dissecans (OCD). Osteochondrosis is a defect in the development of subchondral bone resulting in the formation of a cartilage flap. OCD is when the flap separates and is free-floating in the joint. Early identification and removal of the flap along with articular cartilage debridement gives the best possible chance of improvement.

Ununited anconeal process (UAP) is most common in large and giant breed dogs. The anconeal process develops as a separate center of ossification and normally unites with the ulna by 20-24 weeks of age. If not united by this time spontaneous fusion will not occur. This is common in chondrodystrophic dogs and occurs twice as often in males than females. It presents gradually as an intermittent, subtle to severe lameness. Early identification and treatment will help prevent secondary degenerative changes. Treatment is either surgical removal or fixation of the UAP.

Rehabilitation therapy for elbow dysplasia (FMCP, OCD, and UAP) begins with cryotherapy, low level light laser and TENS to reduce inflammation and help decrease pain.

Once pain and inflammation are controlled, therapeutic exercises can be added to encourage active range of motion to the elbow. Great, targeted therapeutic exercises include hair-scrunchie to the nose, pushups, commando crawling through obstacles and high cavaletti rails. Hydrotherapy can be added with water at a height of the elbow to encourage range of motion and strength. Cryotherapy and low level light laser can continue during treatment to help ease discomfort. NMES can be applied to atrophied muscles if indicated.