PROCEDURE FOR LAMENESS EXAMINATION

Visual

- First, visualize the animal at rest and from a distance. Often this can be done while the owner is giving you a history. Note the body type and condition, conformation, any shifting in weight or abnormal stances, and the attitude of the animal.
- Second, do a closer visual examination of the animal. Look for abnormal wear in the feet, hoof cracks, lacerations, swellings in joints or tendons, atrophy or swelling of the muscles, and any other gross changes.
- Third, one must observe the animal during exercise, at the walk, trot, and sometimes at the canter or gallop. Often, the trot is the most advantageous gait for the exam because of its symmetry. It can be easiest to look at one set of limbs at a time, usually beginning with the forelimbs. Try to define which limbs are involved in the lameness, and the degree of lameness. This examination includes watching the horse move from the front, the side and from behind. Also, circling the horse or having them perform figure eight's can accentuate a lameness. Look for head nodding, gait deficits, alterations in the height of the foot flight arc, phase of stride, joint flexion angle, foot placement, and symmetry in gluteal rise and duration. Be aware that during these examinations, choosing the correct surface is important (i.e. hard surfaces for audible interpretations or gravel surfaces to exaggerate certain lameness’), as well as giving the animal enough room to move freely with the handler.
- With a forelimb lameness, the head will drop when the sound foot hits the ground and rise when weight is put on the lame leg. This is logical because the animal is attempting to minimize the stress and weight put on the affected limb. With a hindlimb lameness, the arc of the foot flight is often reduced. The pelvis will rise just as the lame foot hits the ground. If the lameness is severe enough, there will be a head nod down on the contralateral forelimb as the pelvis rises. Also, in a lame horse's gait, often there are various forms of abnormal limb contact during exercise.
- Finally, one can flex or stress different regions of the legs to try and accentuate a lameness.

Palpation and Manipulation

- Foot

Note the size and shape of the foot. Compare the normal with the abnormal. Look for any abnormal hoof wear, ring formation, heel bulb contraction, hoof wall cracks and swellings, and any other asymmetries. Palpate the coronary band for heat, swelling and pain on pressure. Have available a hoof pick, a hoof knife and hoof testers. Clean out the sole of the foot and search for any abnormalities, including frog atrophy, flat-footedness, or puncture wounds. Use hoof testers on the entire sole and frog region of the foot. Try to localize any hoof sensitivity or signs of laminitis.

- Pastern

Palpate this region for heat and or enlargement. Compare any suspected abnormalities with the opposite pastern. Check for any thickening of the tendons. Rotate the joint to test for pain in the collateral ligaments.
• **Fetlock**

Palpate both the dorsal and palmar aspect for any thickening and swelling of the joint capsule. Palpate the superficial and deep digital flexors for heat, pain or swelling. Palpate the sesamoid bones and the associated ligaments. Rotate and flex the fetlock to check the collateral ligaments and range of motion.

• **Metacarpus/tarsus**

Palpate the tendons on both the dorsal and palmar surfaces for any swelling, pain or heat. Also, palpate the length of MC3/MT3 and the splint bones looking for abnormalities. With the fetlock flexed and raised, check the suspensory ligaments and compare them to the opposite side.

• **Carpus**

Visualize for swelling on the dorsal and palmar surfaces. Try to associate any swelling with a particular joint spaces. Is the swelling diffuse or local? Palpate all the regions individually. This evaluation is most affective while the carpus is flexed. Also, note the degree of flexion and any associated pain. Evaluate the individual carpal bones and accessory carpal bone with thumb pressure.

• **Antebrachium (Forearm)**

Evaluate all the soft tissues for any swelling and inflammation. Also, palpate the bones of the region (i.e. radius) for any fractures.

• **Elbow**

Palpate the soft tissues of the elbow joint. One can use a stethoscope to auscult for any crepitation. Abduct the elbow and carpus to place stress on the medial support structures looking for pain. Flex and extend the elbow. Palpate the olecranon, collateral ligaments, and distal humerus.

• **Shoulder**

Palpate all the soft tissue of the scapulohumeral joint and look for atrophy or swelling. Palpate the bicipital bursa region. Flex, extend, abduct and adduct the shoulder looking for abnormalities. Look for any atrophy in the region of the scapula.

• **Tarsus**

Evaluate the tarsocrural/tibiotarsal joint for any distension, thickening of the joint capsule, bone proliferation of the distal tarsal joints, distension of the tarsal sheath, inflammation or luxation of any ligaments, or any other abnormalities. Also, look at the distal intertarsal and tarsometatarsal joints. Do a hock flexion test (spavin test) where the metatarsus becomes approximately parallel to the ground. A change in degree of lameness or gluteal rise would indicate a positive result. Also, while in that region, observe the tibia for any swelling or pain.
• **Stifle**

  Appreciate any changes in the femoropatellar joint or distension of the joint. Observe the associated muscles for atrophy or swelling. Palpate the patellar ligaments. Note the location of the patella itself, looking for any luxation. Manipulate the stifle with a patellar displacement test (pushing the patella upwards and outwards in an attempt to engage the medial patellar ligament over the medial trochlea), a cruciate test (evaluating any abnormal craniod or caudal movement of the tibia), and an evaluation of the medial collateral ligament by trying to abduct the limb.

• **Femur and Hip**

  Examine the muscles of the region for inflammation and/or atrophy. Check the femoral artery for the quality of pulsation. Put pressure on the greater trochanter to check the trochanteric bursa for inflammation. Palpate the femur looking for fractures. Examine the hip for asymmetry and muscle atrophy. Measure the distance from the tuber ischiadicum to the greater trochanter, and the tuber sacrale to the greater trochanter. With any luxation of the hip there may be disparity in these measurements. Flex and auscult for crepitation.

**Diagnostic Anesthesia**

Using appropriate nerve blocks can help localize the causative area of the lameness. To determine the specific area, begin with a block at the lowest point of the affected limb. Remember, you DESENSITIZE everything below your nerve block, so it is safest to start distally. One can choose either an intraarticular (into a joint) or perineural (around a nerve) nerve block. After the nerve block, the patient is reevaluated for any changes in condition. When alleviation of lameness is achieved, one can proceed with a diagnostic imaging of the appropriate region.

A **palmar digital nerve block** is at the level of the pastern joint or below. It blocks the palmar/plantar and distal parts of the hoof, PIII, termination of the deep digital flexor and most of the coffin joint.

An **abaxial sesamoid block** occurs on the abaxial surface of the base of the proximal sesamoids. It blocks the entire digit distal to the fetlock, except some areas of skin.

A **low palmar/plantar** (or distal metacarpal) block is at the level of the distal ends of the metacarpal bones. It blocks the fetlock joint, sesamoids, and sesamoid ligaments.

A **high palmar/plantar** (or proximal metacarpal) block is at the level of the proximal metacarpal region, just distal to the carpus/tarsus. It blocks the entire digit and most of the palmar/plantar side of the metacarpal bones.

A **peroneal and tibial nerve block** is proximal to the hock. The injection site for the tibial nerve is about 10cm proximal to the top of the tuber calcis on the medial aspect, and about 10cm proximal to the lateral malleolus for the superficial and deep peroneal nerves. It blocks deep sensation from the hock and structures distal to it. Some skin sensation may remain.

Intraarticular blocks can be performed on most joints at any point during the lameness examination and will be specific to the joint.
LAMENESS IN HORSES

Introduction
In horses, lameness problems constitute a huge source of loss financially and athletically within the equine industry. Because our relationship with horses depends largely on their athletic abilities, equine lameness results in some period of inactivity for horse and rider alike. Often times the most frustrating part of dealing with lameness is not the lay-off time, but the difficulty in recognizing the cause of the lameness and finding a treatment that will improve or cure the horse.

Overview
Lameness is an abnormality of the horse's gait that could be caused by pain, a mechanical problem such as "stringhalt" (muscle spasms), or a neurological problem such as "wobblers". Most of the time, lameness in horses results from pain in the musculoskeletal system (muscles, bones, or joints), leading to abnormal movement at a walk, trot, or canter.

Some causes of equine lameness:
- abscesses in the foot
- hoof wall damage
- laminitis or inflammation of the foot
- strained tendons or joints
- bone chips
- fractures
- arthritis (inflamed joints)
- back pain
- nerve damage
- muscle soreness
- wounds, cuts, and bruises

Diagnostic Tests
Diagnosis of lameness is a lot like detective work, since it often involves a process of elimination of potential problems. This process requires patience and methodic thoroughness by you and your specialist. Challenging lamenesses may take several days to investigate and are even more difficult to evaluate once they become chronic. Horses may develop compensatory gait strategies to deal with lameness that may compound the abnormal gait and complicate its evaluation, so it is important to have your horse evaluated promptly.

History: Typically a thorough history will be collected at the beginning of your visit to a referral facility. Knowledge of the sport you are engaged in is most helpful when doing a lameness exam, so it is important to select a veterinarian with knowledge of your specific interest, whether this is dressage, jumping, or barrel racing, or trail riding.

Physical Examination: After taking a detailed history, your specialist will take some time to evaluate your horse standing, first from a distance and then close-by. This is called a "static" examination and involves a critical look at your horse's conformation and attitude. The veterinarian will exam your horses feet, including use of hoof testers (Figure 1), and will palpate (feel) the legs for joint swelling, lumps, bumps, and warm or tender areas.
Figure 1: Hoof testers are applied across the hoof wall and the bottom of the hoof to check for painful areas.

A "dynamic" investigation is then performed to evaluate the horse's gait. Usually this is done under several conditions, depending on your horse's suspected problems. Your specialist may require your horse to be lunged, trotted, hand walked, or ridden on soft and hard ground.

Flexion Test: Following static and dynamic exams, stress tests are often performed to increase the severity of the lameness. The most common stress test is a flexion test, which is very helpful when the lameness is subtle or when no external signs of a problem can be detected (Figure 2). Typically, flexion tests involve stressing a joint (by bending or "flexing" it) for 30 seconds to two minutes. The horse is then trotted for a distance of about 40-50 yards to see if the lameness is more severe. At the end of the stress test, your specialist may have detected which area of the horse's body is the source of the problem and will concentrate on it during the rest of the exam.

Figure 2: The horse's leg is held in a bent position to stress the joint. The horse is then examined at a trot to see if it is more lame.
Nerve or Joint Blocks: To determine the specific location of the lameness, nerve or joint blocks with local anesthetic may be performed (Figure 3). Anesthetic blocks reduce or eliminate the lameness by anesthetizing a joint or a small region of your horse's leg. An accurate knowledge of anatomy is required to interpret these diagnostic "blocks". Once the lameness disappears, your veterinarian will then have narrowed the problem so that other imaging tests such as radiographs or ultrasound can be used. While "blocking" a nerve subcutaneously has hardly any side effects, joint blocks must be performed under sterile conditions because of the risk of introducing bacteria into the joint. This complication, known as septic or infectious arthritis, is an unusual but serious potential side-effect of intra-articular injections. Occasionally, the process of "blocking" will be by-passed and imaging diagnostics will be performed, particularly if the affected region is already identified.

Figure 3: Nerves to a portion of the foot are blocked with a local anesthetic to see if the lameness resolves.

Radiographs (x-rays): Radiographs are often used to show changes in bone and joint surfaces (Figure 4). With many conditions, such as arthritis, visible bone changes are not present early in the disease and therefore radiographs may not help determine the cause of the lameness. Radiographs that are of poor quality may often be non-diagnostic and will need to be retaken under better conditions. Many ACVS Veterinary Surgeons have digital radiography- computerized x-rays- that allow the specialist to enlarge problem areas and highlight them, making them easier to read.
Figure 4: The technician holds an x-ray plate behind the horse's leg so that a radiograph can be taken. Horses may need to be sedated so they stand quietly for the x-ray.

Ultrasonography: Ultrasound- the use of sound waves to evaluate the thickness and character of tissues- is often helpful for looking at tendons and other soft tissues.

Scintigraphy: Bone scan or scintigraphy is a test that uses radioactive material to identify the general region of the body causing the lameness. Bone scans are usually performed before nerve or joint blocks and in horses where the lameness may be very subtle or intermittent or when a non-displaced fracture (for instance, a small crack) is suspected. Once the abnormal region is identified, the area is usually imaged with other methods (i.e. radiographs) to determine the specific problem. Scintigraphy is safe for horses but requires special facilities to protect the people that are administering the test or caring for the animal.

Magnetic resonance imaging (MRI): Magnetic resonance imaging is revolutionizing the field of equine diagnostic imaging and orthopedics. MRI scans use magnetic fields to create images of the tissues inside the body (Figure 5). Image quality is related to the strength of the machine, which is measured in a unit called a "Tesla". The traditional MRI has a strength of 1 to 1.5 Tesla and therefore produces high-quality images. However, because of its tube shape, it requires general anesthesia and a facility designed especially for horses (Figure 6). "Open" magnets are "U-shaped, allowing the horse to stand inside of the ring. This type of MRI machine typically has less than half strength of the traditional machine (usually < 0.5 Tesla) and therefore produces lower-quality images. Interpretation of MRI images requires advanced training and experience.

Figure 5: MRI of a horse's foot. This horse had boney reaction and tendon inflammation along the back of the foot that was not visible on regular x-rays.
When to seek referral

In order to properly investigate the cause of lameness, veterinarians must have a thorough knowledge of the mechanisms and anatomical structures behind a horse's movement. Board-certified ACVS Veterinary Surgeons have received formal training in diagnosing and treating orthopedic problems and understand the mechanics behind an abnormal gait. ACVS Diplomates usually work in a referral hospital where your horse can benefit from the most advanced and sophisticated diagnostic tools, and where a variety of treatment options are available.

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