Equine Lameness Examination

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Learning Outcomes

1) Recognize that lameness in not a disease but rather a clinical sign of disease.
2) Discuss the differences in subjective and objective lameness assessment modalities.
3) Compare and contrast the grades of the AAEP lameness scale.
4) Describe the importance of diagnostic local anesthesia in the equine lameness examination.
5) Apply the steps of an equine lameness to a clinical lameness scenario.

Introduction

Although performance is not required of all horses, many owners routinely expect their horse to execute some level of work on a regular basis. The intensity of work may vary from owner to owner, but one commonality exists: lameness is the most common ailment that inhibits a horse's ability to perform. In fact, lameness is estimated to cost American horse owners over a half a billion dollars every year. Lameness can be described as an abnormal way of going usually noted by asymmetry of movement from side to side; however, lameness is not a disease itself. Rather, it is a clinical sign manifesting from pain or dysfunction of the locomotor system. Localizing the source of lameness can be especially challenging, even for the experienced practitioner. The following describes a comprehensive lameness examination process consisting of seven elements the author uses in clinical practice and in the instruction of veterinary students.

Signalment and History

An equine lameness examination begins with the veterinarian recognizing the signalment of the horse to be examined, especially the age of the horse and its current and prior use. Some specific musculoskeletal diseases and injuries are common to certain horse demographics. For example, younger horses are more likely to display lameness from developmental orthopedic diseases, while older horses are more likely to suffer from osteoarthritis. Additionally, horses used for flat racing are predisposed to a different array of musculoskeletal disorders than those used for western performance events.

Along with signalment, obtaining a complete history is very important when evaluating a horse for musculoskeletal disease. Depending on the scenario and type of horse, all or part of the history may be obtained from the owner, trainer, jockey, primary care veterinarian, or other individual familiar with the horse. Pertinent historical details might include the duration of the lameness, the circumstances when the lameness was first observed, whether the lameness has improved, worsened, or stayed consistent, what, if any, treatments have been initiated, and what was the perceived impact of any treatments on the lameness. Other important historical information may relate to the horse's housing, activity, travel, diet, shoeing/trimming, and prior medical treatments or surgical procedures.

Physical Examination

A thorough general physical examination should be performed as a part of any lameness examination. In addition to the musculoskeletal system, the cardiopulmonary and neuromuscular systems should be closely evaluated. Auscultation of the heart and lungs from both sides of the thorax is important. A rebreathing examination may be indicated, especially if the horse is presenting with a history of poor performance unrelated to an obvious lameness. Muscle symmetry, stance, conformation, and hoof quality and balance should be evaluated. Superficial and deep palpation of the entire spine should be performed noting any pain, swelling, or heat. All four limbs should be palpated both in weight bearing and non-weight bearing positions evaluating the range of motion of all joints. If the horse is shod, the type of shoe and the quality of shoe application should be assessed. Comparisons should be made from side to side noting differences in size, temperature, and sensitivity to palpation.

Hoof Tester Examination

Hoof testers are a large caliper-like instrument used to apply pressure/compression to the hoof capsule and sole. A normal adult horse free of digital pathology/pain will not display a withdrawal (painful) response when hoof testers are applied correctly, thus any adverse response to the pressure is abnormal. If a painful area(s) is identified, the pressure should be reapplied to that specific location to verify the response. If an area consistently yields a painful response, it should be closely inspected for cracks/defects. Painful defects in the sole may need further inspection by paring out the area using a hoof knife. When applying hoof testers, it is important to make sure pressure is not being

applied at or above the coronary band (on the skin). This will always elicit a painful response which is not indicative of hoof sensitivity, rather user error.

Baseline Gait Assessment

Most often, the gait assessment is performed with the horse in hand, led by an assistant; however, it may also be carried out while the horse is ridden or, less commonly, with the horse free in a small paddock. Evaluating a horse's gait for lameness is best performed when the horse is jogging (trotting or pacing). The trot/pace is a two-beat gait and is the only gait that is (or should be) symmetrical from side to side. Ideally, the gait evaluation is performed on a firm surface that is large enough to evaluate 20-30 consecutive strides in a straight line and a circular arc of 15-20 strides in both directions.

Subjective Gait Assessment

Traditionally, lameness (or soundness) is subjectively assessed. Veterinarians who routinely evaluate the gait of horses develop a keen eye which often allows them the ability to recognize even the mildest of lameness. Once a lameness is identified in a specific limb(s), the severity of the lameness is assigned by application of a 0-5 lameness grading scale developed by the American Association of Equine Practitioners in which a grade of 0 is not lame and a 5 is non-weight bearing lame.[1] Becoming proficient at recognizing lameness takes practice and requires knowledge of what is a "normal," non-lame gait. Confidence and competence are obtained by watching the movement of many, many horses, both sound and lame. In general, the more experience one has in lameness diagnosis, the more proficient they are. However, it is important to note that subjective gait assessment is the opinion of the observer. Research has shown that much discrepancy can exist between even experienced veterinarians as to the severity and even sometimes which limb displays a lameness when different observers are subjectively evaluating the same horse. Fortunately, there are technologies that can provide objective information to assist the veterinarian in the task of lameness detection.

Objective Gait Assessment

The symmetry of a horse's gait can be objectively evaluated in two ways, kinetics and kinematics. Kinetics is the study of the forces of motion, whereas kinematics studies the geometry of motion. The forces applied by a limb to the ground can be measured by jogging a horse across a pressure plate. In a sound horse, the ground reaction forces measured should be nearly equal from side to side (LF vs. RF, LH vs. RH), but in a unilaterally lame horse the forces applied to the lame limb will generally be consistently less. Although force plate assessment is considered the "gold standard" for equine lameness detection, clinical application of this modality is challenging.

Body-mounted inertial sensor systems have shown promise and clinical applicability in the evaluation of equine lameness. These systems use kinematics to determine asymmetries in movement comparing one limb to its contralateral counterpart. The author uses one such system[a] in combination with subjective assessment for the majority of clinical lameness evaluations. Asymmetry is reported as numerical data in a standardized report including an analysis of lame limb and severity of lameness. Some degree of asymmetry in movement is expected as no horse moves in perfect symmetry. Thresholds have been established to guide what degree of asymmetry may be significant, indicating lameness, and what is normal variation. As with the subjective assessment, results of the inertial sensor assessment should be interpretated in combination with the other aspect of the lameness examination to determine their significance.

In the author's opinion, neither subjective evaluation nor inertial sensor assessment is superior to the other when performing an equine gait assessment. Although they both provide valuable information, they both also have inherent flaws and limitations. However, when subjective assessment and inertial sensor assessment are used in combination, a more thorough gait assessment can be made versus using either one alone.

Flexion Tests

Flexion or stress tests are used to evaluate the response to increased stress/pressure on a specific region of the limb for a set period of time, usually between 30-90 seconds. The horse is then immediately jogged and the degree of lameness following flexion is compared to that observed in the baseline gait assessment. There is no universal scale to score the response to flexion tests. The author assigns a score to each flexion test using a 0-3 scale where 0 is no change and 3 is a severe worsening of lameness. An inertial sensor system[a] can also be used to assess the response to individual flexion tests.

Although many types of flexion/stress tests may be utilized by equine practitioners, those performed more commonly in both the fore and hind limbs are classified as lower and upper limb flexion tests. For both the fore and the hind limb, the lower limb flexion involves lifting the limb from the ground and placing the fetlock, pastern, and coffin joints into extreme flexion while keeping the cannon bone perpendicular to the ground (Figures 1 & 2). The upper limb flexion in the forelimb involves grasping the limb in the mid-cannon area, flexing the limb at the carpus

Figure 1: Performing a forelimb lower limb flexion test.

Figure 2: Perfuming a hind limb lower limb flexion test.

and lifting the limb upward. (Figure 3). This places the carpus in extreme flexion and also applies some flexion to the elbow and shoulder joints. The upper limb flexion in the hind limb, also called the "spavin test", is performed by grasping the plantar fetlock area and pulling the limb up and forward under the horse until the metatarsus is approximately parallel to the ground. (Figure 4.) It is especially important not to abduct the limb when performing the hind limb upper limb flexion test. Additionally, care should be taken to not apply significant stress to the joints of the upper limb during the lower limb flexion and vice versa.

Figure 3: Performing a forelimb upper limb flexion test.

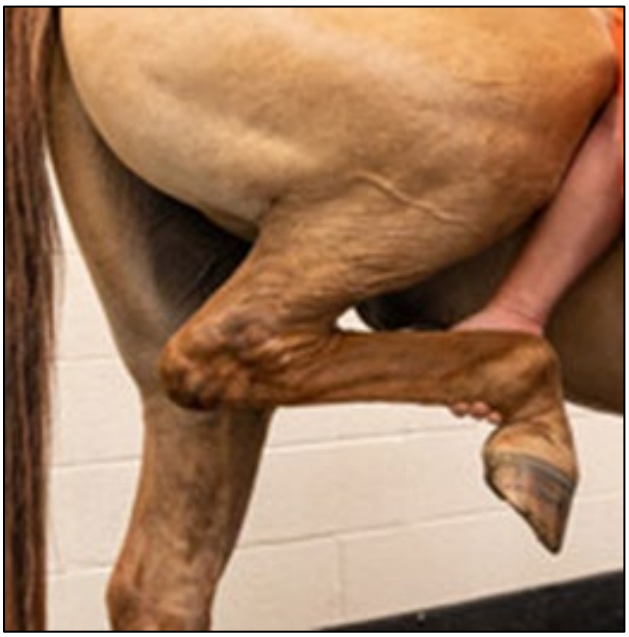

Figure 4: Performing a hind limb upper limb flexion test

Diagnostic Local Anesthesia

Diagnostic local anesthesia is usually performed to localize a lameness to a specific anatomic location of the limb. There are two classifications of diagnostic local anesthesia: perineural (nerve blocks) and intrasynovial (joint blocks). Local anesthetic medications inhibit nerve conduction by blocking the fast sodium channels. The most common local anesthetic agent used for equine diagnostic local anesthesia is mepivicaine HCL (20mg/mL) but lidocaine HCL or bupivacaine HCL are also used. Diagnostic local anesthesia should not be performed in extremely lame (grade 4-5/5) horses unless a fracture has been ruled out by other parts of the lameness examination. Hairline fractures can become complete if the horse is jogged following diagnostic local anesthesia. Local anesthetic medications are also prohibited in most racing/show competitions and diagnostic local anesthesia should not be performed in performance horses that intend to compete in the near future.

Perineural Anesthesia (Nerve Blocks)

Perineural anesthesia of a limb should be performed from distal to proximal. The nerve blocks most commonly performed by the author during a lameness examination include the palmar digital, dorsal branches of the palmar digital, abaxial (basilar) sesamoid, low-4-point, high-4-point, suspensory origin, and median/ulnar/musculocutaneous in the forelimb and the abaxial (basilar) sesamoid, low-6-point, deep lateral plantar, and peroneal/tibial in the hind limb. These nerve blocks and others are described in detail elsewhere.[2,3] The time of onset and effectiveness of perineural anesthesia depends greatly on the volume of local anesthetic used and accuracy of its deposition, as well as individual horse variables. The absence of skin sensation of the intended area of anesthesia can indicate a successful block, but this is not always accurate. Depending on the block performed, the author generally waits ~5-10 minutes following administration of the block to assess the effect. The gait analysis (both subjective and objective) is then repeated and compared to what was observed pre-block. An improvement in lameness that is considered clinically significant indicates the lameness, or at least a significant portion, is due to pathology/pain from the anesthetized area.

Intrasynovial Anesthesia (Joint Blocks)

Intrasynovial anesthesia can be performed in any synovial compartment (joint or tendon sheath) of the limb or axial skeleton. Following aseptic preparation of the needle insertion site, local anesthetic is injected directly into the synovial space. Accurate placement of the needle can be verified if synovial fluid is observed exiting the needle; however, the failure to obtain of synovial fluid does not always indicate incorrect needle placement. Joints most commonly anesthetized by the author during a lameness examination include the distal interphalangeal, proximal interphalangeal, fetlock, carpal, tarsal, and stifle joints. These synovial compartment blocks and others are described in detail elsewhere.[2,4] The gait analysis (both subjective and objective) is then repeated and compared to what was observed pre-block. Depending on the synovial compartment, the author generally waits approximately 10 minutes following administration of the block to assess the effect. The effect is also assessed at approximately 20 minutes. An improvement in lameness that the observer considers clinically significant indicates the lameness, or at least a significant portion, is due to pathology/pain within the anesthetized synovial compartment. It is important to note that the degree of improvement observed with intrasynovial anesthesia is generally less than that observed following perineural anesthesia, thus clinical expectations should be set accordingly.

The diagnostic local anesthesia method used first is often dependent on the other findings of the lameness examination, opinion/experience of the veterinarian, and temperament of the horse. Perineural anesthesia is overall less technically challenging, requires less aseptic preparation, and has a lower chance of significant complications such as septic arthritis, thus is performed more commonly during a routine lameness examination. Intrasynovial anesthesia is performed more commonly for lameness localized to the upper limb or to further evaluate a lower limb lameness previously localized with perineural anesthesia.

Diagnostic Imaging

Once an anatomic area presumed to be causing the lameness is identified, diagnostic imaging modalities should be used to evaluate the bones and/or soft tissue structures. Radiography and ultrasonography are the two more common imaging modalities used in general equine practice, but advanced imaging modalities such as computed tomography, magnetic resonance imaging, and nuclear scintigraphy are often utilized. In some cases, multiple imaging modalities may be required to make a complete diagnosis. Acquiring quality, diagnostic images is very important in making a correct and complete diagnosis. In some instances, consultation with an imaging specialist may be indicated to identify very subtle or unusual abnormalities.

Summary
Equine practitioners are often called on to perform lameness examination on horses of various ages and disciplines. Performing a systematic examination using the steps listed above will often guide the practitioner to a correct diagnosis. Recognizing lameness, especially subtle asymmetries, can be difficult and often requires repetitive gait assessment of many horses to become proficient. Fortunately, objective lameness assessment tools are available (inertial sensor systems) to aid both novice and experienced practitioners. Lameness is not a disease, only a clinical sign of disease or injury that must be thoroughly investigated to find the cause. An accurate diagnosis of the cause of lameness is necessary for any treatment protocol to be successful.

Footnotes

[a] Equinosis Q with Lameness Locator, Equinosis LLC, Columbia MO, USA (www.equinosis.com)

References

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