Pitfalls of lameness evaluation

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Introduction

Lameness evaluation is a subjective assessment of asymmetrical movements of the horse. Interpretation is based on clinician experience and biases. Following lameness assessment, the clinician may decide to try and eliminate the observed lameness using diagnostic analgesia techniques. Interpreting the results of diagnostic analgesia can be complicated and the clinician should be aware of pitfalls in interpretation of diagnostic analgesia that may lead to an inaccurate diagnosis and treatment strategy.

Interpreting results of diagnostic analgesia can be especially challenging when:

- Lameness is subtle and inconsistent
- Lameness is improved with work
- Lameness is exacerbated with work
- Bilateral or multi-limb lameness
- Clinician bias (Expectation or desire for a certain result)
- Horse behavior (Sedation)
- Accuracy and specificity of administration of local analgesia
- Inaccurate interpretation when "checking" the block (Check for loss of skin sensation, hoof tester response, and/or loss of avoidance behavior to digital palpation of a structure)
- Presence of aberrant nerves or unexpected joint communication
- Mechanical restrictions to the gait
- Severe pain
- Ridden examination is performed

Challenges in identification of lameness

It is imperative that the clinician perform a thorough lameness evaluation that is sufficient to work the horse to identify changes that occur to the lameness after work. Lameness evaluation should consist of assessment on a straight line on hard and soft ground as well as lunging exercise on soft and hard ground. Flexion tests are performed as a method to stress regions of the limb (Lower vs. Upper) and identify changes in lameness to localize a region of pain within the limb and guide diagnostic analgesia techniques. It is important that the clinician evaluate the horse on a straight line after lunging exercise to "reset" their baseline lameness. Some lameness will become more or less apparent with work and it is important to recognize this before performing diagnostic analgesia. Following diagnostic analgesia, the horse should be re-evaluated under the conditions in which the lameness was the most consistent and apparent (soft vs. hard, straight vs. lunge, exercise vs. rest, unridden vs. ridden). This can be challenging when the horse gets worse with work and the horse is allowed periods of rest for the blocking procedure and to allow time for the block to take effect.

Subtle lameness can also be exacerbated by watching the horse while being ridden. The weight of the tack and rider as well as the rider ability will affect (improve or worsen, usually worsen) the lameness.

Lameness in more than one limb can lead to compensatory movement that can either make the lameness more or less apparent. Bilateral lameness in the fore or hind end may result in the horse showing limited lameness and may require diagnostic analgesia of one limb to allow the other limb's lameness to become more apparent. Additionally, because lameness is evaluated during the trot (symmetrical, diagonally paired gait) compensatory mechanisms can be mistaken as a lameness. Uneven

loading of the forelimb will result in uneven loading of the hindlimb. Lameness evaluation is done at the trot, therefore, if the primary lameness is in one of the forelimbs the horse will shift its weight from the unsound forelimb to the contralateral hindlimb leading to false interpretation of lameness due to an increase in the motion of the pelvis leading to false interpretation of a contralateral hindlimb lameness. (Decrease in impact loading of the ipsilateral HL and increase in push off the contralateral HL). If the primary lameness is in the hindlimb, the horse will shift its weight toward the contralateral forelimb, the horse's head and neck then move downward when the contralateral forelimb strikes the ground due to the shift of the weight from the contralateral hindlimb and then will more the head and neck upward when the ipsilateral forelimb then strikes the ground leading to false interpretation of an ipsilateral forelimb lameness. This effect is greatest when the primary lameness is hindlimb lameness, i.e. mild HL lameness may cause forelimb compensatory lameness, but only moderate to severe FL lameness will cause a compensatory HL lameness. Understanding these compensatory mechanisms will help guide the clinician on the "primary" lameness when there are multi-limb asymmetries to be addressed. If the primary lameness can be abated with diagnostic analgesia, then assessment of the secondary lameness being a true lameness or just due to compensation is established.

Patient behavior and patient handling are other factors to consider when evaluating subtle lameness. Horses that are fractious can be difficult to evaluate lameness due to inconsistent abrupt head and neck as well as pelvic movement. Sedatives may be used to aid lameness evaluation in these horses, but their use should be limited, and dosing should be based off current research to limit analgesia and gait alterations. Typically, if used low doses are recommended (Xylazine 0.1-0.2 mg/kg, Detomidine 0.002 -0.003 mg/kg, Acepromazine 0.02-0.04 mg/kg) and have been shown to have little effect on lameness parameters. If used, it would be recommended to evaluate the lameness if possible before and after administration and that the clinician keep in mind the duration of effect of these medications considering the duration of the lameness assessment and needs of diagnostic analgesia. There is also a subset of patients that are refractory and/or are too dangerous to perform diagnostic analgesia. This poses a challenge for the clinician and the clinician must decide if they can have localized the lameness enough with the lameness evaluation that they can proceed to imaging and/or treatment or if the patient needs to be heavily sedated for safety while "blocking" of the nerves or joint are performed in one location with a local anesthetic that is "long acting" to allow the horse to wake up from sedation and allow lameness assessment. This prolongs lameness evaluation significantly if more than one block must be performed. The clinician would also have greater concerns about analgesic effects with repeat heavy sedation and alterations in gait.

Effect of clinician bias

There are a multitude of biases that can affect a clinician's interpretation of the lameness examination. The provided history and complaints of the owner/trainer's may bias the clinician toward a particular limb and/or region of interest. Additionally, examination of the horse prior to lameness evaluation may lead the clinician to overinterpret musculoskeletal findings and bias the clinician toward a limb and/or region of interest (Asymmetrical effusion, conformational abnormalities, etc.). Detection in improvement of the lameness can also be biased by the clinical examination of the horse as well as clinician fatigue (time of day, scheduling pressures, complicated multi-limb lameness), owner bias and/or pressure, horse behavior, consistency and skill of the handler.

Diagnostic Analgesia

When performing diagnostic analgesia most clinicians will consider a 70% improvement in lameness following peripheral neural analgesia and 50% improvement following synovial analgesia to be positive. The more subtle and inconsistent the lameness, the more difficult observation and interpretation in

improvement of lameness will be. The agreement among clinicians in improvement of subtle lameness following diagnostic analgesia has been shown to be poor.
Accuracy of the injection (perineural or synovial) is the first important step in diagnostic analgesia. Therefore, the clinician must be aware of anatomy and current standards for methods of perineural and synovial injection. For perineural injection, the needle can inadvertently be placed in a vessel, lymphatic vessel, or even a synovial structure. Ideally the local anesthetic would be deposited within the perineural fascia. For synovial structures, presence of synovial fluid confirms accurate injection, but ease of injection and/or presence of back pressure after injection may also help the clinician conclude that the local anesthetic has been deposited correctly into a synovial space.

When performing diagnostic analgesia, you want to use the lowest volume of local anesthetic possible to reduce proximal migration of local anesthetic. Additionally, the clinician should evaluate the horse within 5-10 mins of local anesthetic deposition. Local anesthetic can also leak or diffuse from a site. For example, when anesthetizing the distal interphalangeal joint, the neurovascular bundle may be blocked due to its proximity. Other examples include the metacarpophalangeal joint, digital flexor tendon sheath or stifle joint leading to anesthesia of the foot.

Determining if the block has been effective can be challenging, particularly in the upper limb. Efficacy of perineural analgesia is evaluated by loss of skin sensation and/or hoof tester response. Skin sensation is relayed by different nerves than those that relay pain and/or deep pain. These differences can lead to differences in loss of timing of sensation, i.e. the horse can lose skin sensation, but loss of deep sensation has not occurred due to need for more time for the nerve to be affected by the local anesthetic. Due to this difference in timing of sensation loss, it is possible for a horse to be evaluated and to be considered unchanged then move up the limb. When deep sensation is lost another more proximal block has been performed, the horse goes sound and the interpretation of the evaluator is the horse improved due to desensitization of the more recent region of analgesia.

Other conditions that can lead to misinterpretation of diagnostic analgesia can occur if there is aberrant anatomy (nerves and/or joint communication), subchondral bone pain, severe or chronic pain, or a mechanically restrictive gait.

Lameness identification
Uneven loading of the forelimb will result in uneven loading of the hindlimb. Lameness evaluation is done at the trot, therefore, if the primary lameness is in one of the forelimbs the horse will shift its weight from the unsound forelimb to the contralateral hindlimb leading to false interpretation of lameness due to an increase in the motion of the pelvis leading to false interpretation of a contralateral hindlimb lameness. (Decrease in impact loading of the ipsilateral HL and increase in push off of the contralateral HL). If the primary lameness is in the hindlimb, the horse will shift it's weight toward the contralateral forelimb, the horse's head and neck then move downward when the contralateral forelimb strikes the ground due to the shift of the weight from the contralateral hindlimb and then will more the head and neck upward when the ipsilateral forelimb then strikes the ground leading to false interpretation of an ipsilateral forelimb lameness. This effect is greatest when the primary lameness is hindlimb lameness, i.e. mild HL lameness may cause forelimb compensatory lameness, but only moderate to severe FL lameness will cause a compensatory HL lameness.

The lameness evaluation is wrought with challenges. An astute clinician aware of these challenges will do their best to minimize them. Tools to help the clinician with evaluation of lameness include video capture and objective data. It is important that the clinician uses these tools to guide the diagnosis and that the clinician be aware of the expected improvement following treatment. If treatment does not result in the expected improvement the clinician should be critical of the lameness evaluation and

consider regional anatomy and/or additional diagnostic analgesia as well as advanced imaging to aid in further diagnosis.

References available upon request from Lindsey Boone at lhb0021@auburn.edu