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HOW TO PERFORM BASIC NERVE BLOCKS IN THE FIELD

Harry W. Werner VMD 13th WEVA Congress October 4, 2013

Introduction

Perineural anesthesia of regions of the equine limb is commonly performed to facilitate standing surgery and wound exploration, to temporarily ameliorate pain and to diagnose lameness.

The proper use of diagnostic anesthesia to localize the source of pain in a lame horse is an essential skill for the equine practitioner. Diagnostic anesthesia should be performed with minimal risk of injury to horse or people and in a manner that allows for accurate interpretation of the patient's response to the procedure. Subsequent decisions regarding diagnostic imaging, treatment, aftercare and prognosis are all predicated upon the presumed anatomic source of pain.

Today's presentation will discuss basic perineural anesthesia (nerve blocks) of limb regions distal to the carpometacarpal and tarsometatarsal joints. [Equine Joint Injection and Regional Anesthesia](#) (William Moyer, John Schumacher and Jim Schumacher) is an invaluable reference and practical guide for performing diagnostic anesthesia. With the authors' permission, I have used this publication and some of its images to construct this presentation. While, due to time constraints, I am not covering intraarticular anesthesia in this presentation, the aforementioned text provides excellent coverage of peripheral nerve and intraarticular anesthesia.

Safety

Proper technique when performing diagnostic anesthesia minimizes risk of injury to the horse, the veterinarian and those handling the patient. Examples of physical restraint options, in ascending order of severity, which can be useful when performing diagnostic anesthesia include:

- sensory distraction (touch, sound, taste, visual)
- skin twitch
- leg up
- lip twitch
- mouth chain
- nose chain
- gum chain
- single leg hobble

When attempting hind limb injection in a fractious patient, one can consider attaching a short extension set to the needle prior to insertion of the needle. This action facilitates subsequent injection of anesthetic solution without requiring further manipulation of the needle hub.

Chemical restraint, when necessary, can be achieved without masking signs of lameness¹ via intravenous injection of one to two milligrams of detomidine hydrochloride. However, one must remember that a small, but significant, percentage of horses

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sedated with alpha 2 adrenergic agonists will respond suddenly and violently to noxious stimuli. Before administering any sedative, the author always informs the owner/agent that sedatives are considered forbidden substances in competition horses.

Site Preparation

While the risk of infection subsequent to perineural injection is relatively low, infection can and does occur. Therefore, it is prudent for both clinical and medicolegal reasons to perform appropriate site preparation prior to injection. Furthermore, the risk of inadvertent injection into a synovial cavity (joint or tendon sheath) is often present when performing perineural injections. The consequences of such infections can be severe.

For most perineural injections, the author simply wipes the site clean with 70% isopropyl alcohol-soaked swabs. When administering blocks in close proximity to synovial cavities, the author performs a site prep using 7.5% povidone iodine scrub followed by an isopropyl alcohol rinse.

Specific blocks close to synovial cavities include:

- low palmar nerve block (fetlock palmar pouches)
- lateral palmar nerve block distal to accessory carpal bone (carpal canal)
- high plantar nerve block (tarsometatarsal joint and tarsal sheath)

The author does not routinely glove or clip hair for perineural injections. However, clipping may be necessary in some cases to facilitate accurate palpation of anatomic landmarks. We obtain permission from the owner or designated agent to clip the injection area prior to clipping a competition horse for nerve block.

Procedures

Needle choice, volume and choice of anesthetic agents and injection techniques for perineural anesthesia may vary among equine practitioners. The author's preferences are as follows:

- Regarding choice of anesthetic agent, three drugs are commonly used: 2% mepivacaine hydrochloride, 2 % lidocaine and 0.5% bupivacaine. Bupivacaine has been reported to possibly cause chondrocyte toxicity. Duration of action with mepivacaine (90 to 120 minutes) is greater than that of lidocaine (30 to 45 minutes). The author uses mepivacaine exclusively in nerve blocks. Before performing the procedure, the author always informs the owner/agent that local anesthetics are considered forbidden substances in many competition horses.
- A thorough knowledge of the anatomy at and around the injection site is essential, as nerve block accuracy depends on appreciation of nearby anatomic landmarks. Insertion of the needle should be swift with the needle detached

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from the syringe. The author uses non-locking syringes onto which a needle can be easily slipped on and off. This technique avoids the potential problem of creating unnecessary discomfort for the horse at the injection site should the syringe be used inadvertently as a lever. If repeated needle placement is necessary, a new needle should be used every time.

- Finally, the volume of anesthetic agent injected should be the minimum amount that the veterinarian considers to be effective. Injecting excessive volumes of anesthetic agents risks diffusion of the drug into neural tissue unassociated with the intended target(s) and, as such, easily leads to false positive resultsⁱⁱ.
- The author first examines the horse in motion three minutes after injection and then every three minutes up to a total of 15 minutes or ablation of lameness. In the author's opinion, whether or not to walk the horse while waiting to assess the block is irrelevant to the interpretation of the nerve block's effect.

Palmar/Plantar Digital Nerve Block

Needle and anesthetic volume = 25 gauge, 5/8" (1.6 cm); 1.5 ml per site.

With the limb held and the operator facing the horse's rear, the needle is placed in a distal vector over the palmar/plantar aspect of palpable vein/artery/nerve bundle with entry 1/4" proximal to collateral cartilage. Loss of skin sensation over the heel indicates a successful block.

This block anesthetizes the distal interphalangeal joint, the sole and the navicular structures and soft tissues of the heel.

In some cases, the block may also desensitize the digital portion of the deep digital flexor tendon and/or the proximal interphalangeal joint (incompletely).ⁱⁱⁱ

In a hind digit, desensitizing the dorsal aspect of the digit requires additional blocking of the dorsal metatarsal nerve.

Pastern Semi-Ring Block

Needle and anesthetic volume = 22 gauge, 1" (2.5 cm); 1 ml per site.

With the limb held and the operator facing the horse's rear, insert the needle into the palmar/plantar mid-pastern perpendicular to the long axis of the pastern and direct the needle dorsally.

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This block anesthetizes the entire foot, including the dorsal aspect not affected by the palmar/plantar digital nerve block. It offers the advantage of avoiding the inadvertent desensitization of the fetlock joint that can sometimes occur with the abaxial (aka - basal) sesamoid block.^{iv}

Abaxial (aka - Basal) Sesamoid Nerve Block

Needle and anesthetic volume = 25 gauge, 5/8" (1.6 cm); 1.5 ml per site.

The neurovascular bundle is easily palpated along the abaxial surface of each sesamoid bone. With the limb held and the operator facing the horse's rear, the needle is placed at the base of the sesamoid bone and directed distally.

This block anesthetizes the:

- foot
- second phalanx
- proximal interphalangeal joint
- digital annular and distal sesamoidean ligaments
- distal superficial and deep digital flexor tendons^v

Additionally, the palmar/plantar aspect of the fetlock joint can sometimes be desensitized.

Loss of skin sensation at the dorsal coronary band indicates a successful block.

Low Palmar/Plantar Nerve Block:

Needle and anesthetic volume = 25 gauge, 5/8" (1.6 cm); 3 ml per palmar nerve site, 1 ml per palmar metacarpal nerve site.

With the horse bearing weight, one needle is inserted into the palpable groove between the palmar/plantar aspect of the suspensory ligament and the dorsal surface of the deep digital flexor tendon, just distal to the ramus communicans. A second needle is inserted proximally and medially from the distal end of the second or fourth metacarpal/metatarsal bone onto the palmar/plantar periosteum of the third metacarpal/metatarsal bone.

This block desensitizes the fetlock joint and all structures distal to it. Insensitivity of skin over the dorsal pastern and, usually, the dorsal fetlock indicates a successful block.^{vi}

High Palmar Nerve Block:

Needle and anesthetic volume = 25 gauge, 5/8" (1.6 cm); 3 ml per site.

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This block requires desensitizing both the palmar nerves and the palmar metacarpal nerves.

With the horse bearing weight, insert the needle just distal to the carpometacarpal joint and perpendicular to the palmarolateral or palmaromedial aspect of the limb, advancing the needle to the dorsal surface of the deep digital flexor tendon and location of the palmar nerve.

To block the palmar metacarpal nerve, the limb is held in hand. Again, just distal to the carpometacarpal joint, the needle is inserted between the axial surface of the splint bone and the palmar third metacarpal bone.

This block anesthetizes the:

- deep and superficial digital flexor tendons
- splint bones and their interosseous ligaments
- proximal suspensory ligament
- inferior check ligament^{vii}

Lateral Palmar Nerve Block:

Needle and anesthetic volume = 25 gauge, 5/8" (1.5 cm); 2 ml

With the horse bearing weight on the limb, insert the needle mediolaterally into the distal third of the longitudinal groove palpable at the medial aspect of the accessory carpal bone. Advance the needle tip to bone before injecting the anesthetic solution.

This block reliably anesthetizes the proximal suspensory ligament without inadvertent risk of entering the carpal canal.^{viii}

High Plantar Nerve Block:

Needle and anesthetic volume: 25 gauge, 5/8" (1.5 cm) per plantar nerve site; 22 gauge, 1.5" (3.8 cm); 3 ml per site.

With the horse bearing weight, anesthetize the plantar metatarsal nerve by inserting the needle one centimeter below the tarsometatarsal joint and axial to the splint bone. Advance the needle to bone and deposit the anesthetic.

The plantar nerve is anesthetized by needle insertion to the dorsal surface of the deep digital flexor tendon from the groove between the suspensory ligament and the tendon.

Completion of the block occurs by blocking the dorsal metacarpal nerves at the dorsolateral and dorsomedial aspects of the third metatarsal bone.

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This block will desensitize the limb distal to the tarsometatarsal joint. However, it risks inadvertent injection of the tarsal sheath and the tarsometatarsal joint.^{ix}

Deep Branch of the Lateral Plantar Nerve Block:

Needle and anesthetic volume: 22 gauge, 1" (2.5 cm); 5 ml.

With the gaskin resting on the operator's thigh, the hock and stifle are flexed at 90° and the fetlock is held in full flexion. Pushing the superficial digital flexor tendon medially, insert the needle perpendicular to the skin just below the head of the fourth metatarsal bone. Advance the needle its full length between the axial border of the fourth metatarsal bone and the lateral border of the superficial digital flexor tendon before injecting.

This block will reliably desensitize the proximal suspensory ligament.^x

Conclusions

Acquiring a thorough knowledge of anatomy and perfecting one's perineural injection techniques will facilitate accurate localization of pain when performing diagnostic lameness examinations. These skills will greatly enhance the value of one's diagnostic images and allow you to recommend treatment and aftercare that are in the best interest of the horse and the client. Attention to detail is essential to avoid horse and/or human injury and to minimize the risk of post-injection complications.

ⁱ Buchner HH et al. Sedation and antisedation as tools in equine lameness examination. *Equine Vet J* supplement 1999;30:227-230.

ⁱⁱ Nagy A et al. Diffusion of contrast medium after perineural injection of the palmar nerves: an in vivo and in vitro study. *Equine Vet J* 2009; 41: 379-383.

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^{iv} Sack WO. Nerve distribution in the metacarpus and front digit of the horse. *J Am Vet Med Assoc* 1975; 167:298-335.

^v Denoix JM. Diagnostic techniques for identification and documentation of tendon and ligament injuries. *Vet Clin North Am Equine Pract* 1994;10:365-407.

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^{vii} Bassage L, Ross M. Diagnostic Analgesia. In: Ross M., Dyson S., eds. *Diagnosis and Management of Lameness in the Horse*. St. Louis: WB Saunders; 2003:104-105.

^{viii} Castro FV et al. A new approach to desensitizing the lateral palmar nerve of the horse. *Vet Surg* 2005;34:539-542.

^{ix} Dyson S et al. An investigation of injection techniques for local analgesia of the equine distal tarsus and proximal metatarsus. *Equine Vet J* 1993;25:30-35.

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× Hughes TK et al. In vitro evaluation of a single injection technique for diagnostic analgesia of the proximal suspensory ligament of the equine pelvic limb. *Vet Surg* 2007; 36:760-764.