A review of local anaesthetic techniques for the equine limb

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Palmar Digital Nerve Block (PDNB)

The palmar digital nerve block (PDNB) was generally considered to abolish lameness originating from the caudal 1/3rd of the hoof and more specifically navicular disease (Adams 1974). However, recent studies have found a number of structures can be desensitized following PDNB resulting in the use of terminology such as caudal heel pain/syndrome (Turner 1994; Trotter 1999). Subsequent studies have found that PDNB can abolish pain arising from the sole, third phalanx, coffin (DIP) joint, pastern (PIP) joint, and first phalanx as well as the navicular bone/bursa and associated structures (Ross 1998; Schumacher et al 2000). Performing a PDNB just proximal to the collateral cartilages ameliorates endotoxin induced lameness of the DIP joint (Easter et al 2000). While some text books describe the location for a PDNB to be mid-pastern (Adams 1974), it is best performed at the level of the collateral cartilages using the smallest effective dose. An injection site that is too proximal increases the risk of desensitizing the PIP joint or proximal P1 (Schumacher et al 2003).

Coffin (DIP) Joint

Abolition of lameness following anesthesia of the DIP joint is also not as specific as once thought (Stashak 2002). Lameness due to navicular syndrome will also respond to anesthesia of the DIP joint (Dyson & Kidd 1993; Turner 1996) DIP joint anesthesia can also abolish lameness due to deep digital flexor tendonitis (Dyson et al 2003) Local anaesthesia of the navicular bursa is thought desensitize structures in direct contact with the navicular bursa including navicular bone, impar ligament and navicular suspensory ligament (Turner 1999) However, other sites of lameness, including solar pain may respond to navicular bursal anesthesia (Dyson 1995; Schumahcer et al 2001), and mepivicaine has been shown to diffuse readily between both the DIP and navicular bursa (Gough et al 2002). Local anaesthesia of the DIP joint can be performed via dorsal or lateral approaches. The site for the dorsal approach is approximately 1.5 cm proximal to the coronet and 1.5 cm off midline with the needle directed parallel to the ground surface or at an oblique angle from proximal to distal at approximately 35-45° to the long axis of the limb (Stashak 1987). The lateral approach is via a depression between the proximal border of the collateral cartilage and the palmar border of P2 (Vazquez de Mercado et al 1998). The lateral approach may result in inadvertent injection of the navicular bursa / digital tendon sheath so the needle should be directed slightly dorsally.
Navicular Bursa

Techniques for performing local anaesthesia of the navicular bursa have been described, but clinical experience suggests it is still a difficult procedure to perform and to be certain is best done using radiographic guidance to ensure correct needle placement. An 18G 3.5 inch spinal needle is directed between the heel bulbs just proximal to the hir line directed to a point midway along the circumference of the hoof approximately 1 cm distal to the coronet with the limb in a raised wedge block in partial flexion. This technique was determined to be up to 5 times more likely to result in successful injection of the navicular bursa compared to other techniques (Boswell et al 1999). Local anaesthesia of the navicular bursa was thought to be mostly specific for those structures in direct contact with the navicular bursa (Turner 1999). However, it has since been shown that there is considerable overlap in the structures anesthetized especially as time increases post block. More recently MRI has improved the interpretation of blocking responses. Clinically the use of navicular bursa injections may be best reserved for treating those horses with palmar heel pain that don’t respond to DIP joint medication.

Abaxial Sesamoid Nerve Block (ABSNB)

The abaxial sesamoid nerve block anesthetizes the lateral and medial branches of the palmar nerves at or just distal to the level of the proximal sesamoid bones and is commonly used to rule out lameness originating from the distal limb. Local anaesthetic agent (3-5 ml) is deposited adjacent to the neurovascular bundle as it runs along the PSB (Stashak 1987). It will also desensitize the PIP joint as well as the soft-tissue structures distal to the fetlock, such as the deep and superficial digital flexor tendons and the distal sesamoidean ligaments. Other structures may be desensitized by this nerve block particularly if placed too proximally. For example, proximal sesamoid bone fractures, axial sesamoid lesions, fetlock joint, and suspensory branch lesions.

Low Four-Point Block / Low Six Point Block

The low four-point block is performed just proximal to the fetlock joint and digital tendon sheath. It is used to block the lateral and medial branches of the palmar and palmar metacarpal nerves in the forelimb and the plantar and plantar metatarsal nerves in the hindlimb. When combined with the dorsal metatarsal nerves in the hind limb it is termed the low six point block. This block can desensitize the fetlock joint / joint capsule, suspensory ligament and surrounding soft tissues. This block may be used following intra-articular anaesthesia of the fetlock joint when there has been a partial improvement but not complete abolition of the lameness. Some clinicians utilize a modified version of it and block the medial palmar/plantar metatarsal nerve as an indicator of palmar osteochodrosis / transverse ridge osteoarthritis of the fetlock joint.

Pastern (PIP) joint

Local anaesthesia of the PIP joint can be performed via a dorsal approach either medial or lateral to the extensor tendon, but most clinicians prefer the palmar/plantar approach. The palmar/plantar joint pouch extends proximally along the caudal aspect of P1 and requires less needle manipulation, allows greater injection volume and provides
more frequent synovial fluid yield (Miller et al 1996). A 21x1.5 inch needle can be directed in a disto-palmar/plantar direction between the palpable palmar/plantar cortex of P1 and its distal palmar eminence and the distal superficial flexor tendon branch insertions onto the proximal P2, with the limb held in a partially flexed position.

**Fetlock joint**

Local anaesthesia of the fetlock joint can be performed via the dorsal pouch, palmar/plantar pouch or thorough the collateral ligament of the proximal sesamoid bone. The latter approach is favoured by most clinicians due to less risk of inducing intra-articular haemorrhage and higher yield of synovial fluid (Misheff & Stover 1991). It is performed with the limb held in a flexed position and a 21x1.5 inch needle directed perpendicularly to the palpable depression between the 3rd metatarsal/tarsal bone and lateral proximal sesamoid bone at the proximal aspect of the collateral ligament of the fetlock joint.

**Elbow**

Intra-articular injection of the elbow joint can be achieved at a point 1 cm proximal to and 1/3rd of the distance caudally to a line joining the most proximal aspect of the olecranon and the most proximal limit of the lateral collateral ligament (at distal end of the lateral supracondylar crest). The needle is inserted into the olecranon fossa, in a distomedial direction approximately 45 degrees to the long axis of the limb. The depth of needle insertion varied from about 4 to 7.5 cm depending on horse size triceps muscle thickness. This approach is thought to yield more synovial fluid and reduce the risk of iatrogenic cartilage damage and may reduce iatrogenic temporary radial nerve palsy. (Sams et al 1993)

**Shoulder**

Shoulder lameness is not as common as many owners would have us believe. Landmarks for intra-articular anaesthesia of the shoulder are as follows – palpate the space between the cranial and caudal eminences of the greater (lateral proximal) tuberosity of the humerus. A subcutaneous bleb of local anaesthetic is placed between and just proximal to the eminences. A stab incision with an 11 blade facilitates inserting a spinal needle. The needle is directed horizontally and slightly caudally. A change of sensation can be felt as the needle passed through the joint capsule. I usually read a shoulder block at 15, 30 and 60 mins. It may be difficult to retrieve synovial fluid in some horses. Injecting saline initially may help in ensuring correct needle placement intra-articularly. A small incidence of communication between the bicipital bursa and shoulder joint has been shown. (Dyson 1986)

**Proximal Metacarpus**

Local anaesthesia of the proximal metacarpal area is most commonly performed to confirm proximal suspensory desmitis. Techniques include; direct infiltration (Stashak 2002), or blocking the lateral palmar nerve before the origin of lateral and medial palmar metacarpal nerves (Wheat & Jones 1981). A high four point block in my experience do not reliably desensitise the proximal suspensory ligament. Keep in mind the distal palmar out-pouches of the carpometacarpal joint extend distally a mean distance of 2.5 cm (Ford et al 1988). These out-pouchings are in close proximity to the palmar metacarpal nerves in the proximal metacarpal region. Deep injections in the proximal
metacarpal regions such as infiltration of the origin of the suspensory ligament or a palmar metacarpal nerve block could inadvertently penetrate these out-pouchings and desensitize the carpometacarpal joint and or carpal sheath. Because the middle carpal joint always communicates with the carpometacarpal joint (Ford 1988), infiltration and desensitization of the middle carpal joint could also occur. Thus, the potential for inadvertent desensitization of a carpal lesion when performing proximal metacarpal analgesia exists and can lead to confusion about the source of lameness. Compared to direct local infiltration and high 4 point blocks, local anaesthesia of the lateral palmar nerve at the base of the accessory carpal bone resulted in a greatly reduced risk of inadvertent injection of the carpal joints (Ford et al 1989). Conversely if a horse blocks sound to the middle carpal joint with no apparent pathology then one should also evaluate the proximal metacarpus/suspensory. Due to a risk of inadvertent injection of the carpal sheath aseptic preparation of the injection site should be performed.

Proximal Metatarsus

Similarly in the hind limb a high six point block in my experience do not reliably desensitise the proximal suspensory ligament. In addition there can be considerable overlap of anaesthesia between local infiltration of the origin of the suspensory joint and local anaesthesia of the tarsometatarsal joint and vice versa due to the close association of the distal joint pouches and proximal suspensory. Contrast media has been demonstrated to diffuse proximally following direct infiltration of the proximal suspensory ligament. Clinical experience also suggests a number of horses with lameness originating from the suspensory ligament will improve following intra-articular anaesthesia of the tarsometatarsal joint. Local anaesthesia of the deep branch of the lateral plantar nerve (DBPLN) just distal to the proximal aspect of the 4th metatarsal bone has been shown to reduce the risk of desensitizing the tarsometatarsal joint and tarsal sheath (Hughes et al 2007). In this study a single injection 15 mm distal to and axial to the head of the 4th metatarsal bone to a depth of 25 mm deposited dye around the DBLPN in 95% of limbs.

Tarsus

Communication of the distal tarsal joints is variable and unreliable (Sack & Orsini 1981). Investigations have shown diffusion of local anaesthetic agents injected into the tarsometatarsal joint between the distal intertarsal and tarsocrural joints in a high percentage of limbs (Gough et al 2002). Clinical implications include that intra-articular anaesthesia of the tarsometatarsal joint may alleviate lameness originating from the distal intertarsal, proximal intertarsal and or tarsocrural joints. Conversely, clinically it would seem that medication of these joints should be performed by injecting each individual joint rather than relying on potential communications.

Stifle

Communication between joint compartments of the equine stifle has been studied using a variety of methods (Lewis 1987; Vacek et al 1992; Gough et al 2002). Generally the medial femoropatella joint communicates more frequently with the medial femorotibial joint than the lateral femorotibial joint. Intrasynovial injection of local anaesthetic has been shown too readily diffuse between joints meaning that blocking individual joints of the stifle may not be as
specific as one would like. Even though most clinically relevant pathology occurs in the medial femorotibial joint, I usually prefer to block all three joints simultaneously for this reason. More recently a technique has been described for injecting all 3 joint pouches of the stifle through one injection site. After aseptic preparation of the stifle a subcutaneous bleb of local anaesthetic is placed between the lateral and middle patellar ligament and 1.5 cm proximal to the tibial crest. A small stab incision with an 11 blade is useful when using a 3.5 inch 18 or 19 gauge spinal needle. The spinal needle is first inserted parallel to the tibial plateau in a dorsolateral to plantaromedial direction across the stifle in front of the tibial eminence into the medial femorotibial joint capsule. When the tip of the needle touches the medial meniscus or cartilage of the medial condyle, the stylette is withdrawn and local injected. There should be no resistance to injection if inserted intrasynovially. To inject the lateral femorotibial joint capsule the needle is withdrawn so the tip is subcutaneous in location and the needle is redirected parallel to the tibial plateau in a dorsolateral to slight dorsolateral direction into the lateral femorotibial joint capsule. It is important to ensure the needle is angled far enough in a lateral direction so as to avoid injecting the intercondylar space. Finally the needle is redirected in a dorsodistal to dorsoproximal direction into the femoropatellar joint capsule between the patella and the femoral trochleas. Synovial fluid is not consistently obtained in any of the 3 joint capsules unless there is effusion.

**Hip joint**

Clinically the coxofemoral joint is located a little more caudal and distal than we often suspect. The landmark for needle insertion is approximately 1 cm proximal to the mid-point of the greater trochanter and directed cranially towards the contralateral tuber coxae. Inadvertent blockade of the sciatic nerve has been reported following incorrect needle placement. Ultrasound guidance can improve the accuracy of joint injections. The probe is placed proximal to the greater trochanter. The dorsal acetabular rim is identified and the needle inserted distal to the probe and just proximal to the greater trochanter. (David et al 2007)

**Sacroiliac joint (SI)**

Sacroiliac pain can be a commonly encountered in equine practice. Various techniques have been developed however given the deep location of the SI joint none have proven reliable. Firstly a 20-25 cm 18 gauge spinal needle is required which can be difficult to acquire in Australia, secondly the SI joint is a low motion joint with a potential joint space. Both blind and ultrasound guided techniques have been described and most clinicians attempt to achieve peri-articular injections at best. Potential complications include desensitisation of sciatic or sacral nerves and retroperitoneal injections (Engeli et al 2002; Cousty et al 2008)

It is apparent that there is considerable overlap in the structures anesthetized by the various local anaesthetic techniques used in the equine hoof. The specificity and sensitivity of a nerve/joint block is likely related to the exact location of the block, technique, volume of anaesthetic agent, presence of pathological conditions, chronicity of the condition and individual anatomical variation. Nonetheless the use of such techniques combined with careful clinical examination and use of imaging modalities form an important part of any lameness examination.
References:


