Is there a best intra-articular therapy?

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One of the most frustrating realities to the treatment of joint disease in horses is the fact that detection of a clinical issue typically occurs late in the progression of the disease process or response to injury. The ideal treatment would preserve anatomy and preserve or restore normal function. In essence this is the greatest challenge as equine practitioners are often asked to find the best formula to not only preserve but to reverse the negative effects of inflammation on joint tissues and athletic function.

The best successes can result when the initial insult only affects the synovial fluid and or the synovial membrane. However, the number of cases encountered in horses where synovial effusion is the only clinical sign is quite low. Yet the synovium can return to normal with appropriate control of physical insults and appropriate reduction of active inflammation. Therefor early attention to reduction of effusive water influx and returning the synovial environment to as close to normal as possible is the goal. The key to preserving normal anatomy and function is maintenance of normal, viscous synovial fluid as joint surface hyaline cartilage requires this normal fluid. Again, perhaps the most frustrating reality is the typically late recognition of joint disease in horses. If radiographic changes of degenerative joint disease (DJD) are evident, the progression of the disease process is chronic, and aggressive and treatment becomes targeted at maintenance of the disease state and hopefully function, rather than any hope of returning an affected joint to normal.

This discussion will concentrate on intra-articular treatment choices, but combinations with systemic medications are a common and reasonably justified therapeutic plan. Non-steroidal anti-inflammatory drugs (NSAIDs) can have very beneficial effects on inflamed tissues and also on clinical results in managing athletic function. Phenylbutazone, flunixin meglamine, firocoxib and others have been used for a long time and very legitimate management tools in the treatment of DJD. These agents often have a negative perception among horse owners and have been understood to only be a pain management modality. The reality is the NSAIDs only reduce pain by reducing inflammation. With appropriate dosing and management, these drugs are solid adjuncts to other medical management of joint inflammation and function. Medication guidelines for competition must be carefully monitored for clients with horses engaged in competitive events.

The use of corticosteroids for direct intra-articular administration has been somewhat controversial in equine practice but remains a regular and consistent management tool for
athletic horses. Years ago the ivory towers preached that in the intra-articular administration of corticosteroids would lead to a certain “steroidal arthropathy” which would accelerate the degradative processes of DJD. This was taken advantage of in the treatment of distal tarsal DJD or bone spavin, as ankylosis or fusion of these joints was/is desirable. However, many race track and sport horse practitioners were insistent that the horses they injected with corticosteroids were not accelerated to end stage DJD and were responding very well to the intra-articular use of these drugs. Finally the reality that some middle ground was likely the reality came to light and some controlled studies were conducted. More studies are likely needed at this point as continued questions arise even today.

Corticosteroids are the most potent anti-inflammatory agents available for intra-articular administration today. Much of the negative effects associated with the use of corticosteroids may be related to total dose administered and the dosing interval used. There may also be some differences in steroidal presence in large range of motion joints versus small range of motion joints. The term ‘chondroprotective’ has been used for some corticosteroids and not for others. This may be misleading and more research is needed to reach conclusive information in this regard. Using smaller doses and longer dosing intervals does appear to reduce any potential negative effects.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Suggested Dose Range</th>
<th>Racing Withdrawal Time</th>
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<tbody>
<tr>
<td>Methylprednisolone</td>
<td>20-100 mg</td>
<td>21 days</td>
</tr>
<tr>
<td>Triamcinolone</td>
<td>3-9 mg</td>
<td>7 days</td>
</tr>
<tr>
<td>Betamethasone</td>
<td>9 mg</td>
<td>7 days</td>
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Several systemic concerns exist with local administration of corticosteroids. Perhaps the most substantial concern is the instigation of laminitis after administration of triamcinolone. The targeted does is 18 mg of the drug. Exceeding 18 mg intra-articularly at any single treatment has been associated with the onset of laminitic crises in some horses. This dose suggestion dates back to a single horse, yet this horse has been referenced many times in the veterinary literature. Parallel to this information, several attempts to create laminitis in normal horses have failed to create the problem. (Perhaps one reason that steroid administration is not a predictable model used to study laminitis) The reality is likely that intra-articular corticosteroid administration in know Metabolic Syndrome horses, Cushing’s Disease horses or horse
phenotypically suspicious of these diseases should be avoided. In other horses, intra-articular corticosteroid use has been very successful in the treatment and management of DJD.

Hyaluronic Acid or Hyaluronan (HA) is the core component of normal synovial fluid. Exogenous administration locally to joint spaces has been successful in reducing acute phase inflammation as well as more chronic inflammatory insults. Research models have demonstrated more success with chronic inflammation. As part of combination therapy with corticosteroids, HA has appeared to be a reasonable and successful partner and perhaps lengthens the duration of anti-inflammatory effects from intra-articular administered treatments. Selecting the corticosteroid of choice and adding 1-2 ml of HA has appeared to be a successful combination. HA volume has roughly been associated with total injection volume and the volume of the targeted joint space.

Intra-articular polysulfated glycosaminoglycan (PSGAG) therapy is a good acute phase anti-inflammatory choice. PSGAGs placed in a joint space provides substrate for synovial fluid, cartilage matrix and intra-cellular matrix. Combination with corticosteroids has not been recommended. PSGAGs combine compliment locally and are considered to be more immune suppressive than corticosteroids and no advantage to combination therapy has been noted.

Regenerative therapies (stem cell preparations and platelet rich plasma (PRP)) placed in joint compartments have been advocated and investigations have demonstrated that stem cells can be recruited or selected by injured tissues in certain environments. Stem cells do not appear to be a good acute phase treatment choice. Early work exploring the potential for intra-articular administration of these agents was encouraging. Recent evaluations have cast some doubts about efficacy, but more work is required to best understand when stem cells and PRP administered directly into joint spaces should be considered.

Autologous conditioned serum (IRAP and IRAP 2) can block one of the principle mediators of inflammation in articular environments – interleukin 1. These agents have been noted to improve cartilage scoring in research models as well as reducing synovitis and lameness. There has been surge in the use of IRAP and IRAP 2 in recent years and in some practices this has reduced the use of intra-articular corticosteroids. Recommended dosing is 6ml per joint. Personal experience has been positive with doses of 1-2 mls. Rigid maintenance of freezing can allow storage and future administration for up to 18 months.
LOCAL ANESTHESIA IN ASSESSING EQUINE LAMENESS

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The use of local anesthesia in the equine lameness examination remains a vitally important aspect of the exam which allows a confident determination of the regional and local source of pain which results in the lame gait. The caveat is that the lameness does indeed originate from pain, and not a pain free mechanical circumstance. Typically most equine lameness is due to pain and therefore amenable to the use of local anesthesia to identify the source.

Interpreting the result of local anesthesia or nerve blocks can generate some questions. Ideally 100% of lameness is resolved with a particular and specific administration of local anesthesia. However, complete and total resolution of lameness is not common. This may be due to chronicity and the development of secondary sites of discomfort or an incomplete removal of regional pain by the local injection. The bottom line is that substantial change for the better of lameness is typically interpreted as localizing the main source of clinical pain. Veterinarians commonly use percentages to describe the change in lameness (IE – perhaps a palmar digital block resulted in “80%” improvement). This is obviously a clinical impression based on experience and repeated observations. Again – what is desired for confidence in results is a marked response and improvement in the lameness presentation.

Drug selection is not very controversial. Three agents are typically utilized for equine nerve blocks: Carbocaine, lidocaine and bupivicaine. Carbocaine and lidocaine are very similar in time of onset of local anesthesia and duration; the choice essentially becomes personal preference. If longer duration of local anesthesia is desired, bupivicaine is an option. Often 3 to 4 hours of local anesthetic effect can be achieved with bupivicaine versus 20 to 45 minutes with lidocaine and carbocaine.

Local skin preparation is necessary before injection for either perineural blocks or intra-articular injections of local anesthetic drugs. However, the degree of preparation can be different for the two types of injections. Perineural injections in the distal limb are essentially subcutaneous administrations of the drug. Proximal injections are often more akin to intramuscular administrations. Therefore, cleaning or disinfecting the skin surface can be done to result in a “clean” site. Absolute asepsis is not necessary. Hand in hand with this is that clipping hair is not required. Intra-articular injections present a different set of concerns. If the potential complications from a lack of asepsis outweigh the desire for a quick procedure, the time and effort necessary for a surgical skin preparation are needed. This is certainly true for injections into a joint. Joint sepsis after local intra-articular injection can certainly ruin your day! Disinfection with either povidone iodine or chlorhexidine can be very satisfactory. Time to final disinfection may depend on how dirty the site is at the beginning of preparation. While clipping and removing hair helps assure skin disinfection, it is not absolutely required. Hair can be left in place and this is often requested by horse owners. If this is the reality, the author typically adds more time and scrub intensity to the preparation prior to injection.
Needle selection and drug volume will depend on the veterinarian’s comfort level and experience. Typically the smallest needle that will allow drug administration in a brief and direct manner with the least amount of resistance is the needle of choice. Recommended drug volumes are listed in Table 1.

In general, local anesthesia administration should progress from distal to proximal following an ascending pattern of the nervous structures. The great majority of equine lameness results from abnormalities distal to the fetlock with most originating from the foot or feet. Mastering the typical blocks needed to assess the distal limb will provide a great advantage in understanding many lameness cases.

The choice between perineural and intra-articular local anesthesia administration is often dictated by the initial physical exam or some factors that are relevant from a particular horse’s history. It would be unusual to go directly to a particular intra-articular block first, without some evidence of joint effusion, injury or a flexion test result strongly indicating this move as appropriate. Far more commonly, the distal perineural blocks that will anesthetize the foot are the considered first. A very nice and complete reference for all common blocks is *A Guide to Equine Joint Injection and Regional Anesthesia* by Drs. Moyer, Jim Schumacher and John Schumacher. (1)

**Perineural Blocks: Distal Limb**

The distal-most block in the equine limb and also the most commonly performed block is of the Palmar Digital Nerve. This can be performed over the palpable neurovascular bundle at the angle where the pastern meets the heel bulb or just axial to the collateral cartilage. Typically both medial and lateral branches of the palmar nerve are blocked. However, at times a selective block pattern can be utilized if concerns exist to discriminate between the lateral and medial aspects of any of the perineural block sites. Most abnormalities of the foot appear to cross midline, therefore blocking both medial and lateral branches is typically required to change the presenting lameness. The Palmar Digital Nerve block will usually anesthetize the caudal one third to half of the foot and the solar regions.

A Pastern Ring block has been recommended to follow the Palmar Digital block if lameness does not improve. This is done with a subcutaneous line of injection to dorsally “ring” the pastern at the level of the Palmar Digital block. Some horses resent this block and the Pastern Ring block may not contribute to anesthesia of more than the Palmar Digital block.(1)

The Abaxial Sesamoid block is performed at the site that is described by the name. The palmar digital nerves can be palpated on the medial aspect of the medial sesamoid bone and the lateral aspect of the lateral sesamoid bone. Injection at these sites would typically anesthetize structures distal to the fetlock. However, horses often resent injection at the abaxial sesamoid sites and the injection volume may dissect proximally such that confusing results may occur. The author prefers injecting into the Basisesamoid site, which can be repeatedly palpated at the base of the sesamoid bones when the limb is held out of weight bearing. It appears this site will provide access to the palmar digital nerve branches without the concern for proximal migration of the injection volume.
The Distal Metacarpal block, also known as the Low 4 Point or Low Palmar, is performed proximal to the fetlock with 2 or 4 injection sites, two immediately distal to the terminal aspects of the splint bones and two between the deep flexor tendon and the suspensory ligament branches immediately proximal to the digital tendon sheath. Structures from the fetlock distally are typically anesthetized with this block.

Utilization of these 3 to 4 blocks will clarify most lameness cases of the fore and hind limbs. Proximal Metacarpal or Proximal Palmar and Proximal Metatarsal or Proximal Plantar blocks are utilized to desensitize the metacarpal and metatarsal regions. Frequently, physical examination findings will preclude the use of these blocks or demonstrate a need to prove a palpable lesion responsible for the lameness.

**Perineural Blocks: Proximal Limb**

The forelimb proximal limb blocks include the Median, Ulnar and Medial Cutaneous Antebrachial nerve blocks. These blocks are not commonly required but are occasionally helpful defining abnormalities of the proximal metacarpal and carpal regions. The Tibial and Peroneal Nerve blocks accomplish much of the same results in the hind limb, blocking structures of the hock and the distal limb.

**Intra-articular Anesthesia: Joint Blocks**

Once the commitment to intra-articular anesthesia is made and the sterile skin preparation completed, other questions may arise. If an aliquot of synovial fluid is desired, a sterile syringe and blood tubes or other container should be made available. Always harvest any fluid for evaluation before any treatment or diagnostic drugs are administered.

Intra-articular anesthesia is more precise than the regional perineural blocks. The drug is contained by the joint capsule and therefore interpretations of radiographs and other images can be more completely understood.

Timing of lameness evaluation after intra-articular blocks can be important. Typically a horse can be examined 5-10 minutes after a joint block and a reasonable assessment of the effects can be made. However, if results are not conclusive at 5 minutes, 5 to 10 more minutes can be waited and the horse re-evaluated. Additional changes in gait that are noted after joint blocks do bring into consideration the potential for diffusion and anesthetic influence on non-articular regional tissues. Examples of this phenomenon are the potential anesthesia of the navicular bursa with protracted time after intra-articular anesthesia of the distal interphalangeal (coffin) joint, and the anesthesia of the proximal origins of the suspensory ligament and palmar cortex of MC3 after intra-articular anesthesia of the middle carpal joint.

Distal and proximal interphalangeal joints, metacarpophalangeal joint, carpal joints, tarsal joints and the stifle joints are the most common sites for performing intra-articular anesthesia. Having a good, illustrated guide can be very helpful when reviewing the procedure for joints that are not commonly injected.