

CURRENT TREATMENT OPTIONS FOR REFRACTORY OSTEOARTHRITIS OF LOW-MOTION JOINTS IN HORSES

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Osteoarthritis of the intertarsal and tarsometatarsal joints (bone spavin) is a common cause of lameness in all types of equine athletes; however, it is particularly prevalent among Western performance horses. Osteoarthritis of the proximal interphalangeal joint (high ringbone), although is less common among equine athletes, is also a frequent cause of lameness in several breeds. Osteoarthritis of these 'lower-motion' joints develops due to repetitive compression, torsion, and shear strain on the joints. The hallmarks of chronic osteoarthritis of the intertarsal, tarsometatarsal, and proximal interphalangeal joints are articular cartilage damage, joint capsule fibrosis, periarticular osteophytes, subchondral bone lysis, subchondral bone sclerosis, joint narrowing and ankylosis. Therefore, osteoarthritis of these joints is typically difficult to medically treat once the process is underway.

Treatment options for refractory osteoarthritis of the distal intertarsal and tarsometatarsal joints:

Medical management remains the best therapeutic option for osteoarthritis of the distal hock joints. The use of corrective shoeing, intra-articular hyaluronan and corticosteroids, and systemic non-steroidal anti-inflammatory medication allows most horses to continue in training and performance. Because of the reported detrimental effects on the articular cartilage, many veterinarians use methylprednisolone in the distal hock joints to accelerate or promote joint ankylosis. However, some horses do not respond well to anti-inflammatory injections or have only a short duration of response.

Extracorporeal shock wave therapy: Extracorporeal shock wave therapy (ESWT) is the generation of a pressure wave outside of the body, which is then directed at a specific area of the body for treatment. It has been hypothesized that symptomatic relief in patients treated with ESWT is the result of an analgesic effect. In humans, pain relief has been reported to occur within 3 weeks after therapy and may last indefinitely. In horses, immediate analgesic effects after ESWT have been reported based on subjective assessments. Over the last decade, a growing number of veterinarians have been utilizing this treatment modality for a wide variety of soft tissue and osseous injuries in horses. One of the first reported uses of ESWT in equine medicine was for the treatment of proximal suspensory desmitis. Since then, ESWT has been used in the treatment of numerous equine musculoskeletal conditions including dorsal metacarpal disease, bone spavin, and navicular disease. The mechanism of action ESWT to palliate lameness in horses with osteoarthritis of the distal intertarsal and tarsometatarsal joints is unclear, but the analgesic effect could be due to altered pain perception by the central nervous system, altered intraosseous pressure, strengthening of periarticular soft tissues, or decreased subchondral bone edema. In some horses lameness decreases for few months after ESWT, whereas in others the lameness persists.

Tiludronate (Tildren): Tiludronate is approved as a human drug for the treatment of Paget's disease. However, an intravenous form of tiludronate is used in horses at a dose of 1 mg/kg bwt, and is currently licensed for the treatment of navicular disease and bone spavin. Inhibition of osteoclasts is the main pharmacological action of tiludronate, which in turn inhibits bone resorption. As a consequence of this inhibitory action, tiludronate slows down bone remodelling and helps in restoring a normal balance between bone resorption and bone formation. Tiludronate has also been shown to have anti-inflammatory properties. It decreases the amount of nitric oxide and cytokines released from activated macrophages, which promotes early inflammation responses. It also inhibits the secretion of cartilage-degrading enzymes induced by interleukin-1 in the chondrocyte or the synovial cell. A recent clinical trial

demonstrated tiludronate treatment and a controlled exercise program to be effective in horses with bone spavin. The authors postulated that tiludronate regulates bone remodelling through a decrease of the resorptive process and should therefore ameliorate the remodelling processes active in osteoarthritis of the distal hock joints and alleviate pain associated with abnormal bone lysis. In addition, results of the study showed that tiludronate had a greater effect in horses with periarticular osteophytes and subchondral bone thickening.

Facilitated ankylosis: Horses with osteoarthritis of the distal hock joints refractory to medical therapy may be candidates for facilitated ankylosis. In most horses, cartilage degeneration and bone fusion of the distal intertarsal and tarsometatarsal joints results in soundness; however, osteoarthritis progresses to fusion of the affected joints in a small number of cases. Therefore, in the case of the distal hock joints, the aim is to facilitate ankylosis by removal of articular cartilage, but maintaining the periarticular ligaments to stabilize the joints. Multiple techniques have been developed to facilitate ankylosis of the distal hock joints in horses. These techniques utilize different methods of articular cartilage destruction, such as surgical drilling, sodium monoiodoacetate injections, laser surgery, and ethyl alcohol injections.

Sodium monoiodoacetate: Over the last 10-15 years, sodium monoiodoacetate has been shown in a number of studies to be successful in promoting ankylosis of the distal tarsal joints; with 60-70% of horses returning to serviceable athletic soundness. Sodium monoiodoacetate is considered a metabolic toxin, and in chondrocytes it specifically inhibits glycolysis. Unfortunately, despite the high effectiveness to promote ankylosis of the distal hock joints, sodium monoiodoacetate injections have some major drawbacks including severe pain for several days post-treatment, and inadvertent injection of the tibiotarsal and proximal intertarsal joints if rare communication between the distal and proximal intertarsal joints exists. For these reasons, this treatment option has fallen out of favor among surgeons.

Surgical drilling: Surgical intervention is also directed at facilitating the ankylosis process, and can be referred to as an arthrodesis. The most commonly employed procedure, known as “drilling”, involves removing 3 large tracts of articular cartilage and some subchondral bone by directing a drill bit across the joint in a fanned pattern perpendicular to the articular surfaces. This method has a reported success rate of 59-80% to return horses to their previous level of athletic performance, however, a period of 3-12 months until soundness (or maximal effect is seen) is achieved should be expected.

Laser surgery: Diode laser-facilitated ankylosis consists of introducing and firing the laser fiber inside of the distal intertarsal and tarsometatarsal joints to damage articular cartilage by heating up and vaporizing the synovial/intra-articular fluid. Laser-facilitated ankylosis has a reported clinical success of up to 90%, and very low postoperative morbidity. Unfortunately, laser surgery not always results in complete fusion of the distal intertarsal and tarsometatarsal joints.

Intra-articular ethyl alcohol injections: Ethyl alcohol has neurolytic and nonselective protein-destructive properties that accelerate articular cartilage damage. Long-term results of the use ethyl alcohol facilitated ankylosis for treatment of osteoarthritis of the distal hock joints showed 70-95% success rate. These horses had rapid lameness improvement (usually within 3 months) and radiographic evidence of joint space collapse.

Treatment options for refractory osteoarthritis of the proximal interphalangeal joint:

Medical therapy in horses with osteoarthritis of the proximal interphalangeal joints provides only temporary relief of pain. Shoeing, intra-articular corticosteroids, and systemic non-steroidal anti-inflammatory medication provide pain relief in milder cases for 6 weeks to 4 months. Concurrent use of PSGAG (IM Adequan[®]), sodium hyaluronate (IV Legend[®]), and oral glucosamine HCl can also be beneficial. Unfortunately, naturally occurring ankylosis is slow and unpredictable, and the joint remains

painful during this process. Therefore, equine veterinarians should be aware of the current treatment options for horses with severe osteoarthritis of the proximal interphalangeal joint.

Traditional surgical arthrodesis: Articular cartilage debridement followed by rigid internal fixation has been the standard surgical approach for successful arthrodesis of the proximal interphalangeal joint in horses. This is typically accomplished by disarticulation of the joint, articular cartilage curettage, and application of transcortical screws (with or without a plate) placed in a lag fashion to provide compression. Unstable repairs result in longer casting times and exuberant callus, which can interfere with the actions of the flexor tendons and impinge on the coffin joint. The prognosis for riding soundness is fair to favorable, particularly for conditions involving the hind limb. Successful outcomes (sound or went back to their preoperative level of performance) with surgical arthrodesis have been reported in up to 87% of horses overall and up to 95% of horses with hind limbs affected.

Minimally invasive arthrodesis: In severe or chronic cases of osteoarthritis, substantial periarticular 'new bone' formation may interfere with the transection of the joint capsule and other soft tissues, making exposure of the remaining articular cartilage challenging. Much of this 'new bone' must be removed to allow for disarticulation of the joint, which adds surgical time and trauma. However, recent studies suggest that it is not necessary to completely remove articular cartilage for successful joint fusion to occur and less invasive surgical approaches should be considered. It is possible that leaving the periarticular new bone and collateral ligaments intact and inserting the hardware in a minimally invasive fashion would allow for load sharing and provide a more rigid fixation than relying on the implants alone. This approach can also be combined with the use of laser energy to destroy remaining cartilage in osteoarthritic joints. Diode laser-facilitated minimally invasive proximal interphalangeal joint arthrodesis has been described recently with functional and cosmetic good outcomes.

Intra-articular ethyl alcohol injections: While surgical arthrodesis is the treatment of choice for osteoarthritis of the proximal interphalangeal joint, some clients are unable to pursue surgery due to costs. Intra-articular injection of ethyl alcohol not only destroys chondrocytes, but it is theorized to cause neurolysis and destruction of sensory innervation to the synovium, joint capsule and, perhaps, subchondral bone. Therefore, the use of intra-articular ethyl alcohol in the proximal interphalangeal joint in horses affected by osteoarthritis can be a viable method for facilitated ankylosis if surgical management is not an option. Moreover, ethyl alcohol has neurolytic and nonselective protein-destructive properties that accelerate articular cartilage damage. A recent report of the use ethyl alcohol facilitated ankylosis for treatment of osteoarthritis of the proximal interphalangeal joints showed that 50% of affected horses became sound, while 38% were improved.

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