

## Multimodal Management of Small Animal Osteoarthritis

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Canine osteoarthritis is one of the most common disorders diagnosed in dogs. The most common historical signs described by owners of arthritic dogs include stiffness after rest, difficulty rising, partial to non-weight bearing intermittent lameness, decreased overall activity, decreased ability to go up or down stairs/into and out of a vehicle, and exercise intolerance. Physical exam findings frequently include decreased range of motion in one or more joints, pain on flexion and extension of joints, crepitus on manipulation of joints, lameness, joint effusion, and often obesity.

Arthritis is a degenerative process that is strictly defined as inflammation of a joint. This process impacts all components of the joint including articular cartilage, synovial tissue and fluid, subchondral bone, and periarticular soft tissue. As such, we must approach treatment of arthritis in our patients from the standpoint of treating an inflammatory condition. Unlike inflammation in soft tissue that is mediated by increased leukocyte presence, arthritis is a chemically mediated inflammation. Catabolic enzymes such as aggrecanase, and MMP's as well as others, are destructive enzymes produced by synovial tissue and result in destruction of cartilage. These changes may be mechanically driven, such as the case of trauma or congenital joint abnormalities. Endogenous repair of cartilage damage may occur, but there is a finite point beyond which the joint loses the ability to repair itself and changes become permanent.

The approach to lameness should be a systematic one. I generally like to categorize causes of lameness into one of four neat packages and attempt to rule each out to help come up with a diagnosis.

Orthopedic – referring to bone and joint injuries

Neurologic – these may mimic orthopedic problems such as may be seen with a root signature

Soft tissue – these are generally muscle and tendon injuries but may include sprains

“Metabolic” – catch-all category including immune-mediated and infectious causes of lameness

Once I narrow the scope of the cause of lameness I can focus on individual rule-outs for that category. Making use of a good orthopedic and general physical exam (which should ALWAYS include a comprehensive neurological exam) I can focus my attention to the area where the lameness has been localized.

Diagnostics for lameness frequently involve good quality, well-positioned, diagnostic radiographs. In some cases, further imaging via a CT or MRI may be involved. I also like to utilize ultrasound when I suspect a soft tissue injury to rule out tendon and muscle injuries. In addition, consider joint taps with cytology and culture, and serum titers when immune or infectious causes are a possible etiology.

Management options for osteoarthritis fall into two broad categories, surgical and non-surgical management. Surgical management may include procedures such as joint replacement, ostectomies (like FHO), and osteotomies...these are discussed elsewhere, and we will focus on non-surgical management for this lecture.

Multimodal management of canine osteoarthritis is the foundation for medically treating arthritic dogs. The tenets of multimodal management include:

- Anti-inflammatory medications
- Chondroprotective supplements
- Weight management
- Controlled exercise
- Essential fatty acids
- Adjunctive therapies

Anti-inflammatory drugs often form the foundation for treatment of canines with osteoarthritis but are in truth only one cog in the multimodal management wheel. Cyclo-oxygenase 2 (COX2) inhibiting drugs are valuable in reducing inflammation in the peri-articular tissue by blocking the inflammatory cascade. But too often, this form of therapy is the only modality chosen. There is value in using these drugs, but they do come at a cost both in price and potential side effects. Prostaglandin E2 (PGE2) is blocked by COX2 drugs and this may account for some of these side effects. PGE2 binds to the EP4 receptor in the synovial membrane which mediates pain associated with osteoarthritis. EP4 antagonists, such as Galliprant®, effectively block this receptor thus reducing pain associated with osteoarthritis.

Chondroprotective drugs such as glucosamine, chondroitin sulfate, and others are nutraceuticals that are supplements favoring healthy joint function. Glucosamine is a precursor for the formation of glycosaminoglycan which is an important molecule present in the cartilage matrix. Glucosamine binds water which gives cartilage its soft, compliant structure during weight-bearing. Their value in treating osteoarthritis is derived from the belief that these supplements provide the building blocks of healthy cartilage matrix production.

I cannot emphasize enough the importance of weight management in dogs with osteoarthritis. This is by far the most important component of the multimodal management plan for treatment. This is also historically the most difficult area in which our clients will comply. I only need to point to the Purina life-time study as proof that dogs free-fed over the course of their lifetime will be heavier and thus have a higher likelihood of multi-joint osteoarthritis (and other comorbidities) than dogs fed a measured diet.<sup>1</sup> Planning a structured weight-loss program for your arthritic patients will do wonders for their overall comfort and ease of mobility. Convincing our clients to undertake, and stick with, a weight-loss plan is often a challenge though.

Controlled exercise is a very important aspect of weight management and thus joint mobility. As in humans, the best way to lose weight is diet and exercise... there are no shortcuts. However, our arthritic patients may be unable to exercise for extended periods of time due to their condition. Controlled exercise in the form of short, slow, controlled leash walks as well as swimming are excellent ways to ensure that our patients are getting the exercise they need.

Consulting the assistance of a canine rehabilitation specialist will also help in terms of developing an exercise plan that improves mobility while maintaining and building muscle mass in these patients.

Essential fatty acids, such as EPA and DHA, are Omega-3 fatty acids. Their inclusion in the diet adds value as they competitively inhibit Omega-6 fatty acids present in the cell membrane of synovial cells. Breakdown of Omega-6 fatty acids is the trigger that begins the inflammatory cascade. By diminishing the amount of Omega-6 FA's present, it thus should help reduce the amount of inflammation.

Adjunctive forms of therapy may have some value, and include modalities such as acupuncture, herbal therapies, hyaluronic acid injections, Adequan® injections, regenerative therapy, radiosynoviorthesis, and adjunct pain medications. There are several common "pain" medications that I see patients treated with that generally do not seem to be effective. Drugs such as Tramadol have been shown to be ineffective at treating pain in dogs.<sup>2</sup> They may, however, have a mild sedative effect giving the appearance of pain management. Gabapentin is an effective pain reliever in neuropathic pain but does not have efficacy in orthopedic pain, although it too may have a sedative effect. NMDA receptor antagonists such as Amantadine are, however, beneficial at preventing wind-up in dogs with chronic osteoarthritis when given at 3-5mg/kg once daily over a 2-3-week period. The benefit of herbals such as CBD oil, turmeric, and others are largely unproven. When true pain relief is needed, medications such as Tylenol-4 are beneficial.

I would be remiss if I did not comment on osteoarthritis in cats. Although cats are better at masking the signs of arthritis than dogs, it is well documented that cats are just as prone to develop osteoarthritis.<sup>3</sup> Treatment of osteoarthritis in cats encompasses the same principles of multimodal management as we use for canines. Although the diagnosis may be more challenging in cats due to the perceived lack of signs, the vigilant practitioner should be able to recognize the subtle signs that cats may present with. Not every overweight kitty who likes to lay around the house is "just a lazy kitty". There may be more going on than meets the eye and it would be beneficial to look for radiographic evidence of arthritis and treat appropriately.

Monoclonal antibodies that target NGF (Nerve Growth Factor) are the most exciting addition to pain management for cats (since 2022) and now dogs (approved in the US in 2023). This will likely be one of the most important components for managing chronic pain due to osteoarthritis in our small animal patients.

## References

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