Osteoarthritis in Companion Animals

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January 2021

Osteoarthritis (OA) is a common condition that affects dogs and cats. It is characterized as a low-grade inflammatory, progressive degenerative joint disease. OA results from degeneration and aberrant repair of articular cartilage in association with alterations in subchondral bone metabolism, osteophytosis and synovial inflammation. In companion animals, OA is almost always secondary to an underlying abnormality, such as joint laxity, osteochondrosis, trauma, etc. It is a pathological process which includes joint capsule fibrosis and periosteal reactions, leading to an altered gait and range of motion. In turn, there is a deterioration of the musculoskeletal system and secondary joint stabilizers, resulting in further deterioration of articular cartilage due to abnormal loading and wear.

In human medicine, it has been shown that synovial macrophages act as immune cells and are essential players in the structural progression and resulting clinical signs associated with OA. Interactions between

macrophages and chondrocytes play a vital role in the initiation and development of OA by secreting inflammatory cytokines which lead to subsequent cartilage degradation and destruction.

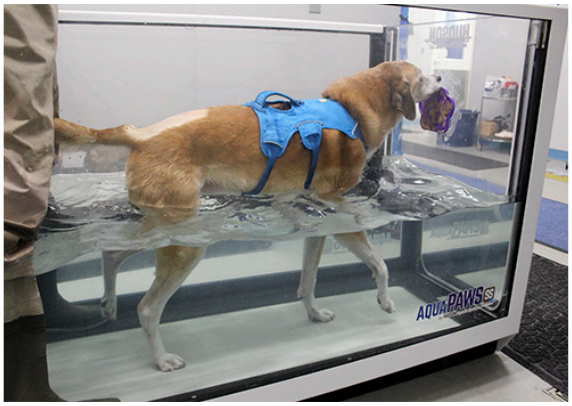
Given that OA is a disease process, rather than a disease entity, management should aim at intervening along the way. This can be difficult at times given the insidious onset and variation in clinical presentations seen in companion animals. History and clinical signs can vary significantly and can include reluctance to exercise, exercise intolerance, stiffness after activity, gait abnormalities, inability to jump (up or down), and behavioral changes. The tendency is for clinical signs to gradually worsen, but animals can have episodic flares, making diagnosis all the more challenging during the early phase. Physical exam findings also tend to vary and can include focal or diffuse muscle atrophy, joint swelling, capsular/extracapsular fibrosis, joint effusion, reduced range of motion, crepitus, and pain on joint manipulation.

Cats pose an even greater diagnostic challenge than dogs given their elusive nature. They can show very few signs, but those typical include a general reduction in activity, reluctance to jump, reduction in maximum jump height, unkempt appearance, and even aggression. Gathering physical findings also proves to be challenging in our feline friends given that many resent even a basic physical exam, never mind invasive orthopedic assessment. Asking clients to get videos of their cat at home in their natural environment can provide a plethora of information that is often difficult to obtain in the exam room. A subtle sign to look for in the clinic includes reluctance to jump off the exam table. Cats with elbow discomfort may land harshly when they do jump, bringing their pelvic limbs to the ground quickly, or landing on their pelvic limbs simultaneously with forelimbs.

Once the discomfort has been localized, baseline diagnostics include radiographs to confirm signs of arthritis and rule out other causes that may contribute to the clinical signs. If there is an obvious underlying condition, such as cranial cruciate tear, this should be addressed. Common radiographic findings consistent with OA include osteophytosis, enthesophytosis, effusion, soft tissue swelling, subchondral sclerosis, and intra-articular mineralization.

While it can be difficult to quantify joint pain in animals, it is well accepted that OA leads to ongoing nociceptive input into the central nervous system resulting in somatosensory system deterioration and central sensitization, contributing to the overall perception of pain. Growing evidence indicates that the COX enzymes play a role in this central sensitization, and COX inhibitors have been shown to prevent the establishment of central sensitization. Early intervention is becoming recognized as important and effective management in long term joint health.

The pillars of OA management include weight management, low impact activity, and pain management. Obesity is a well-known key risk factor for the development of OA. Being overweight is a contributing factor for OA by several mechanisms, including increased load on the joint, but it also results in a subclinical proinflammatory state with increased concentrations of pro-inflammatory cytokines and adipokines. Weight management is a key goal that can be included in OA management from a young age. Keeping pets active helps them to maintain a healthy muscle mass development and reduces fat.



Low impact activity is another goal that can be set early if we suspect or diagnose OA early in the disease process. It is not recommended to completely restrict our pet's exercise. Growing evidence in human and veterinary medicine supports regular, moderate, controlled exercise as highly beneficial. Certain activities, such as running and chasing a ball, may need to be abolished given the 'start and stop,' high impact nature of this movement. However, a change in exercise routine if the current form is causing problems is a more ideal solution, rather than decreasing activity. Completely restricting activity leads to a decrease in musculature, which therefore weakens the dynamic joint stabilizers. Exercises such as frequent, low impact walks and swimming are a few of many that can keep our pets active and healthy. Veterinary physical rehabilitation is a growing specialty, and the benefit of these programs cannot be understated. Physical rehabilitation is not just for post-operative care, but can also be highly beneficial for general body conditioning and maintenance as well. Additionally, it is a great way to mentally stimulate those animals who may be used to a more rigorous form of activity, such as chasing a ball or going for long runs.

Analgesics are also essential in both early and late stages of OA management. While it was previously thought that non-steroidal anti-inflammatories (NSAIDs) were best used for treatment of moderate-late stage OA, there is growing evidence to show the benefits of implementing COX inhibitors early on. Galliprant® is a new therapeutic which targets the prostaglandin EP4 receptor, which is a primary mediator of pain and inflammation involved in the pathogenesis of OA. By targeting EP4 specifically, Galliprant® has been shown to alleviate signs of joint pain in dogs associated with osteoarthritis, while decreasing the risks associated with blocking cyclooxygenase. Other commonly used NSAIDs in dogs include Carprofen and Meloxicam. Currently, there are no NSAIDs licensed for use in OA in cats.

It is well recognized that NSAIDs are the best at targeting joint pain related to OA, however, some animals cannot tolerate NSAIDs or need additional analgesics. Gabapentin and amantadine are drugs intended to manage chronic pain. Gabapentin is a structural analog of gaba-aminobutyric acid and appears to decrease central sensitization by inhibiting presynaptic calcium channels in the dorsal horn, although its

exact mechanism is unknown. Amantadine acts on N-methyl D-aspartate receptors. These medications work best in conjunction with NSAIDs, but can also be used alone or in combination in animals that cannot tolerate NSAIDs. Gabapentin has been shown to improve owner-identified impaired activities of osteoarthritis in cats.

OA in companion animals is a common, and often diagnostically challenging, disease process. Early recognition and intervention are essential to long term joint health.

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