A Practical Approach to Managing Osteoarthritis in Dogs
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Objectives
1. To understand the common causes of osteoarthritis in dogs and their physical and functional impact
2. To learn the relative effectiveness of strategies used to manage osteoarthritis in dogs
3. To discuss the roles of each caregiver in successfully managing osteoarthritis in dogs over a lifetime

Osteoarthritis (OA) is ubiquitous in dogs. It is the most common orthopedic problems, most estimate OA prevalence to be 20% in dogs. This presentation will focus on discussing the common causes of OA, the physical and functional consequences of OA, approaches that positively impact OA, the myths that surround OA, the roles of all caregivers in helping dogs with OA, and a practical approach to managing OA over a lifetime in dogs.

Common causes of OA
Osteoarthritis is the progressive breakdown of the articular cartilage with varying amount of inflammation. Some forms of OA are highly inflammatory, for example when a joint is exposed to subchondral bone or when an intra-articular ligament is frayed, and others are mostly free of inflammation, such as mild hip dysplasia. OA can result from abnormal forces placed on normal cartilage or from normal forces placed on abnormal cartilage. In dogs, most cases of OA result from abnormal forces placed on normal cartilage because of joint instability (i.e., intermittent subluxation) or (permanent) joint subluxation. With joint subluxation, the cartilage is loaded focally rather than diffusely. Large forces are concentrated over a small surface, leading to cartilage damage within weeks. Since subluxation is generally irreversible because it is often undiagnosed and is rarely managed with surgery, cartilage damage increase over time and OA sets in. Surgical procedures that eliminate or minimize joint subluxation before the onset of OA make sense because they could potentially prevent OA. Those surgeries require rapid identification of a problem within weeks of its onset. Since the clinical signs of joint subluxation are discreet, the rapid identification of joint subluxation must be triggered in the absence of clinical signs, a process described as screening, where dogs are evaluated for the presence of a problem before signs of that problem are visible. Dogs can be screened for the presence of hip laxity, the trigger for hip OA and for elbow subluxation, one of the triggers of elbow OA. Hip laxity screening is done at 16 weeks of age and can include a PennHIP evaluation, elbow subluxation screening can be done at 4 to 6 months of age. Elbow screening is particularly relevant in chondrodystrophic breeds, since their antebrachial growth is impaired. If hip laxity is detected in a juvenile, pubic symphysiodesis can be performed, and if elbow subluxation is diagnosed, a distal segmental ulnar ostectomy can be performed. In the absence of long-term prospective trials, little is known about the consequences of those protective procedures; they remain investigative at this time. In the absence of surgery, OA will progress over time and will be diagnosed when clinical signs increase.
The physical and functional consequences of OA

In the first few months after onset, OA is associated with pain in the joint capsule and possibly in the subchondral bone. Dogs with joint pain modify their joint position when they rest, stand, walk, trot, and gallop to minimize pain. Those adjustments are most visible when dogs are resting and standing because there is ample time to adjust the position of joints. When dogs are resting, painful joints may be placed in a hyperextended or hyper-flexed position or may be supinated (i.e. elbow joint) presumably because pain is decreased when the joints are in those positions. All situations where dogs place a limb in an unusual position should be viewed as efforts to relieve pain rather than a mannerism. When dogs are standing, they shift weight away from painful limbs. Dogs shift weight from side to side when a single joint is painful and shift weight away from their back legs or front legs when two legs are painful. Shifting weight forward, when both pelvic limbs are painful, requires a much larger effort than shifting weight side to side, and therefore a dog shifting weight toward the front of his body is likely to have to be much more painful than a dog shifting weight toward one side of his body. When dogs are walking, trotting, and galloping, they shorten the stance phase for affected limbs and shift weight toward other limbs. With time, pain becomes more chronic. Pain is amplified locally, becoming regional. In dogs with hip dysplasia, for example, major changes in mechanical sensory thresholds are detected in the foot, indicated that the entire limb has altered pain perception as a result of chronic pain. Mechanical sensory thresholds return to normal by 3 months after total hip replacement. Chronic pain leads to disuse of a painful limb. Limb disuse is associated with a loss of muscle mass and therefore a loss of strength. Joint inflammation and limb disuse is also associated with a potential loss of joint motion. OA is also associated with a loss of proprioceptive awareness.

From a functional standpoint, impairment of dogs with OA often start during growth (first functional stage of OA). Joint pain may lead to a decrease in spontaneous activity, a delay in becoming able to perform strenuous activity, reluctance to being trained, or signs of antisocial behavior. Overall, those signs tend to be mild and are easy to dismiss. In young adults (second functional stage of OA) the signs of OA tend to be most visible after a period of activity, for example after a day of exercise (weekend warrior syndrome). The first and second functional stages of OA have in common the fact that clinical signs are mostly the consequence of pain. Dogs tend to have normal strength, normal joint motion, and normal fitness. Middle-aged dogs show progressive signs of losing the willingness or ability to perform their activities of daily living (third functional stage of OA). Their pain is now chronic, they may have lost strength over time and possibly joint motion and fitness. Older dogs may lose mobility because of OA (fourth functional stage of OA). Dividing the functional consequences of OA in those four functional stages facilitates the management of the disease.

The approaches that positively impact OA

OA can be managed proactively to slow down its progress and protect things that we know might be impacted in the future (strength, joint motion, mobility). OA can also be managed retroactively, once its signs are more severe. Proactive OA management is much more effective and much less costly than retroactive management but, unfortunately, we most often miss or ignore the early signs of OA, waiting for those signs to become severe to take action. A dramatic change in our approach to the management of OA is warranted, where we make sure a dog does not have OA early on, and we leverage proactive measures to slow the progression of OA and minimize its
impact. Retroactive measures are introduced progressively in addition to proactive measures to enhance pain management. The proactive approaches that have a major positive impact on OA include nutrition, exercise, and the use of non-steroidal anti-inflammatory drugs (NSAIDs). Nutrition is the most impactful aspect of proactive OA management. During growth, dogs should not eat as much as they want because that will greatly accelerate growth (relative to a dog that eats 70 to 80% of that amount of food). Rapid growth leads to the expression of faulty genes associated with developmental orthopedic diseases. Also, OA progresses much less rapidly in dogs that remain slender over time than in dogs that are overweight. Nutrition can also be used to decrease the signs of OA, particularly through supplementation with omega-3 fatty acids such as eicosapentaenoic acid (EPA). Exercise has clear benefits in people with OA. People with OA who exercise are less anxious, less depressed, feel better and function better than people who do not exercise. More activity is associated with a lower lameness score in dogs with hip dysplasia. Minimizing OA pain with NSAIDs is also a proactive strategy that allows dogs to stay active, therefore decreasing the progression of OA from one functional stage to the next. Retroactive management of OA focuses on alleviating pain and improving comfort. Pain relief can be provided with a range of approaches, medication-based (e.g., polysulfated glycosaminoglycans, amantadine), modality based (e.g. cold therapy), or manual therapy based (e.g., massage, stretching). As a whole, retroactive OA management steps are more labor intensive and shorter-acting than proactive steps. The efficacy of some of emerging pain-relieving strategies are

The roles of caregivers in managing OA

Changing the approach to managing OA to achieve an early diagnosis requires the involvement of a range of individuals. Everyone in a clinic should be educated about the basic facts of OA such as the fact that it is often present early in life, that its signs are discreet early on, that it can often be diagnosed using simple screening tests, that growth rate will influence its expression and its severity, that weight will greatly influence its progression, that activity is important to control its signs, that acute pain should be managed to slow the onset and decrease the severity of chronic pain. The clinic staff (e.g. reception staff) should be alert so that dogs exhibiting signs such as placing a limb in a pain-relieving position or weight shifting are detected. Veterinary technicians should be empowered to coordinate patient and education. They can teach dogs to exercise and teach owners to exercise their dogs. They can monitor progress of a weight management program. They can communicate regularly with owners and clinicians to ensure that pain is being managed effectively. Sustained communication is one of the most critical predictors of success when managing chronic health problems in humans. It is also critical when managing OA in dogs. Clinicians should increase awareness of OA whenever possible, they should offer guidance for proper screening, they should prescribe pain medications, they should oversee OA management programs coordinated by veterinary technicians. Owners must learn to recognize OA and must make good decisions with regard to nutrition, activity, and pain management.

A practical approach to managing OA at all stages

At the first functional stage of OA in growing dogs, emphasis is placed on owner education, dog training, modulation of growth (to avoid rapid growth), and the short-term use of NSAIDs. At the second functional stage of OA in young adults, emphasis is placed on treating potential flare-ups (with rest, NSAIDs, and activity modification), developing an exercise and activity program, and optimizing weight. At the third functional stage of OA in adults, emphasis is placed on the
assessment of loss of strength, joint motion, and joint pain and on alleviating pain in the short-term while weight and activity are managed. Small changes in the living environment and activities of daily living should be introduced so that future flare-ups are minimized. At the fourth functional stage of OA in older dogs, an assessment of pain, loss of strength and conditioning is performed. Ergonomic steps are introduced to facilitate mobility. An activity and exercise program adapted to the patient are introduced. Weight and pain are also cautiously managed. It may be easier and more effective to start the OA management as an inpatient at that stage of the disease.

Conclusions
The management of OA in dogs should be as proactive as possible, starting during the early stages of the disease, before profound changes in pain, strength, joint motion, and fitness. The most effective approach is to manage weight, activity, and NSAID administration to keep the dog active and free of flare-ups. That is achieved using a number of key steps:

− Keeping in close contact with owner of dogs with OA
− Debunking the myths that surround OA
− Emphasizing the importance of having a slender dog
− Promoting movement
− Treating early signs of pain using simple approaches such as rest and NSAIDs
− Detecting transitions toward more severe functional stages of OA promptly, and managing them effectively