Osteoarthritis, from Cover

SmallAnimal

Osteoarthritis (OA) is one of the most common health conditions in our canine companions and likely the most common orthopedic problem in dogs. The prevalence has not been established exactly, but most medical writers quote 20 percent of dogs have this disease.[1] Dogs of all ages can develop OA; unfortunately, it is often overlooked in younger dogs. While there is no simple cure that erases osteoarthritis, several strategies make a significant positive impact on its progression and effects. This article presents a comprehensive, evidence-based approach to managing this disease in every stage over a dog's lifetime.

Why dogs get OA

From a scientific standpoint, the causes of canine OA have not been strictly established. The most common appear to be developmental orthopedic diseases, such as hip and elbow dysplasia. These are multifactorial (influenced by genetic and environmental factors) and polygenic (influenced by multiple genes) diseases. Regarding the 50 most affected breeds, the Orthopedic Foundation for Animals (OFA) estimates the prevalence of hip dysplasia at 21 percent, while for elbow dysplasia it is 16 percent. A 40-year study tracking dogs treated at 27 veterinary teaching hospitals showed 16 breeds were at increased risk for hip dysplasia with an overall occurrence of eight percent.[2]

OA is also prevalent in the shoulder joint, but less is known about how it develops in this location. In a lifelong observational study of Labrador retrievers, the prevalence of shoulder OA at eight years of age was 57 percent in slender dogs and 86 percent in overweight dogs.[3] OA also results from cranial cruciate ligament injuries. OFA's study identified 13 breeds at risk of cranial cruciate ligament injury, with an overall prevalence of 4.6 percent.[2] Patellar luxation is another cause of OA, with one survey identifying a prevalence of 1.3 percent.[4]

The mechanism most often responsible for canine OA appears to be joint subluxation. The OA present in hip dysplasia results from subluxation of the femoral head, while osteoarthritis associated with elbow dysplasia results from humero-ulnar or radio-ulnar subluxation. There is no scientific evidence that age and exercise cause OA in dogs,[5] even if the dog-owning public tends to think wear and tear of joints and exercise cause osteoarthritis. (See Table 1 for more common myths about OA.)

The functional impact of OA: Four stages

Dividing the predictable functional impact of OA in dogs into four stages allows trends to emerge (See Table 2). Osteoarthritis in the first two stages often goes undetected or ignored, as signs are generally mild and because OA is often erroneously considered a problem affecting older dogs. In most instances, the clinical signs of OA in its first two stages result from acute joint pain, causing minor loss of strength or fitness.

OA is often diagnosed in Stage 3 because the clinical signs are harder to ignore or dismiss—chronic pain and loss of strength are often present.

At the fourth stage, dogs with OA lose the ability to walk. This is linked to severe chronic pain, declining strength, loss of fitness, and possibly decreased joint motion. These clinical signs are sometimes interpreted as dogs giving up; however, this is an exaggeration. When dogs with Stage 4 OA exercise on an underwater treadmill, they generally walk well.

Management options: Proactive versus retroactive

Managing OA throughout the stages can be proactive or retroactive.

PHOTOS COURTESY DENIS J. MARCELLIN-LITTLE

Figure 1

This one-year-old Labrador flexes his right carpus to alleviate the pain he feels due to elbow dysplasia with early osteoarthritis. OA's warning signs often include a mild lameness and the potential placement of a limb into a pain-relieving position. Osteoarthritis was suspected in this dog based on the presence of a lameness and a pain response to flexion of the left elbow. It was confirmed with a CT scan. Managing this patient's OA included keeping the dog active while avoiding strenuous activity and optimizing body weight. The administration of pain medications as needed and the intramuscular administration of polysulfated glycosaminoglycan were recommended.

The former protects joints from degeneration and slows the progression of OA, while the latter alleviates OA pain and minimizes clinical signs without impacting the course of the disease. Proactive OA management is more effective because maintaining strength is much easier than recovering it.

Proactive OA management steps can include:

- **Optimizing (*i.e.* slowing) bone growth.** Achieved by mildly limiting food consumption during growth and avoiding calcium supplementation.[6,7]
- **Protecting cartilage with glycosaminoglycan polysulfates.** Use of prescription injectable glycosaminoglycan polysulfates in early studies, prior to its approval in 1997, was shown to protect the cartilage of dogs with hip dysplasia during their first year of life. The mechanism of action for this drug effect is unknown.[8]
- **Keeping dogs slender.** Maintaining a healthy weight dramatically decreases the rate of OA progression[3,9] and increases longevity in dogs.[10,11]

Retroactive OA management options include:

- **Relieving pain.** Achieved through medications, particularly nonsteroidal anti-inflammatory drugs (NSAIDs),[12,13] nutritional

Table 1: Common Canine OA Myths

MYTH	REALITY
OA is a geriatric dog disease	Most dogs with OA develop it early in life
Growing fast is a sign of health	Quickly growing dogs experience greatly increased odds of developing OA from a developmental orthopedic disease[6]
Exercise causes OA in dogs	While exercise can hasten the discovery of the disease in dogs, OA is most often caused by developmental orthopedic problems[5]
Dogs with OA should not exercise	Exercise is associated with less lameness in dogs with OA[19]

Table 2: Functional stages: Early diagnosis is key

	LIKELY AGE OF DEVELOPMENT	SIGNS	MANAGEMENT STRATEGIES
Stage 1	Young, still-growing dogs	• Intermittent, lasting a few seconds or minutes • Often dismissed by pet owner	Proactive • Minimize cartilage damage • Optimize growth • Socialize and educate Retroactive • Decrease pain • Optimize weight • Optimize activity
Stage 2	Young adult dogs	• Intermittent signs increase over months to years • Trigged by periods of intense activity • Become more easily triggered and longer lasting	Proactive • Recognize flare-ups and understand triggers • Minimize cartilage damage Retroactive • Manage pain • Optimize weight • Stay active
Stage 3	Adult dogs	• Reluctance to exercise • Reluctance to climb stairs or jump into vehicles • Unable to perform daily activities	Proactive • In-depth OA impact assessment: unwilling or unable • Minimize cartilage damage Retroactive • Multimodal, sustained pain management • Targeted exercise program • Sustained, frequent reevaluation
Stage 4 (critical)	Older dogs	• Inability to walk • Inability to function	Retroactive • Modalities with limited effectiveness may interfere with effective management • Fall back on key management options • Physical rehabilitation

Figure 2

This six-year-old golden retriever with hip osteoarthritis is trotting during an exercise session, and moving well. The dog's clinical signs correspond to the second functional stage of OA, with an intermittent lameness that tends to be triggered by excess activity. Most dogs with hip OA have a relatively mild lameness, which tends to improve when they exercise regularly.[19]

Figure 3

This one-year-old Labrador mix has OA of his hip joints. Changes in his posture include shifting weight toward the front of his body; having a narrow pelvic limb stance and a wide thoracic limb stance; flexing his spine and bringing his pelvic limb forward; and avoiding hip joint extension while relying on excessive tarsal extension. These postural changes result from pain in the hip joints and the lack of willingness to load and extend the hips. Because the pain is severe, the dog reached the third functional stage of OA at a very young age.

supplementation, and the use of electrophysical modalities, such as cold therapy for superficial joint pain.[14] Medications beyond anti-inflammatories offer limited pain relief to dogs with OA.[13] Amantadine, an N-Methyl-D-aspartate receptor antagonist, may offer small benefits over time.[15] Nutritional supplements such as omega-3 fatty acids and undenatured collagen can decrease OA pain.[12] Dogs with osteoarthritis may or may not experience a limited pain-relieving benefit from a range of modalities, including acupuncture and laser therapy. Massage most likely can offer modest short-term pain relief to some canine OA patients, based on its short-term efficacy to relieve osteoarthritic pain in human shoulder and knee.[16]

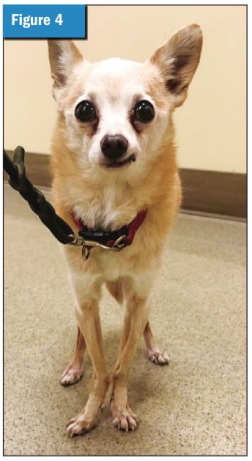
- **Therapeutic exercise.** People with OA who exercise are less painful and less depressed, plus they function better. These benefits last as long as exercise is sustained[17,18] and are on par with the benefits of NSAID therapy.[18] In dogs with OA, exercising more is associated with a lower lameness score.[19]
- **Weight loss.** When dogs with OA lose weight, their lameness decreases. In one study, weight loss of six percent led to a decrease in lameness and weight loss of nine percent led to objectively improved kinetic force plate parameters.[20]
- **Stretching.** The motion of most arthritic joints is not particularly restricted. For example, in one study, hip joints with OA lost one degree of extension per year.[19] Therefore, stretching probably offers no benefits for most joints with OA. However, some joints with OA lose a lot of motion.[19] Since joint pain appears to result from stretching the joint capsule, those dogs are likely to benefit from a stretching program.

Proactively managing OA over a dog's lifetime

Managing OA is a complex undertaking, due to the wide range of clinical signs and severity, plus the large number of management approaches. The best way to manage OA over a dog's lifetime is to create a culture in your veterinary hospital that emphasizes proactivity. This approach includes educating owners about OA early in their dog's life, detecting and diagnosing the disease in its first or second stages, and implementing proactive management strategies, such as slow bone growth resulting from eating limited quantities of food, cartilage protection with a prescription (polysulfated glycosaminoglycan [PSGAG]), and weight optimization. To support this approach, use retroactive strategies like NSAIDs and exercise to manage clinical signs.

When managing OA, resist the tendency to rely solely on pain relief, as this approach only controls the clinical signs of the disease for a few hours at a time, making it a costly, relatively ineffective strategy that is difficult to sustain long term. When selecting pain relief approaches, be sure to consider cost, convenience, and scientific effectiveness. Pain relief should represent a means rather than an end. At the first functional stage of OA, pain relief allows dogs to be less painful while they are socialized and trained. At the second stage, pain relief helps dogs return to an active lifestyle, even if their activity is adapted to their problem. In Stage 3, relieving pain allows dogs to engage in strengthening therapeutic exercises. At the fourth stage, it can help dogs recover some mobility so they can also improve their strength and fitness.

Figure 4



This 14-year-old Chihuahua has osteoarthritis of his right carpal joint. The dog had sustained a fracture of his right radius and ulna before one year of age that was managed initially with a cast and later with cross pins. He healed with some angulation of his lower limb. Factors potentially contributing to his OA included the trauma he sustained, the immobilization of his carpus during the management of his fracture, and the asymmetric loading of his carpus due to its angulation. While osteoarthritis is more commonly managed in dogs from large breeds and in the hip, elbow, and stifle joints, it is also debilitating in smaller dogs and in distal joints. OA management considerations for this patient include medical therapy and the potential use of a brace to support and limit the motion of the right carpus.

Several options described as alternative, complementary, or adjunctive can be used to help manage canine OA, including photobiomodulation (laser therapy), acupuncture, and herbal medicine. Even if dog owners report positive anecdotal impressions and even if limited positive results have been detected in small trials, these options have no scientifically detectable benefits when evaluated in prospective, controlled trials or when systematically reviewed.[12,21] The debate about whether alternative OA management strategies offer benefits may be a distraction from the larger issue of their place in managing OA at various functional stages. Alternative OA management strategies most often are intended to offer short-term pain relief.

For short-term pain relief during the first two functional stages of OA, rest, cold therapy, NSAIDs, and omega-3 fatty acids are more convenient and less costly than adjunctive strategies. During the third and fourth stage of OA, adjunctive strategies are unlikely to make a significant positive impact toward achieving the key management objectives of maintaining or recovering the ability to perform daily activities (Stage 3) or mobility (Stage 4). Therefore, relying extensively on adjunctive methods to manage OA is probably less than ideal. The pain associated with the third and fourth stages of OA is generally chronic and severe, and most likely cannot be controlled using a single, simple strategy. Therefore, it is reasonable to seek potential additional pain relief from alternative OA management options along with the basic strategies (rest, ice, NSAID, omega-3 fatty acids) and in combination with strengthening and stretching.

Takeaway message

Evidence shows the most predictably successful method to managing osteoarthritis in dogs is a proactive approach emphasizing prevention. Engaging the veterinary team in pet owner education and support can improve outcomes for canine OA patients. Doing so increases the chance this disease is noticed and diagnosed in Stages 1 or 2, so proactive medical management can begin before a dog's joints and strength are damaged beyond repair. ●

Denis J. Marcellin-Little, DEDV, DACVS, DACVSMR, is a veterinarian specializing in surgery and rehabilitation. He teaches and practices at the University of California, Davis. Over the last 20 years, Dr. Marcellin-Little has focused on helping dogs with osteoarthritis.

REFERENCES

View references for this article at veterinarypracticenews.com/osteoarthritis-june-2020.

Veterinary Practice News®
THE INFORMATION LEADER FOR VETERINARY PRACTICE AND BUSINESS
June 2020 • Volume 32/Number 6 • VeterinaryPracticeNews.com

MANAGING OSTEOARTHRITIS in all stages and ages

PHOTO © CYNOCLUB/DREAMSTIME.COM

By Denis J. Marcellin-Little, DEDV, DACVS, DACVSMR

Why take a proactive approach to OA? Maintaining strength is much easier than recovering it. OA, Page 24

WHAT YOU NEED TO KNOW IN ORDER TO HELP PREVENT SEROTONIN SYNDROME

By Ibrahim M. Shokry, BVSc, MVSc, PhD

Many antidepressant drugs increase serotonin levels, which can be life-threatening and cause death.

Serotonin, Page 26

HOW AI CAN SUPPORT PREVENTIVE CARE

PHOTO © PHOENIX021/DREAMSTIME.COM

By Jennifer Ogeer, DVM, MSc, MBA, MA

In addition to predicting disease, artificial intelligence is helping to support the value of preventive care.

Artificial intelligence, Page 28