

Practical management of canine osteoarthritis

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Categories : [Companion animal](#), [Vets](#)

Date : January 19, 2015

Canine osteoarthritis (OA) is a common age-related disease in first opinion practice. This review will not consider other inflammatory causes of osteoarthritis (for example, septic or rheumatoid).

OA is usually diagnosed on presenting history and physical examination without confirmatory imaging. This is justifiable because radiographic changes do not correlate well with clinical findings and pain (Barr, 1987) and radiographs were not very sensitive at detecting OA in lifetime studies of Labrador retrievers (Runge, 2008), as by the end of life 87 per cent of the dogs had cartilage erosion of the humeral head, and 91 per cent OA on histopathology, but radiography only detected OA in 78 per cent of dogs.

For this reason, repeat radiography is not recommended as a routine monitoring procedure.

With advancing age, osteoarthritis is likely to occur in multiple joints and, when evaluating gait, stiffness and lameness multiple joint involvements complicate assessment, while severe OA in one or more joints may mask OA in other joints.

Concurrent diseases are common in older dogs and signs of muscle wastage or reduced exercise tolerance are not necessarily due to progression of OA. Other causes of generalised muscle wastage, systemic causes of weakness and cardiovascular or respiratory causes of reduced exercise tolerance should be ruled out.

A range of management tools is available, including therapeutic, nutritional and exercise modification, and adopting evidence-based medicine principles should help clinical decision making for patients with OA. Unfortunately, objective assessments, such as gait or force-plate analysis, are usually only available in referral centres.

In general, a multimodal approach will be needed to help minimise the dose and/or frequency of

administration of drugs and lifetime management is needed for dogs with OA.

OA management for veterinary objectives

Communication with client

Communicate clearly with the owner from the outset.

Explain how OA is not curable, set realistic expectations for improvement and provide advice about future management. Explain how the case is likely to progress, what signs to look for, why compliance with instructions is important and how to monitor progress. Whenever possible, provide written instructions.

Prevention of disease onset or progression

OA is frequently a sequel to trauma, joint laxity (for example, hip dysplasia, patellar luxation or cranial cruciate rupture) or other joint diseases, such as osteochondrosis. Whenever possible, early intervention should be performed to mitigate against the development or severity of OA.

Surgical removal of intraarticular material and joint stabilisation are two examples of treatments that may delay onset or progression.

Diets formulated for elderly (senior) dogs usually have a profile considered beneficial in arthritis, including low-calorie content with nutritional supplements (omega-3 fatty acids, glucosamine, chondroitin).

In research, hip OA was delayed or prevented in Labrador retrievers fed 25 per cent less food than their litter mates and in those that did develop OA the severity was less in the diet-restricted group (Smith, 2006).

Healthy dogs should have a body condition score between two and three out of five; however, these studies might not reflect bodyweight alone as diet-restricted dogs consumed 25 per cent less protein, carbohydrate, fat, vitamins and minerals, as well as calories.

High body mass and body condition score increase biomechanical load bearing on joints contributing to progression and signs of OA. Obese animals might have other risks for OA because white adipose tissue produces leptin, which induces cartilage degradation by moderating matrix metalloproteinase activity (Hui, 2012), so obesity should be avoided, or treated if present.

There is some laboratory evidence NSAIDs may delay progression of OA, but this has yet to be verified.

Relieve pain

Once pain is present an analgesic licensed in the UK for use in OA in dogs should be provided ([Table 1](#)) and the choice of medicine should be determined after a full assessment and screening of the animal for underlying conditions.

Concern has been expressed about an increasing off-label use of analgesics, including tramadol and paracetamol, when the efficacy and safety has not been established in dogs (Davies, 2012b; Shaymaa, 2010) and when the evidence is they are not very effective in humans with osteoarthritis (Cepeda, 2006; Towheed, 2006).

While we know licensed medicines are effective, it cannot be assumed all individuals are pain free – as some dogs may still be in pain despite treatment (Davies, 2012a) and, therefore, ongoing pain assessment is necessary.

Assessment of chronic pain in a brief follow-up consultation can be misleading and other methods should be considered, including the use of owner questionnaires (Hielm-Björkman, 2003; Wiseman-Orr, 2004; Brown, 2007, 2008 and 2009), which can be used to monitor progression long term.

I recommend the validated Canine Brief Pain Inventory (CBPI) as reported by Brown, which can be downloaded for clinical use from the University of Pennsylvania website (www.upenn.edu).

Another objective evaluation tool to consider is the use of activity monitors.

Medical therapy

Licensed NSAIDs are widely used in the management of OA, but they are contraindicated in animals with cardiac, hepatic or renal disease, or where there is a possibility of gastrointestinal ulceration or bleeding, or evidence of blood dyscrasia. According to datasheets, use in elderly animals, which are most likely to develop OA, involves an increased risk that requires a reduced dosage and careful clinical management.

Care is also needed if an animal is dehydrated, hypovolaemic or hypotensive.

Elderly dogs should be screened (history review, physical examination, blood tests and urinalysis) for risk factors for acute renal failure, hepatic disease or gastrointestinal ulceration before NSAIDs are administered. If risk factors are identified, alternative drugs should be used, or a reduced dose and/or increased dosing interval used.

The lowest effective dose should be used, but long-term administration is generally better than short-term, intermittent administration (Innes, 2010). NSAIDs should not be administered with another NSAID or corticosteroid; however, in one study (Engelke, 1995) concurrent medication of

phenylbutazone with prednisolone in 100 dogs with various musculoskeletal diseases was found to be effective and no adverse events were noted. Combination products are licensed in the UK ([Table 1](#)).

There is evidence therapeutic diets can reduce the dose of carprofen and meloxicam without compromising efficacy (Fritsch, 2010; Wernham, 2011).

Maintaining limb function

Maintaining limb function and activity is important in preserving quality of life for the dog and its owner and is achieved by ensuring regular exercise and, when necessary, physiotherapy and hydrotherapy.

Articular cartilage obtains nutrients from synovial fluid, and weight-bearing forces and movement are necessary for this to occur. Inactivity leads to muscle wastage, reducing support around joints and increased joint stiffness. Controlled exercise can be used to build up and strengthen soft tissues around joints to help support them.

Physiotherapy and hydrotherapy should be carried out by properly trained personnel. A series of physiotherapy sessions has been shown to increase the range of movement in arthritic joints in dogs (Crook, 2007).

Aquatic physical activities – swimming and hydrotherapy – are beneficial by encouraging limb movement while the dog's weight is supported in water. Water can also be used to increase resistance against which the dog has to walk or trot on a submerged treadmill.

However, controlled canine studies are needed to determine the true value of these interventions. In humans, significantly less pain and improved physical function, strength, and quality of life were reported, but it was unclear whether the benefits were attributable to intervention effects or a placebo response (Hinman, 2007).

A period of rest is important during acute inflammatory phases and if there is joint effusion, but generally, frequent short exercise periods of 15 to 20 minutes are advised. Exercising should not exacerbate clinical signs of pain or reluctance to continue activity. If an inactive dog is required to increase its exercise this should be introduced gradually.

While walking, it is useful for owners to use a GPS system in a mobile phone to measure the distance and duration of exercise and to keep a diary of events.

If their dog starts to tire, or becomes reluctant to walk, the time/distance travelled can be logged to monitor the animal's exercise capability.

Monitoring exercise through the use of activity monitors is becoming increasingly popular (Brown, 2010) especially as they are now relatively cheap. More expensive monitors can be used to obtain a very detailed analysis of exercise patterns.

Monitoring

It is important to put in place owner-centric as well as veterinary monitoring for efficacy of treatment, progression of OA and development of other clinical problems.

Basic factors to measure regularly are bodyweight, body condition score and assessments of muscle mass. For guidance, see the American Animal Hospital Association guidelines on nutrition (Baldwin, 2010). Also monitor exercise performance – distance and duration – clinical signs and for evidence of other disorders.

Nutritional management

Various nutritional interventions may be considered for the management of canine OA and a summary of the findings of a recent systematic review (Davies, 2014, unpublished) are presented in [Table 2](#). The highest degree of confidence is for some of the therapeutic diets that have published randomised controlled clinical trials (RCTs) to support their use. I consider the evidence weak if there is only one published RCT because in science repeatability is essential to support the findings as being true. As can be seen from [Table 2](#), when multiple RCTs are available they often present conflicting evidence.

Other treatment modalities

Acupuncture

Although widely used in the management of osteoarthritis-associated pain in dogs and humans, the scientific evidence on the efficacy of acupuncture remains controversial. Some studies have suggested benefits without (Still, 1989) or with gold beads (Jansenns, 1986; Jaeger 2006; Scognamillo-Szabo, 2010), but others have been unable to demonstrate a beneficial effect, including systematic reviews (Hielm-Bjorkman, 2001; Bolliger, 2002; Habacher, 2006; Sanderson, 2009).

Electrotherapy

There are different techniques for applying electrical current to tissues and in one paper (Miacnik, 2006) transcutaneous electrical nerve stimulation (TENS) resulted in improved weight loss and clinical signs.

Homeopathy

While homeopathy is not generally accepted as an effective treatment by the profession, one randomised, controlled masked trial showed beneficial effects of a homeopathic combination preparation called Zeel in the management of canine OA (Hielm-Bjorkman, 2009).

Hot and cold

While the application of cold to inflamed joints to cause vasoconstriction and reduce inflammation is well established in humans, clinical studies are lacking for dogs. Hot packs should not be applied to swollen joints because vasodilation may make this worse.

Massage

Massage can help disperse fluid in muscle and, in conjunction with physiotherapy and other modalities, may help reduce periarticular swellings and stiffness in joints.

Regenerative medicine

Three studies have reported improvements in lameness, pain and range of movement following intra-articular administration of autologous adipose-derived mesenchymal stem and regenerative cells in dogs with chronic hip (Black, 2007; Vilar, 2013) and elbow (Black, 2008) osteoarthritis. However, patient numbers were low ($n= 21$ and $n=14$ respectively) so the studies had weak statistical power and the latter study was not a randomised, controlled or masked study.

Surgery

In situations in which the patient has severe OA with intractable pain or a non-functional joint or limb, surgical intervention may be necessary, such as arthrodesis, amputation or joint replacement. However, these may be inappropriate for dogs with multiple joint involvement.

Ultrasound

Therapeutic ultrasound can be applied in pulsed (non-thermal stimulus) or non-pulsed (thermal and non-thermal stimuli applied) modes, but is best used in management of muscular conditions rather than osteoarthritis.

Monitoring

Dogs with OA should be monitored regularly. The legal requirement for repeat prescriptions of POM-V products is six-monthly, but frequency should be tailored to the individual dog and should

be more frequent if screening detects evidence of systemic disease.

For example, if there is evidence of chronic kidney disease I recommend use of the International Renal Interest Society (IRIS) guidelines (IRIS, 2014) which, depending on staging, can advise re-evaluation after two months.

Because problems are increasingly likely to arise with advancing age, each re-examination should involve a detailed history, physical exam and appropriate laboratory evaluations, as well as objective assessments such as gait analysis, force plate analysis or activity monitors if available.

Summary

A step-by-step way to manage OA in dogs:

- When first diagnosed, identify any underlying cause for the OA and treat if possible to delay progression.
- Advise the client of the need for bodyweight control to avoid excessive weight gain and institute a weight loss programme for obese dogs.
- In mild OA consider introducing at least a senior diet, but, preferably, a therapeutic diet formulated for OA that has good controlled clinical studies to support its use.

Once pain is present:

- Obtain a full history, conduct a physical examination and appropriate diagnostic tests to rule in/out clinical or subclinical disease, especially renal or hepatic issues.
- Use a licensed analgesic. These can be used with confidence for safety and efficacy, but ongoing monitoring is still needed, at least every six months (legal requirement), but more frequently as needed.
- Avoid off-label use of medicines without proven efficacy and safety.
- Plan regular reassessments (at least six monthly) based on individual needs.
- Consider using activity monitors and/or a validated owner questionnaire to assist with ongoing assessment of chronic pain.
- Consider other treatment modalities after discussion with owner, including nutritional interventions and alternative treatments, even though the scientific evidence for their use may be weak.

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Physiotherapy should be carried out by trained personnel and can increase the range of movement in arthritic joints.

IMAGES: Pride Veterinary Centre, Derby.



Robert, 13, and Charlie, 10, the author's elderly Labradors, both have OA. Charlie is a recently

rescued dog and has other issues (hence his body condition score).



Aquatic physical activity encourages movement while the dog's weight is supported by the water. Water can also be used to increase resistance using a submerged treadmill.

IMAGES: Pride Veterinary Centre, Derby.

Class of drug	Names
NSAIDS	Carprofen, cimicoxib, firocoxib, ketoprofen, mavacoxib, meloxicam, nimesulide, phenylbutazone (dogs above 20kg), robenacoxib, tolfenamic acid.
Corticosteroids for anti-inflammatory properties	Dexamethasone, prednisolone, methylprednisolone.
Combined opiate and NSAID	Codeine and paracetamol.
Combined NSAID and corticosteroid	Cinchophen and prednisolone.
Other	Pentosan polysulfate.
Herbal remedies (see NOAH Compendium)	Mixed vegetable tablets, garlic and fenugreek.

Table 1. Medicines licensed for use in the management of canine OA in dogs (correct at November 24, 2014)

Description	Assessment grade**	Treatment modalities
Systematic review meta-analysis of multiple RCT* studies	Good	None
More than one RCT* (+/- grey literature to support product licensing)	Good	None
More than one RCT* with positive findings using objective outcome measures	Good	Therapeutic diets
Single RCT* with positive findings using objective outcome measures	Weak	Collagen, elk velvet antler
All or none study	Good	None
Systematic review of good quality cohort studies	Moderate	None
More than one RCT* with positive findings using subjective outcome measures	Moderate	None
Single RCT* with positive findings using subjective outcome measures	Weak	Antioxidant administration, flavonoid mixture, special milk protein concentrate
Multiple non-RCT* with positive findings using objective outcome measures	Moderate	None
Single non-RCT* with positive findings using objective outcome measures	Weak	None
Single non-RCT* with positive findings using subjective outcome measures	Weak	Gelatin, polydextrose fibre supplement
Conflicting evidence from RCT* studies using objective outcome measures	Weak	Glucosamine +/- chondroitin, omega-3 fatty acids (fish oil)
Conflicting evidence from RCT* studies using subjective outcome measures	Weak	Chondroitin, green lipped mussel extract, turmeric (P54FP, curcumin)
Conflicting evidence from non-RCT* studies	Weak	Diacerein/diacerhein
No evidence for efficacy from studies performed	None	Beta-1,3/1,6 glucans, S-Adenosyl-L Methionine (SAMe)
Abstract only available in English	Unclassified	Avocado/soybean unsaponifiables
No studies found	None	Biacalain, bromelain, garlic +/- fenugreek, ginger, L-carnitine, L-cysteine, manganese, methylsulfonylmethane (MSM), mixed vegetable tablets, resveratrol
(*RCT – randomised controlled trial; ** Grade – reflects clinical confidence in evidence for efficacy). A poor grade does not mean that the specific treatment modalities are not effective; just that, currently, good evidence is lacking.		

Table 2. Summary of grading of the evidence for nutrition in the management of OA in dogs following a systematic review of the literature (Davies, 2014, unpublished)

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