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FELINE ARTHRITIS MANAGEMENT

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Osteoarthritis in the cat has received a lot of attention in the last ten years, when prior to that it was an infrequently recognised and poorly understood problem in the cat. As veterinarians we should be assessing cats, particularly the older animal, for its presence and educating owners in its treatment and management.

What is osteoarthritis (OA)?
Osteoarthritis implies a joint problem, primarily associated with degeneration and loss of cartilage and proliferation of bone in the form of osteophytes around the joint. This results in a joint that has a reduced range of motion and one that is undergoing low grade inflammation resulting in varying degrees of pain and swelling of the offending joint(s).

In cats osteoarthritis can be secondary to underlying developmental joint disease such as hip dysplasia *(Figure 1)*. It can occur subsequent to a joint injury such as an intra-articular fracture or luxation but it usually occurs as a primary problem with no easily identifiable underlying cause. Cats develop osteoarthritis in all their large joints, but particularly the hip, hock and elbow joint *(Figure 2) (Hardie et al 2002, Lascelles et al, 2012)*. Over 80% of cats greater than 12 years of age had axial skeletal changes *(Hardie et al 2002)*. Appendicular skeletal changes are even more common with over 90% of cats of all ages having radiographic changes in at least one joint *(Lascelles et al 2012)*.

- Reduced height of jump
- Reduced activity
- Sleeping more
- Playing less
- Decreased grooming
- Less keen to interact with owner
- Seeks seclusion
- Increased elimination outside the litter tray

Table 1. Clinical signs associated with osteoarthritis in the cat.

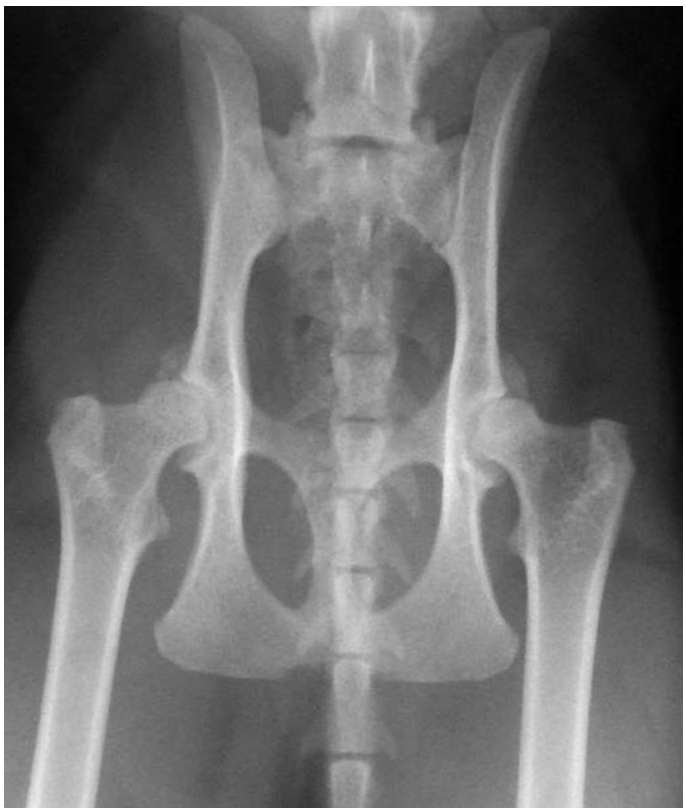

Figure 1. Hip osteoarthritis in an eight year old domestic short haired cat secondary to hip dysplasia. Large bilateral osteophytes are present on the cranial acetabulum.

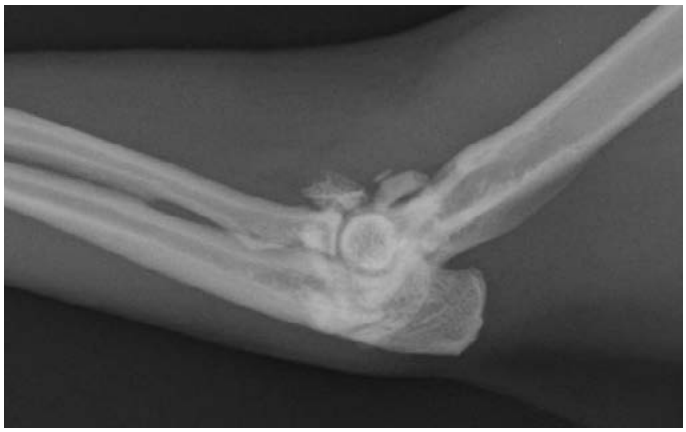

Figure 2. Elbow osteoarthritis in an eleven year old burmese cat. There are peri articular osteophytes and joint mice. Bilateral elbow changes were present.

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QUESTIONS TO ASK OWNERS OF CATS WITH THE POSSIBILITY OF OSTEOARTHRITIS.

Have there been any changes in the cat's ability or enthusiasm to:

- Go up and/or down stairs
- Use the cat flap
- Jump onto or off the bed/sofa/your lap/work surfaces etc.
- Jump or climb into/onto its favourite bed
- Play
- Climb trees/fences etc.
- Use scratching posts (or other substrates)

Have any of the following been noticed?

- A stiff or stilted gait (i.e. less fluid – less 'feline' - motion)
- A limp
- Vocalizing or hissing in response to moving around or being stroked over joints

Have any of the following changes in your cat's behaviour been detected?

- Grumpy or less happy with people and other animals in the house
- More withdrawn – interacting less with others in the house
- Less active
- Sleeping in different locations e.g. on the floor
- Not coming upstairs/into the house any more
- Passing urine or faeces in abnormal locations *e.g.* beside the litter tray, other locations inside the house
- Purring less
- A reduced appetite
- Changes in coat condition (e.g. matted, scurfy) and/or grooming behaviour – e.g. grooming less overall, neglecting certain areas (pain over joints or pain turning to groom certain areas), overgrooming certain areas (e.g. due to pain over a joint)

Other miscellaneous questions

- Any weight change?
- Has the cat had any known trauma or musculoskeletal injuries in the past?
- Any knowledge concerning affected relatives? (e.g. hip dysplasia is more common in certain breeds e.g. Maine Coon and possibly other pure breed cats)

Table 2. Historical questions that can help to identify musculoskeletal problems in cats *(Modified from Caney S. Feline Focus, 2007).*

How to diagnose OA

Owners may believe that it is normal for their older cat to sleep more and be less active. As vets we need to be aware of the high incidence of OA in the older cat and not dismiss an owner's observation that their cat cannot jump as high anymore as being normal for an older cat *(Table 1)*. If the cat is in pain and unwilling to move around because of osteoarthritis then it is important to educate owners as to this possibility and to try to intervene to alleviate some of the pain that the cat is experiencing.

There are some useful questions that a vet can ask of an owner to try to identify cats with musculoskeletal problems *(Table 2)*. Alternatively the cat owner can be asked to complete a validated questionnaire prior to the consultation and then regularly thereafter to assess response to treatment *(Zamprogno et al 2010, Benito et al, 2013)*.

Orthopaedic examination

Lameness perhaps surprisingly is not the most prevalent clinical sign of osteoarthritis in the cat. Behavioural changes are more common and usually associated with the cats' decreased agility and reluctance to move around. Performing an orthopaedic examination of a cat can be tricky and often requires patience. In a cat that is impossible to examine ask the owner to video the cat in its home environment and then you will be able to assess their concerns more fully. Ask them to video the cat doing the things it finds difficult – e.g. jumping or climbing stairs. In the more amenable cat then watching it walk around the consulting room and allowing or encouraging it to jump on and off a chair can be helpful to observe if there are any gait abnormalities. Then examining the joints, firstly by running your hand over the cat with an assistant holding the cat gently over its chest to prevent it walking away. You may need assistance to keep the cat standing still. The changes to look for in individual joints are swelling or enlargement, decreased range of motion and pain. However bear in mind that not all joints will be painful and not all painful joints will have osteoarthritis. Some cats resent joint examination even when the joint is not painful or arthritic. The presence of crepitus, joint thickening and joint effusion has been shown to be predictive of the presence of radiographic DJD *(Lascelles et al 2012)*.

How to confirm the diagnosis?

Although the combination of appropriate clinical signs and physical examination findings may lead you to be fairly certain a cat has OA it is ideal to try to confirm your suspicions by seeing change on radiographs. Radiographs of affected joints can be taken after sedation.

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A combination of midazolam and ketamine can be useful in the older cat, avoiding use of drugs that lower blood pressure and putting the older cat on intravenous fluids whilst it is sedated.

The primary radiographic change associated with osteoarthritis is the presence of periarticular osteophyte formation although this is not always present or easily identifiable in every case. It is important to appreciate that osteoarthritis may be present in the absence of obvious radiographic changes. Contrarily the presence of radiographic changes does not always correlate with clinical signs of osteoarthritis. Occasionally cats develop excessive periarticular mineralisation and ossified bodies adjacent to their joints, particularly in the stifle joint *(Figure 3)*.

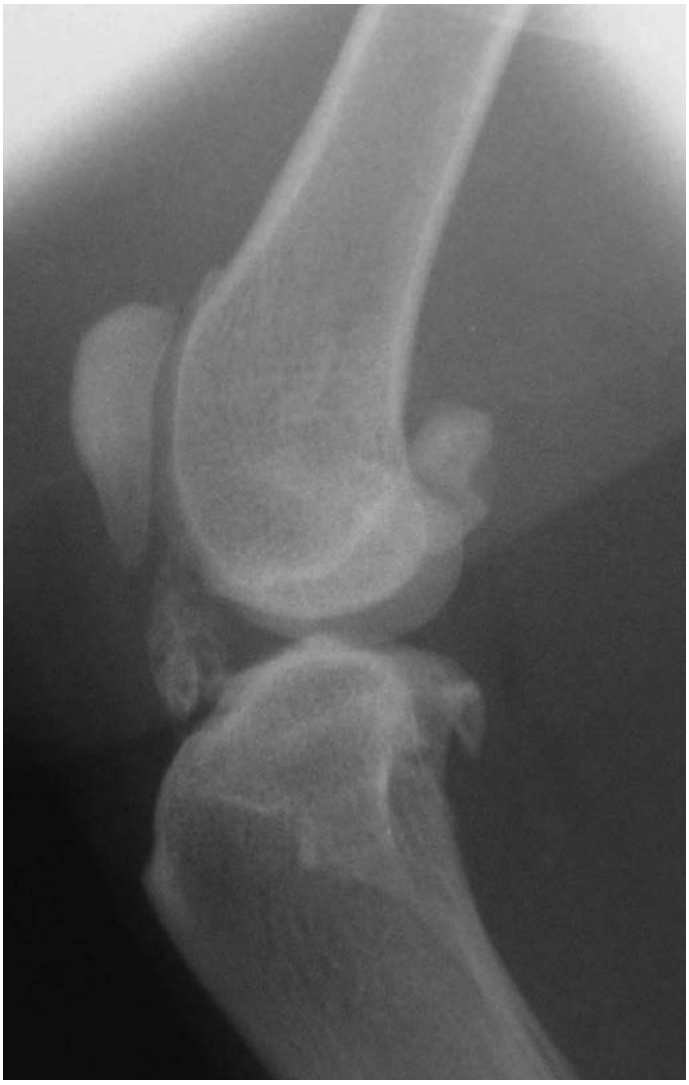

Figure 3. Mineralisation of the intra-articular structures in the stifle of a seven year male neutered cat. There is also mild periarticular osteophytosis of the stifle with new bone on the proximal pole of the patella and trochlear ridge.

Treatment

Once you have established that a cat does have osteoarthritis a treatment plan needs to be formulated. The aims for treatment are to treat the primary problem and prevent or limit progression of the disease.

For combination therapy we can consider the following categories:

- **Drug therapy**
- **Dietary modulation**
- **Weight loss**
- **Physical therapy**
- **Exercise**
- **Environment modification**

Drug therapy

What medication is suitable for cats, particularly if you are considering that long-term administration may be likely? Non steroidal anti-inflammatory drugs (NSAIDs) are the main treatment modality in most species, and the cat is no different. Meloxicam is the only NSAID licensed for long term use in the cat but other NSAIDs are available for short term usage and the licensing for these medications may change in the future so they also become available to use long term. A client leaflet is available advising on safe use of NSAIDs at **www.isfm.net/toolbox** and **www.catvets.com/professionals/guidelines/publications**

Multimodal analgesic therapy is being introduced to the feline patient although it is in the early stages of usage *(Lascelles and Robertson 2010, Sparkes et al, 2010)*. The basic premise is to use drugs that will act synergistically – most commonly combining a NSAID with other drugs such as amantadine, gabapentin or tramadol.

NSAIDs, older cats and renal disease?

Older cats with OA may have concurrent disease that may concern you when considering administering drug therapy, particularly as it may need to be given long term. Routine blood and urine analysis is recommended prior to starting therapy to investigate for renal or hepatic problems. It is also advisable to measure blood pressure as inhibition of cyclooxygenase (COX) in the kidneys can exacerbate pre-existing hypertension.
If cats are diagnosed with chronic kidney disease (CKD) then NSAIDs can still be used with appropriate checks and follow ups. There are two studies evaluating the long term usage of NSAIDs (meloxicam and piroxicam) in cats, including cats with International Renal Interest Society (IRIS) stage 3 CKD.

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NSAIDs IN CATS WITH RENAL DISEASE AND OA

- **Monitor blood and urine for renal & potassium abnormalities before and after starting therapy**
- **Start with the lowest effective dose**
- **Consider using adjuvant therapy**
- **Give NSAID with food, preferably wet to increase water intake**
- **Treat hydration and avoid its occurrence**
- **Additional care and checks required if concurrent cardiac disease, consider alternative therapies**

Table 3. Considerations for NSAID administration in cats with renal disease and Osteoarthritis.

Stem cell therapy

Stem cells extracted from adipose tissue and injections of plasma rich protein are two therapies that hold potential for modulating inflammation and repairing or regenerating damaged tissues. These have been used in humans and dogs and anecdotally some reports are positive. However studies is dogs are limited in number *(Vilar et al 2013),* and there are no studies yet in cats, so at this time further work is needed to fully evaluate the benefits of this type of therapy.

Drug	Dose	Comments	Mode of Action	References
Amantadine	1.0-4.0mg/kg SID (start at lowest dose and increase slowly).	Minor CNS and GIT signs seen in humans and dogs.	NMDA antaganonist.	Perry, 2014.
Amitryptiline	0.5 - 2.0mg/kg PO q24h.	May be useful addition to NSAIDs for chronic pain.	Blocks noradrenalin e and serotonin reuptake.	Chew *et al* 1998.
Buprenorphine	0.02mg/kg. sublingual q8h	Can cause anorexia after 2-3 days. Smaller doses (5-10μg/kg) may be better for long term usage.		Carroll GL *et al* 1998.
Gabapentin	5-10mg/kg q12h.	Particularly effective if increased sensitivity or excessive pain	Unknown mode of analgesic effect.	Lascelles & Robertson 2010.
Ketoprofen	1mg/kg PO q24hr, maximum 5 days.	Can be used as pulse therapy or has been used by some at 1mg/kg every 3d long term. Alternatively use 0.5mg/kg daily for 5d (weekday) followed by no drug over the weekend and then repeated.	COX-1 inhibition.	Lascelles *et al* 2001.
Meloxicam	0.1mg/kg po day 1, then 0.05mg/kg PO 4d then 0.05mg/kg eod OR 0.25-0.5mg/kg daily	Well received as an oral medication. Drop size can be unpredictable so best dispensed by syringe. GI signs primary complication.	Preferntial inhibition COX-2.	Gunew *et al* 2008.
Prednisolone	0.5-1.0mg/kg PO q24h OR 0.25-0.5mg/kg eod.	Can be very effective. DO NOT use in combination with NSAIDs.	Inhibit prostaglandin synthesis.	Lascelles and Robertson 2010.
Robenacoxib	1-2mg/kg PO q24h up to 6d	Palatable tablets. Concentrated at sites of inflammation. GI side effects.	Selectively inhibits COX-2.	Giraudel *et al* 2009 a,b.
Tolfenamic acid	4mg/kg SID for max of 3d.	Acute musculoskeletal pain. GI side effects.	COX inhibitor.	Perry 2014.
Tramadol	1-2 mg/kg q12-24h.	Side effects such as euphoria, mydriasis, salivation, nausea seem more common in the cat. Very unpalatable.	Metabolites agonists at opioid receptors. Inhibits reuptake of noradrenalin e and serotonin.	Papich and Bledsoe 2007, Pypendop & Ilkiw 2008.

Notes: Some drugs are approved for inflammatory or painful conditions in the cat in certain countries, and doses for the control of chronic pain are extrapolated from these. The doses given come from Lascelles and Robertsons (2010) experience, and the experience of others working in the area of clinical pain control. Sources of information are given. Where sources of information are not given, there is no readily available information on this drug as an analgesic in the cat.

KEY - **PO** = orally, **SC** = subcutaneously, **PCV** = packed cell volume, **GI** = gastrointestinal, **CNS** = central nervous system, **NMDA** - N-methyl-d-aspartate, **COX** - cycloxygenase

Table 4. Drug therapy for the cat with Osteoarthritis.

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Nutraceuticals and diets

Nutraceuticals are food supplements with potential health benefits. The claims for these products include anti-inflammatory properties, cartilage regeneration and delayed cartilage degeneration with the potential to improve mobility and decrease stiffness in animals. There is currently no definitive unbiased (trial not sponsored by the manufacturer of the nutraceutical or diet) in vivo measurable evidence that they work, but they may be having a benefit in the long term.
The products currently marketed for cats often contain a mixture of various nutraceuticals and additives and these are documented in Table 5.

Product trade name	Contents	Claims	Preparation	Comments	Manufacturer
Yumove Advance	Green lipped mussel Hyaluronic acid Glucosamine Chondroitin Manganese Vitamin E.	Improves mobility Supports joints Aids stiff joints.	Capsules, easy sprinkle free to reduce the risk of kidney and bladder problems.	Phosphate and vitamin C.	Lintbells.
Cosequin	Glucosamine Chondroitin Manganese.	Supports cartilage production and protects against breakdown.	Capsules to sprinkle.	Supports bladder health.	Nutramax Labs.
Dasuquin	Glucosamine Chondroitin Manganese. Avocado/Soybean unsupontifiables.	Supports cartilage production and inhibits cartilage breakdown.	Tasty easy to administer capsule.	Also supports bladder health.	Nutramax Labs.
Seraquin	Glucosamine HCL Chondroitin sulphate Circumin.	Joint support supplement.	Palatable tablets.	Tablets can be hidden in food if not eaten from the hand.	Boehringer Ingelheim.

Table 5. Nutraceuticals and supplemented diets available for the cat.

Diets rich in omega-3 fatty acids are recommended for cats with DJD *(Lascelles et al, 2010b)*. Recent studies have provided evidence that n-3 fatty acid supplementation can reduce the inflammatory and matrix degradative response elicited by chondrocytes during OA progression. These diets may also assist with weight loss. Two diets are available that are specially formulated for cats with joint problems, Hill's feline JD and Royal Canin's feline mobility diet. They contain some or all of omega-3 fatty acids, green lipped mussel powder, glucosamine and chondroitin.

Weight reduction

While obesity has not been proven as a risk factor for OA in cats, it is notable that approximately 14% of older cats suffering from OA are obese *(Clarke & Bennett, 2006)*.

Weight loss in cats with OA should be encouraged by the use of low calorie diets and encouraging exercise. The latter might be improved by environmental modification. Regular monitoring by revisits are required to maintain motivation.

Exercise

Encouraging the cat to move around more can be achieved by the use of toys, feeding puzzles, playing chase games and cat nip toys. A cat tower / scratcher with different levels but easily accessible may encourage more activity. Owners should try to interact with their cats and encourage play several times daily.

Environmental modification

Altering the cats' environment to accommodate its disability associated with the osteoarthritis can have beneficial effects. This can be achieved by ensuring the cat has easy access to its food and water bowls, sleeping area and litter tray, and if this is not the case providing access by means of steps or a ramp. A litter tray with a low side can aid entry and prevent accidents in the house. Ensure the cat flap is easily accessible both from inside and out

Physical therapy

Physiotherapy and hydrotherapy will not suit every cat but with an amenable animal these therapies can have advantageous effects. Where possible a programme should be designed, implemented and monitored by a qualified veterinary physiotherapist *(Montavon et al, 2009)*. Passive range of motion exercises and massage can be performed at home and be useful at reducing muscle pain *(Lascelles & Robertson 2010)*. Cold and heat therapy, laser, ultrasound, and shock wave are other therapies that could be considered although there is little evidence published about their usage in cats.

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Neutraceutical	Purported claims	Mode of action
Glucosamine sulphate	Building block of cartilage	Mild anti-inflammatory effects. Precursor for glycosaminoglycan and proteoglycan synthesis.
Chondroitin sulphate	Provides raw materials for building new cartilage.	Delays cartilage breakdown. Anti-inflammatory action. Stimulate hyaluron synthesis.
Omega 3 fatty acids	Improve function in dogs and cats with OA.	Reduce the inflammatory and matrix degradative response in chondrocytes.
Hyaluronic acid	Helps lubricate joints.	Exogensous product enhances chondrocyte hyaluronic acid and proteoglycan synthesis. Reduce production of mediators.
Avocado/Soybean unsapontifables	The addition of ASU (avocado/soybean unsapontifables) appears to boost analgesic effects.	Antioxidant and increases viscosity of synovial fluid.
Circumin	Potent natural antioxidant.	Anti-inflammatory.
Green lipped mussel (perna canaliculus)	Anti-inflammatory.	Inhibits 5 lypoxygenase pathway.
Manganese	Supports collagen formation in cartilage, tendon and ligaments.	Detoxification of superoxide free radicals.
Vitamin E	Anti-oxidant.	Helps neutralise free radicals.

Table 6. Summaries of the various products included in 'Mobility' supplements for cats.

Acupuncture can be beneficial and has been used in cats with arthritis. It may take several sessions before an improvement is seen and then intermittent top up treatments can be used for maintenance. Acupuncture can be used in combination with analgesic drugs.

Surgery

There may be an underlying condition that is causing or predisposing a cat to osteoarthritis such as cranial cruciate ligament rupture, elbow dysplasia, patellar luxation, hip dysplasia and traumatic injury. Underlying problems with the joint lead to degeneration and inflammation causing synovitis, loss of cartilage and sclerosis of the subchondral bone. Elimination of these underlying problems can be an important part of managing or preventing and limiting osteoarthritis formation. Surgical correction of joint stability, removal of osteochondral fragments and correction of inappropriate loading of the joint is often needed to slow the progression of osteoarthritis and give the best outcome. Arthroscopic flushing can be used for an already arthritic joint. Salvage surgery by joint fusion,replacement or excision can all be performed in the end stage joint where medical management and environmental modification are no longer deemed effective *(Figure 4)*.

Some patients will still require nutritional and perhaps medical therapy following surgery. Post operatively the nutraceuticals (such as Cosequin or Dasuquin) can be given following surgery for extended periods of time in cats. NSAIDs are also used as needed for additional pain management and anti-inflammatory properties.

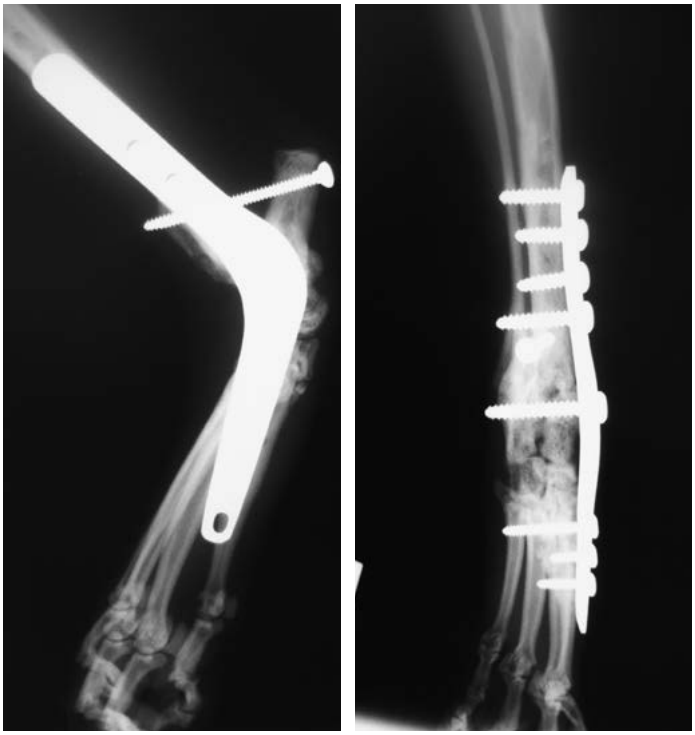

Figure 4. A four year MN DSH had a traumatic hock injury that resulted in osteoarthritis and the cat was ultimately treated by pantarsal arthrodesis with a custom arthrodesis plate. *(Images courtesy Gordon Brown).*

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References

Benito J, Depuy V, Hardie E, Zamprogno H, Thomson A, Simpson W, Roe S, Hansen B, Lascelles BD. Reliability and discriminatory testing of a client-based metrology instrument, feline musculoskeletal pain index (FMPI) for the evaluation of degenerative joint disease-associated pain in cats.
*Vet J. 2013 Jun;***196:** 368-73

Caney S. Feline Arthritis. *Feline Focus, 2007,* **17(3)** 11-17.

Chew DJ, Buffington CA, Kendall MS, *et al.* Amitriptyline treatment for severe recurrent idiopathic cystitis in cats.
J Am Vet Med Assoc 1998; **213:** 1282–86.

Carroll GL, Howe LB, Slater MR, *et al.* Evaluation of analgesia provided by postoperative administration of butorphanol to cats undergoing onychectomy.
J Am Vet Med Assoc 1998; **213:** 246–50.

Gunew MN, Menrath VH, Marshall RD. Long- term safety, efficacy and palatability of oral meloxicam at 0.01–0.03mg/kg for treatment of osteoarthritic pain in cats. *J Feline Med Surg 2008;* **10:** 235–41.

Giraudel JM, King JN, Jeunesse EC, *et al.* Use of a pharmacokinetic/pharmacodynamic approach in the cat to determine a dosage regimen for the COX-2 selective drug robenacoxib. *J Vet Pharmacol Ther 2009;* **32:** 18–30.

Giraudel JM, Toutain PL, King JN, et al. Differential inhibition of cyclooxygenase isoenzymes in the cat by the NSAID robenacoxib. *J Vet Pharmacol Ther 2009;* **32:** 31–40.

Hardie EM, Roe SC, Martin FR: Radiographic evidence of degenerative joint disease in geriatric cats: 100 cases (1994-1997).
J Am Vet Med Assoc 2002, **220(5):**628-632.

Hulse S, Physical Therapy. In Feline Orthopaedic Surgery and Musculoskeletal disease. Montavon P, Voss K, Langley-Hobbs SJ, Elsevier, Saunders, 2009.

Lascelles BD, Henderson AJ, Hackett IJ. Evaluation of the clinical efficacy of meloxicam in cats with painful locomotor disorders. *J Small Anim Pract 2001;* **42:** 587–93.

Lascelles BDX, Robertson S. DJD - associated pain in cats. What can we do to promote patient comfort? *Journal of Feline Medicine and Surgery 2010* **12,** 200-212.

Lascelles BD, Dong YH, Marcellin-Little DJ, *et al.* Relationship of orthopedic examination, goniometric measurements, and radiographic signs of degenerative joint disease in cats. *BMC Vet Res 2012;***8:**10.

King JN, Dawson J, Esser RE, *et al.* Preclinical pharmacology of robenacoxib: a novel selective inhibitor of cyclooxygenase-2. *J Vet Pharmacol Ther 2009;* **32:** 1–17.

Papich MG, Bledsoe DL. Tramadol pharmacokinetics in cats after oral administration of an immediate release tablet. *J Vet Int Med 2007;* **21:** 616.

Perry K, The lame cat: the challenge of degenerative joint disease. *Companion Animal 2014:* **9,11;** 582-525

Pypendop BH, Ilkiw JE. Pharmacokinetics of tramadol, and its metabolite O-desmethyl-tramadol, in cats.
J Vet Pharmacol Ther 2008; **31:** 52–59.

Sparkes *et al* ISFM and AAFP consensus guidelines. Long term use of NSAIDs in cats. *JFMS 2010* **12** 521-538

Robertson SA, Lascelles BD. Long-term pain in cats: how much do we know about this important welfare issue? *J Feline Med Surg. 2010 Mar;***12(3):**188-99

Vilar JM, Morales M, Santana A, *et al.* Controlled, blinded force platform analysis of the effect of intraarticular injection of autologous adipose-derived mesenchymal stem cells associated to PRGF-Endoret in osteoarthritic dogs. *BMC Vet Res 2013;***9(131)**:1-6.

Zamprogno H, Hansen BD, Bondell HD, Sumrell AT, Simpson W, Robertson ID, Brown J, Pease AP, Roe SC, Hardie EM, Wheeler SJ, Lascelles BD. Item generation and design testing of a questionnaire to assess degenerative joint disease-associated pain in cats.
*Am J Vet Res. 2010;***71:**1417-24.