THE FELINE HIP – HOW IS IT DIFFERENT TO THE CANINE?

Karen L Perry BVM&S CertSAS DipECVS FHEA MRCVS
Veterinary Medical Center, Michigan State University, 736 Wilson Road, East Lansing, MI 48824
kperry@cvm.msu.edu

Introduction

Hip osteoarthritis (OA) is relatively common in the domestic cat but is not well recognised. The incidence is breed dependent with pure-bred cats having a greater incidence than domestic short-haired (DSH) cats. Of the pure-bred cats, the Maine Coon is the most likely to be affected.

Hip dysplasia in other species is an inherited disease and the mode of inheritance is generally accepted to be polygenic. The heritability of feline HD has not been specifically documented but it is considered likely that genetics plays a role.

The canine neonate is born with normal joint conformation but in individuals predisposed to HD, changes occur between 30-60 days of age which lead to abnormal joint development. (1) The situation is different in humans where pathologic changes are usually present at birth. The sequence of events relative to the time at which pathologic changes occur is not well described for the cat but HD in cats is consistently associated with an abnormally shallow acetabulum. (2) This appears to be an important cause for the onset of OA and a major conformational defect of feline HD. The shallow acetabulum is similar to the situation in humans but differs to dogs, where subluxation of the hip joint, with or without a shallow acetabulum, is an early radiographic finding. (2) In dogs, laxity of the hip joint has been recognized as a constant feature of HD and this is generally accepted to play an important role in the pathogenesis. Although cats have a shallow acetabulum, subluxation of the femoral head is not consistently seen, suggesting that joint laxity may not play the same role in pathogenesis. (2)

Clinical Presentation

Due to the nature of chronic, gradual onset pain associated with OA the accompanying behavioral changes can be subtle and easily missed. Clinical signs associated with HD include inactivity, pelvic limb lameness worsened by exercise, difficulty climbing, reluctance to jump, inability or reluctance to climb stairs, walking in a crouched position, howling while resting and a reluctance to squat to defaecate.

Lameness associated with HD in cats can vary from relatively mild to severe with an inability to walk on the pelvic limbs. In addition to this, HD is commonly bilateral and bilateral lameness can be difficult to recognize with the gait simply being stiff and stilted with shortened strides bilaterally. With unilateral problems, cats may unload a painful limb, demonstrate a hip hike, or use the tail asymmetrically to shift weight toward the more normal side when the cat is in motion.

Physical examination findings include cats pain and crepitus upon extension of the hips and muscle atrophy. When examining the hip, abduction should be performed in addition to flexion, extension and rotation. In most cats you can easily obtain 90^o of pain-free abduction, similar to dogs. Cats with hip OA generally resent hip abduction, sometimes more so than flexion and extension. The Ortolani sign can be attempted, although this is not usually possible in the conscious cat and in cats with painful hips it is possible for them to overcome this test through muscular forces.

Imaging

Lateral and ventrodorsal radiographs centered at the level of the coxofemoral joints are the standard radiographic projections when imaging the pelvis. The normal acetabulum in cats is generally shallower than in the dog. In dogs, one of the generally accepted criteria for normal acetabular depth is coverage of 50% of more of the femoral head. If this criterion were applied to cats then HD would be over-diagnosed. Objective measurements used in the assessment of coxofemoral joints include the Norberg angle (NA) and the distraction index (DI). Cats have a shallower acetabulum which is reflected in a lower NA, with the mean feline NA being 92.4^{o} (3) compared with 103.4^{o} for dogs with normal pelvic radiographs. Measurement of NAs in two separate studies revealed that cats with OA had lower NAs (84^{o} +/- 10^{o}, 86^{o}) than cats without signs of OA (95^{o} +/- 5^{o}, 98^{o}). (3,4) Low NA values reflect a combination of subluxation secondary to increased joint laxity and reduced acetabular depth.

The DI is a ratio or unitless index of passive coxofemoral laxity. Most canine breeds with DI values greater than 0.3 experience an increasing incidence of coxofemoral OA but the cat seems to be protected from OA until greater joint laxity is evident as cats with DI values of less than 0.4 do not have signs of OA. (5) There remains (as in dogs) a direct relation between increasing DI values and radiographic evidence of OA with the mean DI for cats with OA (0.6) being significantly higher than for cats without OA (0.49). (5)

In one study, the most common radiographic finding present in dysplastic cats was a shallow acetabulum and this was sometimes the only radiographic abnormality. (2) Subluxation, is not as consistently associated with OA in cats. (2) Degenerative changes seem to develop later and are less marked than in the dog and unlike in dogs, most degenerative changes appear on the craniodorsal acetabular margins with a low incidence of degenerative remodeling reported on the femoral head and neck. (6)

Non-Surgical Management

While the clinical signs associated with feline OA are less obvious than those associated with canine OA, there is little doubt that cats suffer pain associated with OA and that this warrants appropriate therapy.

Non-surgical management may include:

- Environmental and activity modulation
- Physical therapy
- Dietary modulation
- Weight reduction
- Nutraceuticals
- Drug therapy
    - NSAIDs
    - Multimodal analgesia
- Stem cell therapy
- Appropriate monitoring

Surgical Management

There are two recommended options for surgical management of feline HD and associated OA; femoral head and neck excision (FHNE) and total hip replacement (THR).

Femoral Head and Neck Excision – FHNE is a salvage procedure intended to alleviate pain associated with movement of diseased coxofemoral joints. The clinical results reported following this procedure vary significantly. Successful outcome after FHNE is dependent on sufficient periarticular muscle competency for maintenance of a functional and durable pseudoarthrosis and high levels of postoperative rehabilitation are often required in order to achieve optimal long-term function.

Reported complications after FHNE include ongoing lameness associated with limb shortening, patellar luxation, sciatic neurapraxia, and limitation in range of hip motion accompanied by severe muscle atrophy. The most common reason for poor outcome after FHNE is bone-to-bone contact between the proximal femur and acetabulum which may or may not be related to inadequate femoral neck resection.

There is a commonly held perception that function after FHNE is better in cats and small dogs. This is based upon a widely accepted presumption that the ability to compensate for the mechanical disadvantages of an absent coxofemoral articulation is dependent upon weight, with lighter animals having an advantage. Recent work has questioned this presumption, after demonstration of long-term functional disabilities in many small breed dogs and cats after FHNE. (7)

Total Hip Replacement - Although FHNE has the potential to return some dogs and cats to nearly normal function, inconsistent clinical results have fuelled a trend toward the preferential choice of THR as the standard of care. Micro THR aims to improve quality of life while maintaining normal biomechanical function in cats that are affected by coxofemoral pain caused by OA. This is undoubtedly beneficial when considering salvage procedures of the coxofemoral joint, as restoration of normal hip joint function is certainly the preferred outcome.

Complication rates associated with THR in dogs include aseptic loosening, septic loosening, improper implant positioning, periprosthetic femoral fracture, luxation, sciatic neurapraxia, pulmonary embolism, femoral medullary infarction, patellar luxation, extraosseous cement granuloma formation and neoplasia. Only small numbers of cats have been reported in the literature but the outcomes for all of these are stated to be successful or excellent (8,9) and favourable when compared to FHNE. (10)

Although no objective data comparing functional outcome in cats after FHNE and THR have been reported, it seems likely that cats will benefit from joint replacement in preference to FHNE. (8) However, there is a risk of complications with Micro THR and cost implications, and surgeons should weigh the risks versus the potential benefits. (9) Until further evidence is available, and based on the encouraging initial results of micro-THR in dogs and cats, THR should be considered as an alternative to FHNE in any cat in which salvage surgery is required.

References

1. Riser WH: Growth and development of the normal canine pelvis. J Am Vet Rad Soc 1973; 14: 24-34
2. Keller GG, Reed AL, Lattimer JC, Corley EA. Hip dysplasia: A feline population study. Vet Radiol Ultrasound 1999; 40: 460
3. Langenbach A, Giger U, Green P et al. Relationship between degenerative joint disease and hip joint laxity by use of distraction index and Norberg angle measurements in a group of cats. J Am Vet Med Assoc 1998; 213: 1439
4. Koeppel E, Ebner J. Die hueftgelenksdysplasie der katze. Kleintierpraxis 1990; 35: 281
5. Allan GS. Radiographic features of feline joint disease. Vet Clin North Am Small Anim Pract 2000; 30: 281-302
6. Smith GK, Gregor TP, Rhodes H, Biery DN. Coxofemoral joint laxity from distraction radiography and its contemporaneous and prospective correlation with laxity, subjective score and evidence

of degenerative joint disease from conventional hip-extended radiography in dogs. Am J Vet Res 1993; 54: 1021-1042
7. Off W, Matis U. Excision arthroplasty of the hip joint in dogs and cats – clinical, radiographic and gait analysis findings from the Department of Surgery, Veterinary Faculty of the Ludwig-Maximilians-University of Munich, Germany. Vet Comp Orthop Traumatol 2010; 23: 297-305
8. Witte PG, Scott HW, Tonzing MA. Preliminary results of five feline total hip replacements. J Small Anim Pract 2010; 51: 397-402
9. Liska WD. Micro total hip replacement for dogs and cats: surgical technique and outcomes. Vet Surg 2010; 39: 797-810
10. Liska WD, Doyle N, Marcellin-Little DJ, Osborne JA. Total hip replacement in three cats: surgical technique, short-term outcome and comparison to femoral head ostectomy. Vet Comp Orthop Traumatol 2009; 6: 505-510