



Update on Canine Hip Dysplasia

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Introduction

Canine hip dysplasia (CHD) is a common, inherited, developmental condition resulting in mal-articulation of the coxofemoral joint and secondary degenerative joint disease. Multiple treatment options are available and depend on the age of the animal, desired function, pathological condition of the joint and financial resources of the owner.

Pathogenesis

Dogs with CHD are born with normal appearing hips. By 4 to 12 months in affected dogs, there is a biomechanical imbalance between the forces acting on the hip and the soft tissues maintaining joint congruency. The result is increased joint laxity. The greater the laxity, the greater the chance for development of osteoarthritis.

There are many proposed mechanisms for the development of CHD, although none have been established as the definitive cause. Many reports have established a hereditary basis for CHD. The mode of inheritance is complicated and appears to be polygenic. Recent work has documented that genetic selection alone will work to improve hip quality. However, the phenotype of dysplastic dogs appears to be determined by a combination of genetics and environmental factors. Rapid growth and overfeeding are two of the most likely factors that can increase the severity of osteoarthritis in dogs with CHD.

Diagnosis

The diagnosis of CHD is accomplished by a combination of palpation and radiography. A positive "Ortilanti sign" is confirmation of hip joint laxity. Not all dogs with positive Ortilanti signs will develop clinical CHD. Many radiographic techniques are currently used to aid in the diagnosis of CHD. Standard hip extended (OFA) views are useful but have the limitation of masking hip joint laxity in some cases. OFA views are further limited by the need to wait two years to accurately predict the presence of disease. Stressed views (Penn HIP and 60 degree) have the benefit of showing laxity in a more functional position and may be abnormal as early as 4 months of age. The stressed techniques can be used to determine a distraction index (DI). The DI is a ratio of the distance from the center of the acetabulum to the center of the femoral head divided by the radius of the femoral head. Dogs with a high DI have a high probability of

developing CHD. Breeders should be encouraged to pursue stressed radiography in dogs at 6 months, prior to selection of breeding stock.

Other methods used to evaluate the coxofemoral region include the dorsal acetabular rim (DAR) view. This view gives more information about the degree of osteophyte development on the acetabular rim and is used by some to determine suitability for triple pelvic osteotomy.

Recently ultrasound has been used to determine the amount of laxity in puppies. Puppies with laxity demonstrated as early as 6-8 weeks have a high probability of development of CHD. Limitations include difficulty in verifying the correct imaging plane, user dependent results, and availability of equipment.

Treatment

Conservative medical management is often used as the first line of defense with CHD. This includes weight loss, anti-inflammatory drugs, nutraceuticals and acupuncture. In a long term follow up of 68 immature dogs with hip dysplasia that were managed conservatively, only 24% developed severe gait abnormalities and 63% had no pain on hip extension. Although the study has its limitations (no force plate analysis, no control groups, few objective criteria) it did suggest that there is a subset of animals that may respond well to conservative therapy.

Triple Pelvic Osteotomy (TPO) is recommended for treatment of CHD in young dogs to establish joint congruence and minimize the progression of degenerative joint disease. Ideal candidates for TPO should be 6 to 18 months of age with minimal radiographic evidence of DJD and a positive Ortilani sign.

Osteotomies are performed on the ilium, ishium and pubis and a canine pelvic osteotomy plate (Slocum Enterprises) is applied to the ilium to rotate the segment of bone 20, 30 or 45 degrees. Recent work has shown that increasing the degree of rotation does not significantly improve the beneficial effects of a TPO. Long-term results of TPO are excellent. Force plate analysis of 15 dogs with TPO demonstrated that treated limbs had locomotor function similar to those of normal hind limbs of a control group. Dogs with TPO have good range of motion of the hip, decreased radiographic progression of disease and decreased pain. Complications associated with the procedure are uncommon but include screw loosening, sciatic neuropraxia, progression of DJD, and incisional complications. The ischial incision is most prone to trauma and secondary seroma formation.

Femoral Head and Neck Excision (FHNE) is a salvage procedure for CHD. It is usually reserved for dogs less than 35 pounds that are not responding to conservative therapy. FHNE can be used in larger dogs but will have variable results. The most important part of a FHNE is to remove an adequate amount of the neck. The bone should be taken back to the level of the lesser trochanter to create a pain-free fibrous articulation. Interpositional muscle flaps (biceps, gluteal) are not indicated with FHNE.

Post-operative management of FHNE patients is different than in most orthopedic surgeries in that early limb use is encouraged. Physiotherapy consisting of gentle flexion and extension combined with analgesics may speed recovery time.

Total Hip Replacement (THR) has been successfully used in dogs for the last 30 years to treat CHD. Two broad categories of THR are available: cemented and non-cemented. Both have similar success rates in the dog, but the porous coated, non-cemented prosthesis is not yet commercially available. Non-cemented prostheses rely on bony ingrowth to stabilize the implants versus relying on polymethyl-methacrylate (PMMA). This may enable use in younger dogs and reduce the chance of implant loosening.

Cemented THRs have been used extensively in the dog since the mid 1970s. The initial fixed head (Richard's) systems have been largely replaced with the more versatile modular components of BioMedtrix. In addition to improved implant design, several new surgical techniques have led to even lower complication rates. Pulsatile lavage systems are now being used to completely remove blood and debris from the implant site to greatly improve strength of cement adherence. New, third generation cementing techniques include centrifugation and pressurization of the cement to minimize air pockets and improve the cement mantle around implants. A new device for centralization of the femoral implants has been introduced to minimize the potential for endosteal contact of the implant, which may lead to premature loosening.

Improved technique and experience with the procedure has led to a very low complication rate. Complications occur in 5 to 10% of patients. These complications include infection, dislocation of implants, loosening, sciatic neuropraxia or femoral fracture. Of all of the listed complications, only infection requires implant removal. Surprisingly, even these dogs may have good post-operative function. The amount of scar tissue present may improve the resulting FHNE outcome. Dislocation and loosening can be managed successfully by revision procedures.

Cemented THR can be performed in dogs older than 10 months. Ideal candidates for THR should not be obese or have any evidence of underlying infectious or neurologic conditions. Any urinary tract infections or pyoderma should be eliminated prior to surgery. Preoperative screening tests should include OFA and lateral views of the hips, complete blood count, biochemical profile and urinalysis with culture.

Although CHD is a bilateral disease, only one hip is operated on at a time. The most clinically affected limb is operated first. In 50-60% of dogs, unilateral THR gives sufficient pain relief to allow good function. In dogs with severe disease or lameness the second hip may be replaced no sooner than 8 weeks after the first.

Most dogs are walking on the affected limb the day after surgery. Dogs are maintained in the hospital until they are able to ambulate on their own and do not require analgesics. This is usually 1 to 2 days after surgery. Strict rest and confinement are mandatory for 8 weeks after THR! During this period, dogs are most prone to luxation and should not be allowed any off-leash activity. After this period, radiographs are taken to confirm implant stability and dogs are allowed a slow return to normal function over the next four weeks.

THR has also been used successfully to manage chronic hip luxations, comminuted acetabular fractures, comminuted proximal femoral fractures, failed femoral head and neck excisions and neoplasia of the coxofemoral region.

Symphysiodesis is the newest concept in management of CHD. This involves cauterization or stapling of the pubic symphysis. Arresting growth at this level results in greater lateral acetabular coverage of the femoral head. Long term evaluation of this technique in dysplastic dogs has not been performed. The age at which this technique should be performed to allow ideal acetabular coverage has not been determined and likely will vary between breeds. Research in this field is ongoing.