

CANINE HIP DYSPLASIA (CHD)

Introduction

The hip joint is a simple ball and socket type of joint, and the ball (femur head) is normally positioned deeply within the socket (acetabulum) throughout the full range of motion (Fig.1). CHD occurs when the ball can slip in and out of the socket due to an abnormal amount of laxity in the hip joint of juvenile dogs (Fig.2).

Initially this joint laxity tears the surrounding soft tissues which try to support the hip joint which causes pain, however minimal changes will be visible on normal X-rays.

Eventually bone on the edge of the socket and end of the ball begin to wear away where the two bones are scraping past each other every time the joint pops in and out. The joint reacts by laying down arthritic bone around the joint (Fig.3 & Fig.4B). These changes are visible on normal X-rays but are only visible later in the development of CHD.

CHD is the single most common cause of osteoarthritis in the canine hip joint.

Over 90% of cases involve CHD in both hip joints.

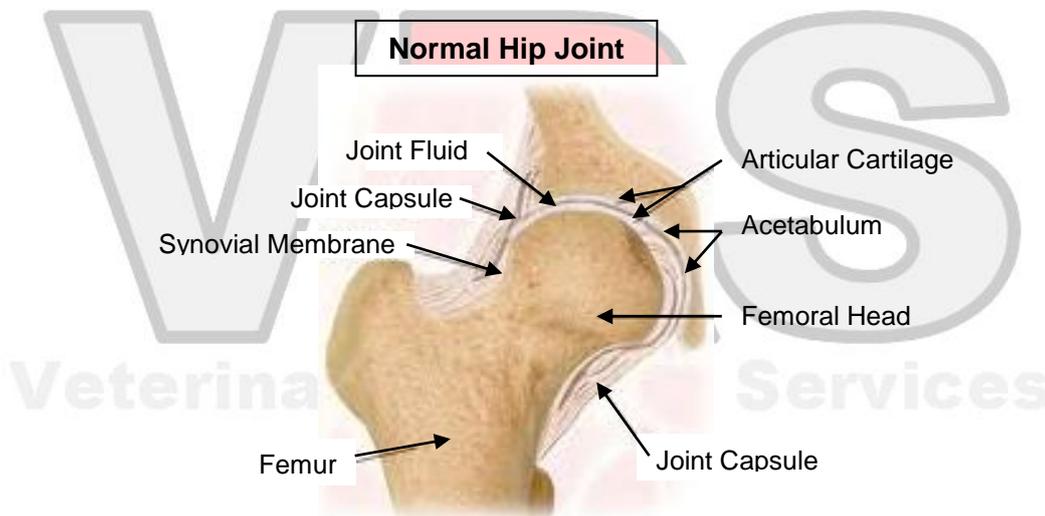
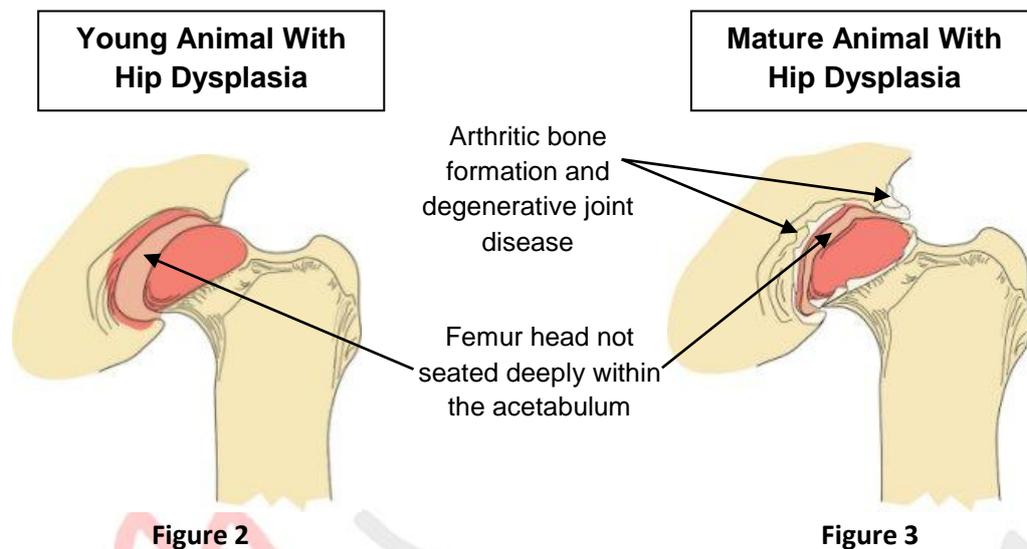


Figure 1



CHD is caused by a number of factors:

- **Genetic**
Heritability ranges from 20% – 60% depending upon the dog breed. Common breeds affected include German shepherds, Labrador and golden retrievers, St. Bernards, bullmastiff, Newfoundland, Rottweilers, boxers, huntaways etc. Some large breed dogs such as grey hounds, Siberian huskies and Dobermann pinschers tend to be at lower risk. Smaller breeds such as some of the spaniel breeds and Border collies are also commonly affected.
- **Hormonal**
Predisposed bitches have a number of hormones which are at abnormal levels in the milk.
- **Environmental**
Over nutrition, rapid growth, traumatic exercise.

Environmental factors will worsen a genetically predisposed individual but will not cause CHD in an individual not genetically at risk. A dog without the genes for CHD is very unlikely to develop CHD. However not all dogs carrying the genes for CHD will develop CHD. Therefore you may have individual animals which appear to have normal hips but carry the CHD genes, which will then be passed onto their progeny. Therefore it is critical to not only assess the hip scores (see Diagnosis) of the parents, but also the grandparents and further back if possible.

Clinical signs

Initial signs are usually seen from 3 months to 12 months of age and are mainly due to pain caused by the tearing of the tissues around the joint and microfractures in the socket.

However in many cases CHD does not become obvious until after this time when the dog begins to develop osteoarthritis at an age earlier than expected from normal wear and tear on the hip joint.

Signs may include one or more of the following:

- Reluctance to exercise
- Poor stamina
- Difficulty or pain on rising, especially after rest
- Reluctance or difficulty with jumping
- Bunny hopping gait
- 'Marilyn Monroe' walk
- Muscle loss in the hind limbs
- Pain in the hip joint

Diagnosis

Initial diagnosis may be made from the clinical signs, however this should be confirmed by a detailed orthopaedic examination and X-rays. Sedation and/or general anaesthetic will need to be administered to allow complete examination to the hip joint.

Standard X-rays for hip scoring (BVA/KC, OFA) may be performed from 12 months to 24 months depending on the breed and accreditation authority (currently 12 months of age or older in New Zealand). This style of hip scoring generally assesses the secondary degenerative or arthritic changes that occur to the joint over time, hence the need to do them on more mature animals once the damage has occurred and will show up on X-ray (Fig.4B). These hip scoring x-rays are for breeding purposes and should not be confused with X-rays taken for diagnostic purposes which may be performed at an earlier age.

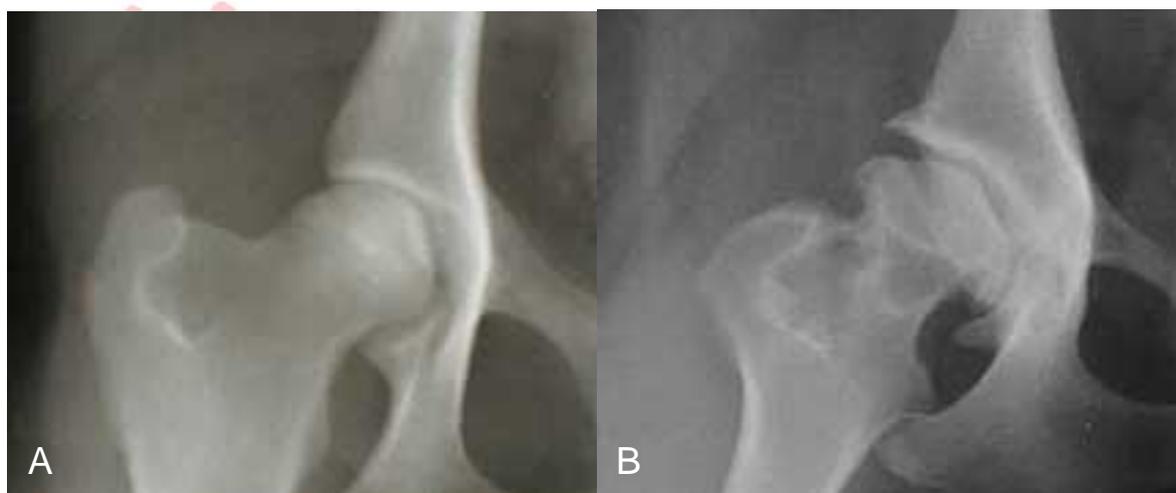


Figure 4. Standard hip X-rays from two mature dogs being assessed for CHD.

- A.** Normal hip joint. Ball seated well within the socket without any secondary degenerative changes.
- B.** Severe CHD with massive degeneration of the hip joint with multiple bone changes.

The Penn Hip Scoring (PennHip®) can be performed from 16 weeks of age and assesses laxity in the hip joint of young dogs. It does not rely on assessing the secondary changes, hence it can be performed at a much earlier age before the secondary degenerative changes have occurred. While the PennHip® score is for breeding purposes, this style of X-ray can also be performed from approximately 14 weeks of age for the assessment of laxity in the hips of juvenile dogs for the purpose of surgical corrections such as JPS in these young dogs (see Treatment).

PennHip® is accepted as being a superior method of detecting CHD when compared to the traditionally used X-ray views (BVA/KC, OFA).



Figure 5. Hip X-rays from a young dog being assessed for CHD.

A. Standard extended ventrodorsal (BVA/KC style) hip X-ray. Note the lack of degenerative changes present around the joint due to this being a juvenile dog.

B. Compressed PennHip® hip X-ray. The ball seats itself deeply within the socket when it is compressed into the socket.

C. Distracted PennHip® hip X-ray. The ball moves a long way out of the socket when a force is applied to try to move it out of the joint. This indicates the presence of significant joint laxity and therefore CHD in this young dog. The severity of the CHD can be calculated.

Other X-rays or assessments may be required for different potential surgical procedures such as TPO, DPO, FHNE, THR (see Treatment).

It is critical that each patient has a thorough orthopaedic and neurological examination to rule out other potential disease states which are commonly mistaken for, or may occur concurrently with, CHD in both juvenile and adult animals. This will ensure that the best treatment options can be offered for each individual animal and owner.

Treatment

A treatment should be designed for the specific dog and owner. After confirmation of CHD a number of options may be offered depending upon a variety of factors including, breed, age, stage of disease, severity of disease, owner expectations, athletic requirements, concurrent disease etc. Individual pamphlets are available for the different treatment options listed below which contain more detailed information.

- **Nonsurgical therapy.**

The goals of nonsurgical therapy are to alleviate clinical symptoms, improve quality of life, improve clinical function and slow the progression of clinical disease.

The majority of adult dogs with pain and lameness associated with hip dysplasia can be effectively managed with conservative methods. Mature animals that have been diagnosed with CHD but are not displaying any clinical signs do not require any treatment other than management of their exercise types and weight.

It should be noted that approximately 70% of juvenile animals will grow out of the pain associated with the first phase of CHD by 18-24 months. However a high percentage of these animals will later develop signs of pain associated with the development of osteoarthritis in the joint. These two phases may run straight into each other, otherwise a variable period of months to years may exist between the two phases of CHD associated pain.

- **Diet:**

In juvenile animals restricting food by approximately 25% can reduce the risk of development of CHD and OA. Feeding dogs less than 10 months of age adlib (free access)

and trying to maximise growth potential have been shown to increase the occurrence of CHD. Excessive energy and calcium in the diet have been identified as risk factors for CHD. In adult animals weight management will reduce the degree of wear and tear on a dysplastic joint and may slow progression of osteoarthritis and allow a reduction in the amount of other medications required.

- **Exercise modification and physical therapy:**

Regular low impact exercises such as walking or controlled running are critical to help maintain the muscles which aid in stabilizing the hip joint, as well as helping to maintain the health of the joint.

Hydrotherapy can be highly beneficial.

Traumatic exercise types such as hard acceleration, jumping and cornering will place a high degree of strain on the joint should be avoided.

Provision of warm, comfortable bedding at a sensible height can also be helpful.

- **Disease modifying osteoarthritis drugs:**

A variety of agents including glycosamine, chondroitin sulphate, omega-3/6 fatty acids and pentosan polysulphate (Cartrophen Vet®) may have a role to play in CHD management. The science behind the various products is quite variable and should be discussed individually for each pet concerned.

- **Nonsteroidal anti-inflammatory drugs (NSAIDs):**

A wide variety of drugs are available and are commonly used to manage the pain and inflammation associated with CHD.

- **Surgical therapy**

May be divided into **constructive surgery** where an attempt is made to retain the normal anatomical structures of the joint but improve their functionality. JPS, TPO and DPO are all included in this group. **Destructive surgeries** are where the normal anatomical structures are removed and may be replaced with implants. FHNE and THR are surgeries which would be included in this group.

- **Juvenile pubic symphysiodesis / symphysectomy (JPS)**

JPS involves altering the growth of the pelvis of juvenile dogs to allow the socket portion of the hip joint to rotate over the ball portion of the hip joint thereby providing a more stable joint.

This surgery can only be performed effectively on dogs less than 20 weeks of age. The earlier the surgery is performed (from 12 weeks of age) then the greater the amount of rotation of the socket that can occur.

It takes time for the hip socket to rotate as the dogs bones grow and therefore it is important to ensure modification of the dogs exercise program particular until the animal is at least 10 -12 months of age.

At risk breeds of animals should be carefully assessed early on to see if they have CHD and if so they should be assess to see if they are a suitable candidate for JPS. This assessment will involve sedation or a general anaesthetic and may involve X-rays. Not all juvenile dogs with CHD are good candidates for JPS. To not assess an at risk animal before 20 weeks age will remove JPS as an effective treatment option for CHD.

Patient selection and medium term care are critical to ensure success. Outcomes so far appear to be excellent with minimal patient morbidity. This is the least invasive and least expensive surgical option available for CHD.

- **Triple pelvic osteotomy (TPO) and double pelvic osteotomy (DPO)**

Both of these surgeries rely on surgically cutting the pelvis and physically rotating the socket portion of the hip joint over the top of the ball portion of the joint. A metal plate and screws are placed on the bone to hold the socket in the new position while the bone heals.

Often a very narrow window of opportunity exists where this surgery can be performed, as once the edge of the socket is damaged through wear and tear, then these surgeries will have a poorer chance of success and a poorer end result. Some animals will have damaged the edge of the socket as young as 4-6 months of age.

Again early identification of CHD and assessment for the best treatment options is critical. Most commonly dogs have TPO / DPO performed around 8-10 months of age, although they may be performed from approximately 4-18mths of age in selected individuals.

Early postoperative care is critical while the bones heal, however outcomes are usually excellent with careful case selection.

- **Femoral head and neck ostectomy (FHNO)**

This is generally considered a salvage procedure where other good treatment options do not exist.

The ball of the hip joint is cut off and a scar tissue joint (pseudoarthrosis) is allowed to develop.

FHNO is generally restricted to use in smaller individuals (adult body weight 17-22kg) as the results become more unpredictable with increasing adult body weight.

Animals never regain full function of the limb and may display a reduced range of motion, reduced weight bearing or limb function, and possibly periodic lameness. However many animals retain a functional, pain free limb.

It should be used with extreme caution in juvenile animals as it may alter the dynamics in the knee of the growing animal.

- **Total hip replacement (THR)**

With THR the ball and socket joint is replaced with metal implants. THR is best performed on mature animals but may be recommended in juvenile animals in some cases.

Outcomes from THR are usually excellent however careful patient selection is critical.

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