

## HIP JOINT EVALUATION FOR PUPPIES FROM SIXTEEN WEEKS OF AGE WITH PENNHIP

Hip dysplasia is a common cause of hind limb lameness and debility in dogs. The likelihood of a puppy having hip dysplasia is increased if the dam and sire have hip dysplasia (in other words it is a heritable condition). The hip joint is a ball-and-socket joint, with the head of the femur as the 'ball' and the acetabulum of the pelvis as the 'socket'. In the normal dog the head of the femur fits neatly into the acetabulum.



Image of a tight hip joint with the femoral head fitting well into the acetabulum.

*The underlying cause of hip dysplasia appears to be laxity (a loose fit).* Where laxity exists in the joint, weight borne on the hind limb is not transmitted evenly through the acetabulum, femoral head and down the femur, resulting in abnormal stresses on the joint surfaces.



Image of a loose hip joint indicative of hip dysplasia.

The result is remodelling of the acetabulum and femoral head, inflammation and instability. Osteoarthritis (inflammation associated with the bones and soft tissues of the joint) will continue to progress and may become apparent in radiographs (x-rays) of the hips as new bone formation around the joint. There is no cure for hip dysplasia. Current treatment options include *conservative management* (weight restriction, exercise modulation, medical therapy to control discomfort), *reconstructive surgery* (**triple pelvic osteotomy**, in which the bones are cut to free the acetabulum and the free portion of bone rotated to improve acetabular coverage over the top of the femoral head) and two *salvage surgeries*: **femoral head and neck excision** (removing the femoral head and neck so there is no bony connection between the femur and the pelvis anymore) and **total hip replacement**.

The standard x-ray view for assessing the hips is to lie the dog on its back and pull the hind limbs out behind it (extending all the joints) so it is lying flat on the x-ray table, in much the same way as one would image a human's hips.



Left: positioning for acquisition of standard x-rays of the hips of a dog. Right: standard x-ray of the hips of a dog.

This x-ray view of the hips is good for assessing the degree of hip joint remodelling and new bone formation around the joint. However, these signs may not become apparent in all dogs with hip dysplasia until two years of age or more.



X-ray of the hips of a dog showing severe remodelling of the femoral heads and acetabula on both hind limbs.

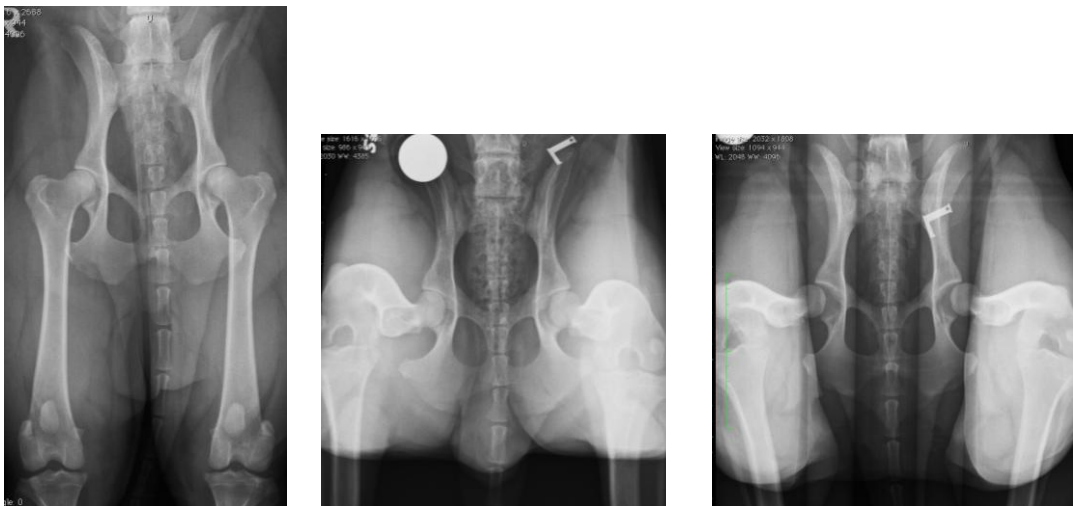
Assessing dogs using the extended x-ray view at one year of age is likely to miss some dogs with hip dysplasia. So some dogs may be allowed to breed despite having hip dysplasia. It is thought by some orthopaedic specialists that this is the reason that there has been slow or no progress in the fight against hip dysplasia despite schemes designed to assess the hips of dogs before they are considered for breeding.

It has been shown that hip laxity may be assessed at an early age (as young as sixteen weeks old) and *this appears to be a reliable predictor of hip dysplasia in later life*. By measuring the degree of hip laxity in a puppy, we can give a more reliable likelihood of developing hip dysplasia in later life. This allows us to **select suitable breeding animals** much earlier on and with a higher level of certainty than previous methods of assessment.

At the Veterinary School of the University of Pennsylvania in Philadelphia, USA, a team of researchers have been developing the Pennsylvania Hip Improvement Program (or PennHIP) for almost 20 years. This involves a series of three x-rays which may be taken at any age from sixteen weeks old. The three views are as following:

1. The **standard view** of the hips with the hind limbs extended to assess the degree of osteoarthritis
2. The **“compression view”** in which the femoral heads are maximally reduced into the acetabula
3. The **“distraction view”** in which the femoral heads are maximally pulled out of the acetabula.

Radiographs are submitted to the University of Pennsylvania for evaluation, resulting in a figure for each hip which is derived from the difference in the positions of the femoral heads within the acetabula in the compression and distraction views. This figure is known as the distraction index or DI. The DI theoretically ranges from 0.00 to 1.00 and is used to give a prognosis for the development of osteoarthritis as a result of hip laxity (or hip dysplasia).



PennHIP study of a dog. Left: standard x-ray with the hind limbs extended. Middle: compression view showing the femoral heads pushed maximally into the acetabula. Right: distraction view showing the femoral heads pulled maximally out of the acetabula.

We can take PennHIP radiographs and determine the likelihood of a particular puppy suffering from hip dysplasia in later life *from as early as sixteen weeks of age*. This means we can select dogs for breeding long before breeding would be considered. It also means that we can consider early surgery in some severe cases, particularly where clinical signs of lameness or discomfort are already present.

We are one of only a handful of centres in the UK offering this invaluable and cutting-edge service. Please contact us for more information, or see the PennHIP website [www.pennhip.org](http://www.pennhip.org).

#### Costs of PennHIP investigation at SCVS

Single dog.....£293.75  
More than one dog.....£235.00 per dog

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