



Two radiographs of different views of a normal elbow. These views show the clean lines and lack of secondary change which characterise a normal joint

Elbow dysplasia in dogs - a new scheme explained

Matthew J. Pead, BVETMED, PHD, CERTSAO, MRCVS
and **Sue Guthrie**, BA, BVETMED, PHD, MRCVS

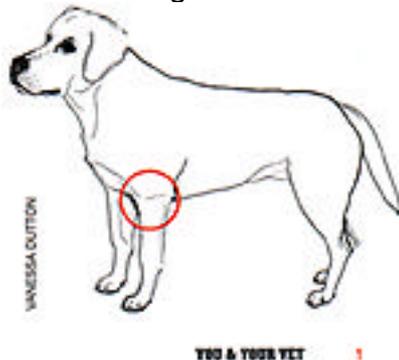
Elbow dysplasia has been identified as a significant problem in many breeds. Importantly, the condition appears to be increasing worldwide. It begins in puppy hood, and can affect the dog for the rest of its life.

Since the late 1960s, veterinary surgeons routinely dealing with lame dogs have been aware of an increasing number of problems which arise during puppyhood. Hip dysplasia was the first disease to be widely recognised, and a scheme to assess and control it is well established. More recently, elbow dysplasia (ED) has been identified as a significant problem in many breeds. Importantly the condition appears to be increasing worldwide and, although the disease begins in puppyhood, it can affect the dog for the rest of its life.

The principal cause of ED is the genetic make-up of the animal. Thus, a scheme which screens animals for elbow abnormalities and allows the animals with the best elbows to be chosen for breeding, can be successful in reducing the level of the problem in the canine population.

ELBOW DYSPLASIA THE DISEASE

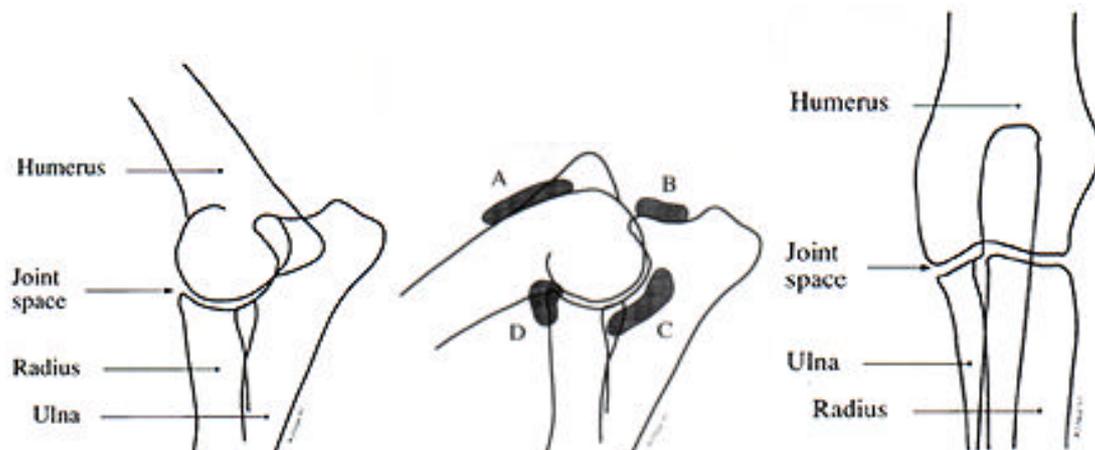
ED simply describes the abnormal development of the elbow (a dog's elbow is circled below). The term includes a number of specific abnormalities, which affect different sites in the joint. They cause problems by affecting the growth of the cartilage which forms the surface of the joint, or the structures around it.



These abnormalities, called primary lesions, then start a secondary osteoarthritic process. The most common primary lesions are:

- Osteochondritis dissecans (OCD or OD)
- Fragmented or ununited coronoid process (FCP)
- Ununited anconeal process (UAP)

Examination of different radiographic views allows detection of abnormalities



The 'extended lateral' position gives a view of the bones and joint surfaces of the elbow from the side. In this view, the position of the joint is similar to that in the standing dog

The flexed lateral view is a side on view of the elbow. This view allows examination of the secondary changes in ED which occur in the shaded areas. Note how some of the shaded areas here are overlaid by other structures, which makes them difficult to examine

The 'crani-caudal' view is taken from the front to the back of the joint and gives a totally different picture. Evidence of primary disease, which cannot be identified on the lateral view, is seen on this view. It also enables confirmation of secondary abnormalities

There are other, more rare, primary lesions which may occur in combination with these, or on their own. Primary lesions occur during the growth of a puppy, and nearly always occur in both elbows to some degree.

Once the dog reaches maturity the primary lesions may stabilise. However, once abnormal development of the joint has been started by the presence of a primary lesion then further secondary changes occur as a consequence. Of particular importance is abnormal wear of the joint surface and osteoarthritis (arthrosis). These secondary lesions cannot be reversed and they are a potential problem for the rest of the dog's life.

The elbow is particularly vulnerable to this type of disease. In construction, the joint is like a hinge. The bones and cartilage surfaces which form each side of the joint have complex shapes which fit closely together. The elbow is also a high motion joint and the normal forelimb gait is more dependent on the elbow than on other joints. Thus, a small change in the shape of one part of the joint can have large consequences for the function of the joint, just like a small piece of grit in a door hinge, and once elbow function is affected then forelimb gait is altered.

An additional problem with ED is that lame dogs are only the 'tip of the disease iceberg'. Many dogs have sub clinical disease; that is, they have primary lesions or osteoarthritic changes in their elbows, but they do not become lame. Fortunately these subclinical dogs can be identified by taking radiographs (X-ray films) of their elbows.

Even though they have no lameness problem themselves, they have a high chance of producing lame offspring, if allowed to breed.

THE CAUSES OF ELBOW DYSPLASIA

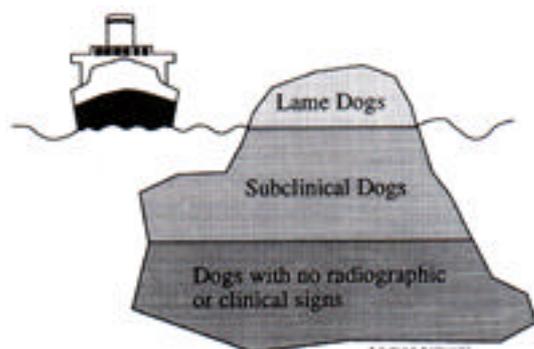
ED is a multifactorial disease, which means that a number of factors can influence the occurrence of the condition. The most important factor, however, is the genetic make-up of the dog. Other factors such as growth rate, diet and level of exercise may influence the severity of the disease slightly in an individual dog, but they cannot prevent the disease or reduce the potential of the dog to pass the disease on to offspring. However, studies show that ED has a high heritability confirming that a high proportion of the cause of the disease is genetic.

As individual breeds of dog have a proportion of their genetic make-up in common, it is not a surprise that some breeds are more vulnerable to a heritable condition than others. In general, medium- and large-breed dogs are considered to be vulnerable to ED.

Unfortunately ED is not controlled by a single gene or a simple inheritance. It is a polygenic characteristic, which means that it is controlled by the combination of many genes. One way of visualising this is to think of a normal dog as carrying a few of the genes which can cause elbow problems; a dog with subclinical disease will have more of these 'problem' genes, and an animal with lameness will have a higher proportion still.

The greater the degree of ED in the parents, the more likely they are to pass the disease on to their offspring (as shown in this study of Swedish Rottweilers)

Parents	Per cent of offspring affected
Normal x Normal	31
Normal x Mild ED	43
Normal x Moderate ED	48
EDxED	56



Dogs in which elbow dysplasia causes lameness are only the 'tip of the iceberg'. These animals are obvious because of their lameness. However, there are many dogs with subclinical disease that have an increased risk of producing offspring with elbow dysplasia. These animals are not obvious and can only be located by screening

CONTROL OF ELBOW DYSPLASIA

As the genetic make-up of the dog is the overwhelming influence on the cause of ED, the disease can be controlled by minimising the 'problem' genes in the population. This means selecting sires and dams with the best genetic make-up. There is no laboratory genetic test available, like a DNA 'fingerprint', to show which animals have the best genetic make-up for elbows. However, dogs can be screened by radiographing (X-raying) their elbows, and looking for the signs of ED.

If sires and dams are only selected from animals with minimal ED, most of the clinical and subclinical animals can be eliminated from the breeding programme, which prevents them passing their defective genetic make up on to the next generation. Success of such control depends on a high proportion of any breed participating, and making the information public, so that low-risk animals can be selected by anyone wishing to breed. In other countries, screening schemes like this have been successful in significantly reducing the ED problem. There is an international standard for such schemes administered by the International Elbow Working Group (IEWO), which encourages a coordinated approach to the problem.



2/3. Secondary changes - the radiograph on the left shows a smooth bump of osteoarthritic new bone (arrowed). This is mild (grade 1) elbow dysplasia. The radiograph below shows gross irregular osteoarthritis in the three arrowed areas. This is severe (grade 3) elbow dysplasia

1. Primary abnormality - this cranio-caudal radiograph shows an enlarged joint space (dark line) on one side. In this gap you can see a large detached fragment (white). This is an osteochondritis (OCD) lesion. When removed it was the size of a little fingernail!



The breeds that have a higher incidence of elbow dysplasia are:

Basset Hound, Bernese Mountain Dog, English Mastiff, German Shepherd Dog, Golden Retriever, Great Dane, Irish Wolfhound, Labrador Retriever, Newfoundland, Rottweiler

THE NEW UK ELBOW DYSPLASIA SCHEME

To provide an opportunity for the control of ED in the UK, the British Veterinary Association and the Kennel Club (BVA/KC) have introduced a screening scheme run along IEWO guidelines. Previously the only elbow schemes running in this country have been set up by individual groups such as the Bernese Mountain Dog Club of Great Britain and the Guide Dogs for the Blind Association. These have been successful in helping to avoid breeding from animals with a high risk of producing ED in their offspring.

The grading system is simple

Grade	Description
0	Normal
1	Mild ED
2	Moderate ED or a primary lesion
3	Severe ED

THE GRADING PROCEDURE

Initially the scheme will require three radiographic views of each elbow, as described on page 2. This ensures that all the areas of the joint where abnormalities may occur can be examined. Abnormalities are detected with greater accuracy on examination of three views, as compared to a single view. The radiographs are examined independently by two scrutineers who will look for primary lesions such as osteochondritis dissecans (OCD), and the secondary osteoarthritis which occurs in ED. A grade for each elbow is calculated from the presence of the primary lesions and the size and extent of the secondary lesions. The overall grade for an animal is simply the higher of the two individual grades. The grades for each elbow are not added together as they are for the two hips in the hip dysplasia scheme. Identification of subclinical disease and its grade in either elbow is the important factor in screening so the grade of the worst elbow is always quoted as the overall grade and will be published on the progeny's Kennel Club registration documents, and in the Kennel Club Breed Records Supplement.

The grading procedure and the records will be under continuous review, which may lead to periodic changes, and the publication of information for those involved in controlling and treating ED. The scheme will be represented at IEWG meetings so that the UK keeps pace with, and participates in, international developments in the management of ED.

Getting a dog's elbows graded

Owners should contact their veterinary surgeon and arrange an appointment for the dog to be radiographed (x-rays). The radiographs will usually be taken under anaesthesia or heavy sedation so the dog may have to be left at the veterinary practice. Elbow radiographs can be taken at the same time as those for the BVA/KC Hip Dysplasia Scheme. When taking the dog for its radiographs owners should remember the following.

- The dog must be at least one year old, but there is no upper age limit.
- The dog's KC registration certificate and any related transfer certificates must be available so that the appropriate details can be printed on the radiographs.
- The owner should sign the declaration (first part) of the certificate, to verify the details are correct and grant permission for the use of the results.

Once the radiographs are taken, the veterinary surgeon fills out the appropriate section of the form and submits both the radiographs and the form to the BVA. The results and the radiographs are normally returned to the veterinary surgeon within three weeks with a certificate for the owner and a copy for the veterinary surgeon. Once a grade has been given for a dog, the radiograph cannot be resubmitted; however, owners have the right to an appeal, which takes the form of a re-appraisal of the original radiographs, made within 45 days of the dispatch of the original certificate. The whole procedure from initial appointment to receiving the grades is handled through the veterinary surgeon.

COSTS

The owner is liable for the veterinary surgeon's fee for anaesthetising the dog and taking the radiographs, and the BVA's fee for the grading.

ADVICE ON BREEDING

The overall grade is used internationally as the basis for breeding advice. Breeders are advised to select dogs with grades of ID or 1 in order to reduce the risk of ED in their offspring.

As ED is a prevalent disease, especially in the breeds listed on page 3, such advice will only be effective if it is continued over a number of generations. The most difficult part of accepting such advice for many breeders is that a number of dogs which have never been lame and exercise freely, also have high grades. This, however, is the subclinical population with the ability to pass the problem on in the breed. To gain long-term control of the disease these dogs ought not to be bred from.

TREATMENT OF CLINICAL ED

Dogs which have clinical ED often become lame between six and 12 months of age. Initially the lameness may be difficult to ascribe to a particular joint. However, at this age a persistent forelimb lameness should be investigated by a veterinary surgeon. There are other conditions leading to signs similar to those of ED so the veterinary surgeon needs to consider these as well.

Diagnosis of ED is normally based on a forelimb lameness with pain on flexion or extension of the elbow. The animal may have a short or stilted forelimb gait as both elbows are often affected. Confirmation of the diagnosis is made by finding primary or secondary lesions on radiographs of the elbow.

Treatment methods vary depending on the nature and severity of the problem. Conservative treatment involving weight restriction and control of exercise is always important. Drugs may be used to relieve the pain and inflammation associated with the condition and to promote repair processes within the joint. In some dogs, surgery is required to remove fragments of cartilage and bone from the joint to relieve pain, but this is not always appropriate. In nearly all the cases there are some secondary changes which lead to some problems with the joint through out life, possibly restricting the dog's ability to exercise. However, most dogs will be comfortable with a fair level of exercise if treated carefully between the ages of six and 18 months.

In April 1997, the BVA AWF, the AHT and the RSCPA held a joint symposium on the subject of 'Hereditary diseases in dogs: what are they and what can be done?' which included a presentation on elbow dysplasia.

Copies of the proceedings, containing nine papers in all, are available from the BVA AWF, 7 Mansfield Street, London W1G 9NQ, price £12.50 (include p&p).