Elbow Dysplasia
by Patricia Long
January, 1998

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What is an elbow joint? Three bones meet to form this complex joint. The humerus comes down from the shoulder and has a curved end, which rests on top of the radius. Behind the radius is the ulna, which extends up past the bottom of the humerus, and is what you feel as the point of the elbow. There is also a curved notch in the ulna into which the curved end of the humerus fits. If there is any joint that is a recipe for disaster, this is it. The precision with which the bones must fit together, combined with cartilage, ligaments, and tendons, added to the stress on the joint from running and jumping - it's a wonder the joint ever works properly. One 1986 Swedish study of 105 Bernese Mountain Dogs found that over 53% of them had elbow joint problems. Elbows are definitely a problem in the breed, and like other joint problems, there appears to be a genetic factor. In fact, one study found that the heritability factor of elbow problems was even higher than that for hip dysplasia!

Current theory on elbow dysplasia holds that all problems are caused by asynchronous growth of the bones. If the bones are not in the right place at the right time, processes won't unite, stress will be placed on the wrong part of a bone, etc. So even if the bone eventually catches up, the damage is already done. All of this makes a great deal of sense, and will probably change the view that some elbow problems are linked more to osteochondritis than to bone growth. For now, I will describe the three main aspects of elbow dysplasia using the earlier, still common explanations of joint incongruity, ununited anconeal process (UAP), and fragmented coronoid process (FCP). But understand that knowledge and treatment of elbow dysplasia is a continually changing field of veterinary medicine. CAT scans and MRI will be the way elbow problems are diagnosed in the future, which will help to plan better treatment methods.

Joint incongruity is usually caused by failure of the radius and ulna to grow at the same rate. You'll hear the term "premature closure of the distal ulnar (or radial) physis." Distal is simply a directional term used to mean the farthest from the body, and the physis is the growth area, involving cartilage and bone cell production. If the physis closes too soon, or is injured, the bone does not grow to its proper length causing the other bone to curve which causes incongruity of the elbow. (The bones more likely grow at different rates, not due to injury or premature closure of a growth plate). If the bones fail to grow properly, surgical correction of the bone length and curvature can be done to create a congruent elbow. Surgery to install pins and plates may be worth it to allow the dog normal movement, but post-operative
care and recovery will be difficult and lengthy for both dog and owner. Joint incongruity may have a genetic basis, and is generally considered to be a growth problem.

To understand ununited anconeal process, we first need to know what the anconeal process (AP) is. At the top end (the proximal end, the part closest to the body) of the ulna, is a slightly hooked piece of bone, which fits into a hole in the humerus. It is enclosed within the joint capsule and is only visible in x-rays taken from a specific angle with the elbow partially flexed. The use of the word process is due to the fact that this is a part of the bone that articulates, or moves, with another bone. The AP forms in the developing bone from a separate growth area and is fully united with the ulna by the time the dog is 4 - 5 months old. But if it never unites with the ulna, it can detach completely and float in the joint capsule, causing pain and eventual arthritis. UAP was considered to be a form of osteochondritis, with the same causes: heredity, injury, and diet. Treatment is also similar as that for OCD. Surgery to remove the loose body is usually only done for extreme cases. DJD (degenerative joint disease) will develop even with the surgery, but at a slower rate. If the problem is diagnosed very early, the AP can sometimes be permanently fixed to the ulna without the later development of DJD, but the AP is often too damaged for this repair by the time diagnosis is made.

Fragmented coronoid process was also considered to be a type of OCD. To quote from Small Animal Orthopedics, "FCP may develop as the result of excessive loading of the medial coronoid process. Many dogs with FCP have elbow incongruity; an association with elbow dysplasia has been identified in Bernese mountain dogs. FCP may result from trauma. A genetic predisposition has been implied."

The head of the ulna has a curved indentation (called the trochlear notch) which allows the rounded bottom of the humerus to fit to form the curved joint. The top lip of this notch is called the anconeal process, and the bottom lip of this notch is called the coronoid process. The side of the coronoid process closest to the dog's body is called the medial coronoid process. If this notch fails to develop the proper curvature, too much weight is placed on the coronoid process, causing it to fracture. Diagnosis is difficult and is usually made by ruling out all the other possibilities. It usually starts when the dog is between 5 and 9 months of age and can begin as limping that comes and goes, getting gradually worse. Surgery is usually done to remove the fragment, but it won't always stop the development of DJD.

For information on ED and the International Elbow Working Group, see:

From the List:
Susan Ablon's Chumley had bilateral elbow dysplasia with severe incongruent growth of the radius and ulna. Surgery was performed on the worse elbow and consisted of breaking the ulna to slow its growth and allow the radius to catch up.
This failed to provide any significant improvement, so the other elbow was not done. Treatment with Adequan and Banamine have helped him to lead a relatively comfortable life, and now at age 9 years he still has a significant limp. Binky was lame on both front legs, and since no bone fragments were seen on x-ray, Susan decided against any surgery. After 4-6 weeks of treatment with Cosequin, Binky no longer limped.

Lisa Allen has one male that had bilateral ED, UAP, and FCP. Surgery made a little difference; however, he cannot overexert himself or his arthritis acts up. She has another male with FCP in one elbow, and surgery made a great deal of difference, although he will occasionally limp for a step or two. She advocates learning all you can before deciding on surgery.

Gisela Haas reported on a Dutch study that found 72% of 97 BMDs studied had some form of elbow dysplasia. Her Chuckie limped on his right elbow at 4 months, which was corrected surgically. He did start limping on the left leg, but it was probably due to the extra stress of keeping his weight off the bad leg. After his right leg cleared up, the left leg got better as well. Now at age 6.5 years he still limps on his right leg after exercising. He now has severe arthritis in the right elbow.

Theresa Herman's Denali had elbow dysplasia in both elbows. He had a long, slow, painful recovery from surgery on the one elbow that included the bone breaking when the pin slipped, and a fever of 105 for no determined reason (although Rocky Mountain Spotted Fever was suspected). As he continued his recovery, one of his hips dislocated. This past May, Denali began limping on his other elbow. Bloody fluid was taken from the joint, and showed a high white cell count. X-rays showed arthritis and very ragged edges. The vet thinks there was a bone infection following the first surgery that never really went away. It can spread and settle in other joints. He was put on 2 months of antibiotics and so far so good! He takes Rimadyl, shark cartilage, Ester-C, and Glycoflex. His hip is still out of the socket, with severe HD in both hips. Theresa gives him special massages and stretches to strengthen his muscles. He takes a short walk twice daily, and runs and plays like a normal Berner!

Laurie Crocker's Kodi was diagnosed with FCP at seven months, and two radiologists' reports recommended surgery. An orthopedic surgeon at Tufts, however, said either way Kodi would probably always limp. Laurie decided to wait and see, and the limping cleared up on its own for a full year but just recently reappeared.

Kathy Kettner's Sophie Tucker had surgery for bone fragments in the elbow. It took an MRI to diagnose the problem; x-rays didn't show the fragments. After excruciating pain and a long post-surgical recovery, there was no change. But acupuncture has made a remarkable difference. She is on Rimadyl and double strength Cosequin, twice daily and bi-weekly acupuncture for life.

Ellen Barnaby's Daisy began limping at 5 months. Initially diagnosed as pano, FCP
was not diagnosed for another year. At 18 months Daisy had surgery to remove the fragments. Now at age 3, she is doing quite well with an occasional bout of soreness if she overdoes it, and a bit of arthritis. The vet had recommended swimming as exercise - luckily Daisy loves it. Daisy also takes SF-74 (Perna Mussel) with every meal, is on a lower protein diet with an emphasis on keeping her weight to a minimum. She also takes Rimadyl on an as-needed basis.

Dick Larsen's Lady was limping at 12 months, and was diagnosed with FCP. But when surgery was performed, the vet was very surprised to find a torn, frayed ligament. The ligament was repaired, and Lady was as good as new 6 weeks later.

Gael Goldsack's Kiri had surgery for FCP when she was 9 months, but DJD developed in both elbows. She gets periodic injections of Cartrophen, which eliminates any limping within a week by promoting cartilage growth over the roughened areas of the DJD, thus reducing the irregularities and hence the pain. Even now at 7 years, Kiri is generally limp free. Gael's friend's Irish Wolfhound Chloe broke her radius near the growth plate as a puppy, consequently leading to joint incongruity and UAP. At 14 months Chloe had surgery to cut the ulna, allowing the elbow to find its own new level (see Ablon). Now at age 5 years, Chloe exhibits no sign of a limp.

Arden Petrov's Bear's ulna stopped growing, causing joint incongruity. The surgeon used a technique used on children, in which the ulna is cut, pins are driven into each of the segments, and an adjustable spacer is installed. Every day, a half turn is done with the adjusting knob in order to keep the bones from knitting, which should cause the bone to grow to compensate. But the pins broke off, and for the second surgery, Arden had the vet do the more standard procedure of separating the ulna and letting it grow. Bear may have a limp, but the spacer was a little too much for an energetic pup.

Steve Dudley reported on Swedish and Australian studies (digest 654) which showed ED to have a higher heritability factor than hip dysplasia. Steve has also raised a tantalizing question. Should we be focusing on ED, or on angulation? The elbows are a natural "shock absorber". If a "shock absorber" is mounted incorrectly relative to angle of approach of reactive forces, small, integral parts within the shock absorber become unduly stressed and eventually fail. So is the problem FCP or UAP, or are they simply symptoms of a different problem?

References:
The Veterinary Clinics of North America, Small Animal Practice; "Congenital Conditions that Lead to Osteoarthritis in the Dog", Steven A. Martinez, DVM, MS, W.B. Saunders, 1997, pg 740-748.


