

Introduction

The elbow is a complex joint made up of three bones, the humerus in the upper arm and the radius and ulna in the lower forearm. The top of the radius is flat and supports the humerus. This is the weight bearing bone in the forearm. The top of the ulna curves around the humerus to allow the normal movements of the elbow joint.

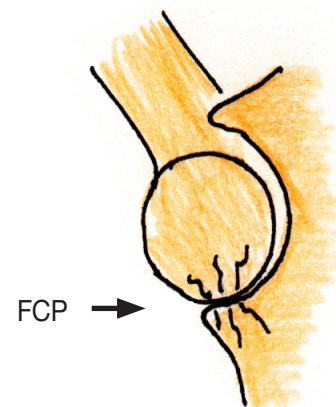
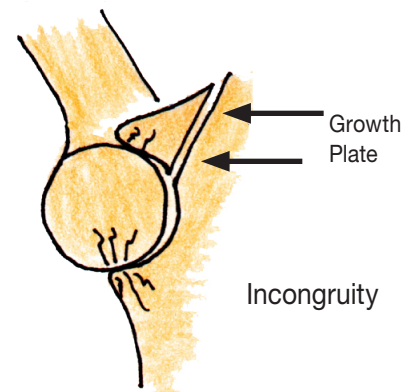
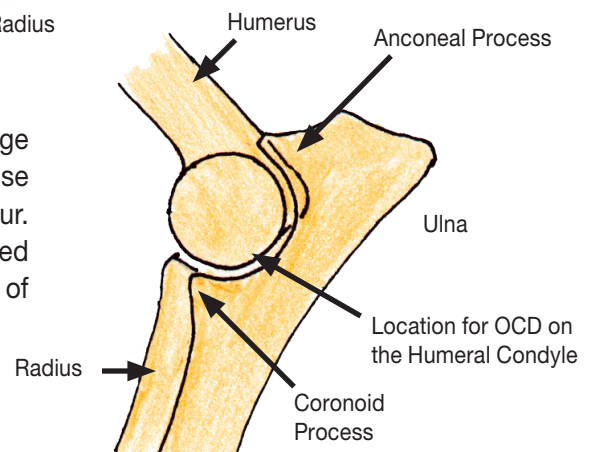
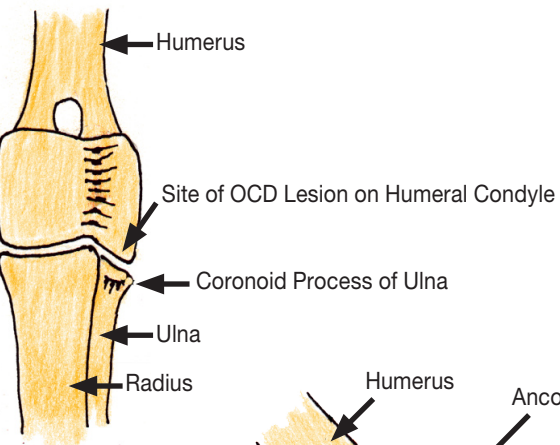
In young, fast growing, large breed puppies and in dogs bred to have crooked legs, abnormal development of the elbow joint may occur. This abnormality, *Elbow Dysplasia*, may result in damage to the joint surface cartilage or failure of portions of bone to fuse properly. Left untreated, severe, crippling osteoarthritis will occur. For the most part, this condition is inherited and can be passed on to offspring. Elbow dysplasia may manifest itself as a variety of different conditions.

Coronoid Disease

The point at the bottom part of the ulna in the elbow that curves around the humerus is called the coronoid process. If there is incongruity that is a disparity in the lengths of the radius and ulna even transiently during rapid growth, the coronoid process can become traumatized and fragmented.

The diagnosis can often be difficult because early damage to the cartilage can not usually be seen on x-rays. We are often suspicious of the diagnosis with careful orthopedic examination. Scintigraphy (bone scans) and CT scans may localize the problem and detect incongruity not visible on radiographs. Arthroscopy or open arthrotomy may be required to confirm the diagnosis.

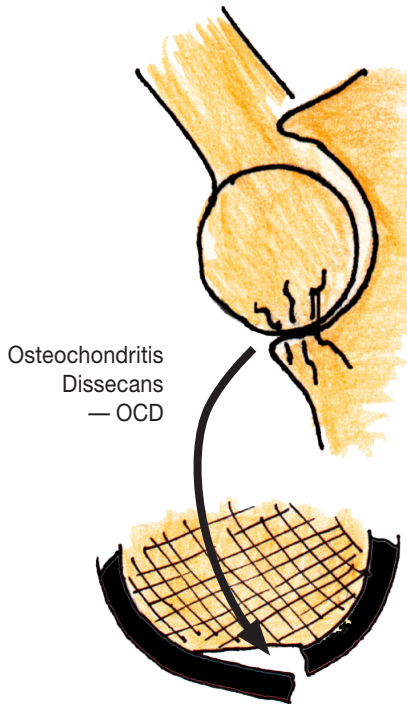
The fragments in the coronoid process (fragmented coronoid process or FCP) must be surgically removed to avoid severe, crippling arthritis. Despite even early diagnosis and early surgical removal, some irreversible damage may have already occurred making arthritis inevitable. The ultimate goal of the surgery is thus to minimize the severity of the arthritis that will develop. Thus, the earlier surgery can be performed, the less arthritis may eventually develop. In addition to removing the damaged cartilage, procedures to encourage new cartilage formation (cartilage microfracture) and



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to take the load off of the coronoid process by removing a small piece of the ulna (ulnar ostectomy) or equalize the lengths of the radius with the ulna (radial lengthening osteotomy), may be beneficial and recommended.

Osteochondritis Dissecans



Osteochondrosis is a developmental abnormality of the cartilage of puppies leading to sites where the cartilage is thicker than normal. There is a localized separation of the articular cartilage from the underlying bone. This can lead to the formation of a cartilage flap, known as *Osteochondritis Dissecans* (OCD).

OCD can be present in more than one joint even though the patient appears lame in only one leg. Thus, radiographs of other joints may be necessary. The most common areas affected are in the shoulder, in the elbow, in the stifle (knee) and in the hock (ankle).

This condition is usually seen in fast growing, large breed puppies although it can be seen in some families of smaller dogs. Overfeeding high protein/high calorie diets and over supplementing with vitamins and minerals, especially calcium, can worsen or accelerate its development in fast growing puppies. Although the the OCD flap may occur as a result of a minor trauma, the underlying osteochondrosis may be hereditary and passed on to offspring.

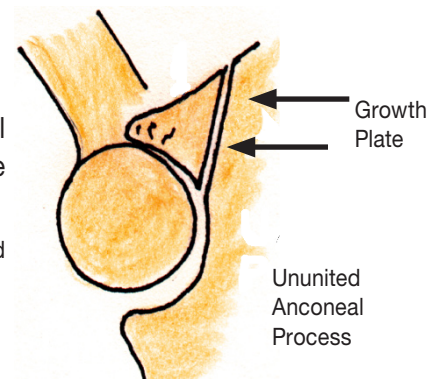
The flap and any free floating fragments cause pain and inflammation. Clinical signs of pain usually begin by 6 months of age and can be manifested as limping, soreness, stiffness or mild gait abnormality. Surgical removal of the flap will help to eliminate this pain. New healthy cartilage will grow into this area within about 3 weeks. The initial cartilage regrowth is soft and cannot withstand the loads of high impact activity. This cartilage continues to mature

for 8 weeks to become a firmer more durable form of cartilage. Thus, strict rest is necessary during this entire 2 month healing period. After surgery, patients must be kept confined to a small area for 8 weeks and only walked on a leash. Normal activity may be resumed after that time.

Despite even early diagnosis and early surgical removal, some irreversible damage may have already occurred making arthritis inevitable. The ultimate goal of the surgery is to relieve pain, encourage healthy cartilage regrowth and minimize the severity of the arthritis that may develop.

Ununited Anconeal Process

The point at the top of the curve is called the anconeal process. The anconeal process develops separately from the rest of the ulna and should unite or fuse by 5 months of age.



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Incongruity of the elbow joint or disparity between the rate of growth of the radius and the ulna may result in pressure on the point of the anconeal process preventing it from uniting with the rest of the ulna. This free floating ununited anconeal process (UAP) causes pain and inflammation. This condition is often seen with FCP.

Surgical removal of this process will eliminate the pain and minimize the severity of arthritis that will develop. However, as is the case with fragmented coronoid process, development of arthritis is inevitable. If ununited anconeal process is identified early enough, before the process is completely detached, a corrective osteotomy (bone cut) in the ulna below the joint may allow the preservation and eventual fusion of the anconeal process to the rest of the ulna. This surgery must be performed in puppies less than 4 1/2 to 5 months of age.

Osteoarthritis

In severe cases or untreated cases of elbow dysplasia, osteoarthritis will develop. The end result is loss of articular (joint surface) cartilage and “bone on bone” pain. Surgeries to salvage pain free use may be necessary. One such surgical treatment option is a technique called Sliding Humeral Osteotomy (SHO). In the SHO procedure, the humerus is cut and the bottom portion slid over to redistribute the loads in the elbow to areas of the joint with healthy cartilage and off the areas of “bone on bone” pain. A specially designed bone plate is applied to stabilize the SHO through the bone healing phase. Research suggests this will decrease the load on the damaged portion of the joint by about 35%, making many patients again pain-free or managed better with anti-inflammatory medications.

Excision of the joint and replacement with a prosthetic elbow, known as Total Elbow Replacement, is becoming a viable surgical treatment option due to the recent development of newer prosthetics and techniques. Your pet’s surgeon can advise you on which technique may be best for your pet. **VMSG**