

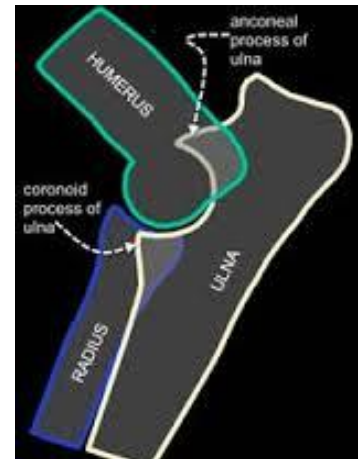


Elbow Dysplasia

The Elbow

The elbow is a hinge-type joint formed by the humerus, radius and ulna. The elbow joint has 2 compartments, medial (towards the middle of the body) and lateral (towards the outside of the body). This joint in dogs and cats is similar to ours and functions in the same manner. As it is a hinge joint, it pivots around an axis and allows motion in only one plane, much like the way a door hinge works. Dogs and cats however do not have the same ability to supinate and pronate their lower limb in the manner that humans do (= the manner in which we can internally and externally rotate our hand).

As with other joints in the body, the elbow is stabilized by collateral ligaments (medial and lateral). In addition, the tendons of insertion of the biceps muscle on the radius and ulna play a role. Stability is also influenced by joint congruency, that is, the way in which the radius, ulna and humerus meet and fit together. When this does not occur properly due to a deformity or shortening of one of these three bones, a condition called elbow incongruity occurs. Elbow incongruity is one of the conditions believed to be responsible for the development of elbow dysplasia.

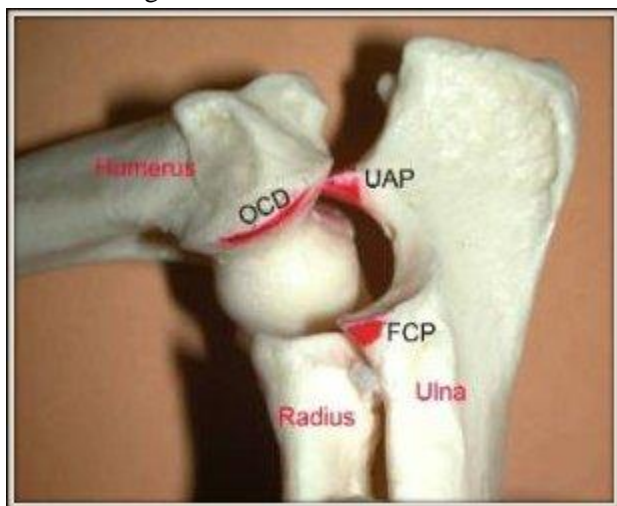


Elbow Dysplasia

Elbow dysplasia refers to a failure of one or more structures in the elbow to develop properly. A constellation of different clinical syndromes exist that are collectively referred to as “elbow dysplasia” and which share a common cause. The underlying cause of the various forms of elbow dysplasia is believed to be a failure of cartilage to develop properly and mature into bone in the young growing animal. All bone starts out as cartilage that undergoes a process called ossification where it matures into bone and becomes calcified. When the bone under the joint cartilage fails to undergo ossification as the young animal grows and matures, it results in cartilage that is either too thick or bone that is weaker than normal. This then leads to one of several of the syndromes known collectively as elbow dysplasia.



The development of elbow dysplasia is determined by a combination of genetics, nutrition and other environmental factors. Elbow dysplasia is usually bilateral (both elbows affected) and some of the issues that lead to elbow dysplasia can cause lesions in other joints as well. Elbow dysplasia is primarily seen in large breed dogs but can be seen in any breed of dog and has rarely also been diagnosed in cats. Certain breeds of dogs are particularly predisposed and include German Shepherds, Labrador and Golden Retrievers and Mastiffs among others. Prevention of elbow dysplasia is one of the primary reasons for the recommended feeding of large breed puppy foods to growing large and giant breed puppies. Signs of elbow dysplasia can become apparent anytime after 5 months of age and older.



Un-united Anconeal Process (UAP)

Un-united anconeal process occurs when the growth plate between the anconeal process and the rest of the ulna fails to mature and turn into bone. The anconeal process then becomes unstable and can result in significant lameness. Sometimes lameness does not become apparent

until well into maturity after significant arthritis has developed. UAP is particular to German Shepherd dogs although other breeds can be affected. The anconeal process should be united by the age of 5 months and is definitively diagnosed on plain xrays.

Treatment of UAP is somewhat controversial. If detected early, surgical repair should be performed and is generally quite successful. Removal of the anconeal process has also been advocated. There is evidence to suggest that if joint disease is present at the time of diagnosis then surgical intervention will not have a significant impact on long-term outcome. Others have advocated that surgical repair should still be performed even if joint disease is noted. We favour this approach and will recommend definitive surgical treatment under most circumstances.

Osteochondrosis Dissecans (OCD)

OCD occurs when an area of thickened cartilage becomes diseased (osteochondrosis) and elevates forming a flap, which can then detach (osteochondrosis dissecans). The diseased/damaged area becomes painful and generates a significant inflammatory response, leading to arthritis over time. A detached cartilage flap is referred to as a “joint mouse.” OCD lesions can occur on the humeral condyle (elbow), humeral head(shoulder), the femoral condyle(knee) and the hock (ankle).

OCD is the simplest of these problems to treat and is both definitively diagnosed and treated arthroscopically. The flap and any other loose cartilage is removed from the joint and the lesion bed is debrided to stimulate healing. In most cases these lesions can now also be resurfaced with a synthetic cartilage graft,



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restoring normal function to the joint with the same wear-resistant surface used in artificial hip and knee implants.

Fragmented Coronoid Process (FCP)

FCP occurs when the coronoid process of the ulna becomes damaged or fractured. This can occur at any age and usually results in an acute lameness. The lameness may be transient or can become chronic. If unaddressed, severe degenerative changes occur over time and the resulting joint damage results in a reoccurrence or worsening of lameness. In some cases this may occur over a period of years. Episodes of lameness become more and more frequent until the lameness becomes permanent. At this point the joint is usually heavily damaged (see medial compartment disease below).

The exact cause of fragmentation is a matter of strenuous investigation currently. Recent evidence has shown this to be a highly complex problem that seems to have a number of different causes and contributing factors. In recent years the incidence of FCP in our canine population has increased dramatically. It has recently been coined “jump-down disease” for the occurrence of cases subsequent to dogs jumping down from the inside of pick-up trucks and SUVs. This is probably more reflective of changes in our lifestyle and the types of vehicles we drive than an escalating problem inherent to our dog population.

The current standard of care treatment for FCP is arthroscopic removal and debridement of the fragment/coronoid process. Other treatments can be and often are performed concurrent with arthroscopy and will be discussed in detail later.

Flexor Enthesiopathy

This is a newly recognized syndrome and little is understood at this point in time. It was previously often misclassified as “un-united medial epicondyle”. Flexor enthesiopathy can be a primary problem or secondary to other forms of elbow dysplasia that have progressed to more severe degenerative joint disease. The clinical signs are highly variable from no clinical signs to very severely affected. Most dogs with primary flexor enthesiopathy will eventually progress to showing clinical signs.

There is no currently generally accepted treatment protocol for primary flexor enthesiopathy. Removal of bone fragments if present seems to result in a significant improvement for some dogs. Many dogs with clinical signs have significant to severe medial compartment disease, which will have a major impact on outcome. Medical treatment is probably the most appropriate primary therapy for the majority of these cases until such time as joint resurfacing becomes necessary.

Elbow Incongruity

As mentioned previously, elbow incongruity refers to a failure of the radius, ulna and humerus to properly fit together to form a normal elbow joint. This causes mechanical instability and damage to the joint surfaces and inflammation. Characterizing, diagnosis and definitive treatment of elbow incongruity is complex and is beyond the scope of this handout. When appropriate, elbow incongruity will be discussed with the client on a case-by-case basis.



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Medial Compartment Disease

Medial Compartment Disease (MCD) should not be confused with elbow dysplasia; it is a separate entity. MCD occurs when the medial compartment of the elbow becomes damaged, particularly with respect to the cartilage in that location. This means that the major working surface of the elbow, specifically the ulna and matching surface of the humerus, have undergone significant to severe degeneration and impaired function. These dogs usually display some degree of lameness as MCD is associated with chronic inflammation and pain. Significant MCD requires medical management at a minimum and will usually require surgical management at some point.

How Do I Know If My Dog Has Elbow Dysplasia or MCD?

Elbow Dysplasia is diagnosed by performing a physical examination and obtaining x-rays. More difficult or subtle cases are sometimes diagnosed arthroscopically. It can be diagnosed as an “incidental finding” during a routine check-up or as part of an orthopaedic exam to determine the cause of a lameness issue. Signs associated with elbow dysplasia can range from absent (ie – dog shows no lameness or indication of problems), to non-weight-bearing lameness. Dogs affected with severe bilateral disease usually have a very stiff, short-strided gait with a very gradual onset. As the onset can be very gradual and difficult for lay persons to recognize, it may go un-noticed or ascribed to “old age”.

When you present your dog to your veterinarian for a lameness problem, a complete

orthopedic examination is usually appropriate to obtain a proper diagnosis. The lameness exam should include a gait evaluation, a complete physical examination including a detailed examination of all 4 legs with the dog awake, and a proper orthopedic examination. The orthopedic examination itself is a very detailed examination of all 4 limbs and all of the joints of those limbs. This examination must be performed under sedation and includes a number of manipulations and physical tests to determine the full extent of any existing orthopedic problems. It is important to appreciate that the dog has 4 legs; **all limbs should be examined thoroughly!** Good quality, properly positioned radiographs of any affected limbs and joints are then obtained to assist diagnosis and plan appropriate treatment.

Elbow Dysplasia, MCD, and Arthritis

Clinical signs and secondary problems associated with elbow dysplasia and MCD can be highly variable. As a result, treatment recommendations are dependant on the particulars of the individual problem(s). Elbow dysplasia is usually chronic but can occur acutely due to minor trauma or sudden aggravation of signs.

As with any other orthopaedic disease affecting the joint, elbow dysplasia causes inflammation, which leads to arthritis and degenerative joint disease. At least minimal long-term therapy is appropriate to all elbow dysplasia cases, even after surgical correction. Appropriate long-term medical therapy will directly determine the outcome and the long-term comfort of the patient.

Medical Management

As mentioned previously, many cases of elbow dysplasia require surgical intervention. However, medical management is necessary for almost all cases, including those not requiring surgery, pending surgery, in the perioperative period (during recovery) **and for the rest of the dog's life after surgery.** It is important to understand that surgery is a very important event, but management of degenerative joint disease is life-long. No matter how good a job the surgeon does, it is important to understand that arthritis will develop over time.

It is also important to understand that arthritis is not a disease. Elbow dysplasia, cruciate ligament disease, patellar luxation, etc, are diseases. These diseases cause inflammation; arthritis is simply inflammation with the addition of time. As such, the goal of **all** of our therapies is to prevent or suppress inflammation, thereby preventing the development of arthritis. Attempting to treat arthritis is generally unproductive – at that point it is too late.

Medical management may consist of one or more of the following: NSAIDS, laser therapy, joint diet/dietary management, chondro-protectants, platelet-rich plasma, and stem cell therapy. Which therapies are chosen depends on the particulars of the case, the degree of arthritis present, the size of the dog and the client's preferences. Most cases require minimal therapy and not advanced treatments such as stem cell therapy, long term NSAID's, etc. Ideally, our long-term treatment plan for all of our patients is to manage them with chondroprotectants and joint diet. Understand that these long-term treatments are not optional – failure to comply with the specific diet and

chondroprotectant regimen prescribed is likely to result in long term problems. A brief description of these therapies is listed below.



Weight, Diet and Degenerative Joint Disease

In any patient with any orthopedic disease, the most important factor impacting the development of disease, prognosis and treatment is the weight of the patient. This is true with respect to the relative weight of the dog (St. Bernard v. Chihuahua) but especially with respect to obesity. **Regardless of the orthopedic condition, failure to recognize and address issues of diet and obesity will result in treatment failure, no matter how much is invested in treatment and surgery.** Some surgeons have a policy of declining to perform surgery until obesity issues are resolved due to the higher complication rate, increased difficulty in performing procedures and sometimes demonstrated failure of compliance on behalf of the client. Your veterinarian should provide specific dietary recommendations including a specific diet(s), strict feeding guidelines that include specific measuring instructions and complete diet counselling. Any complicating medical conditions such as hypothyroidism need to be diagnosed and treated.



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Joint Diets – A prescription veterinary diet formulated specifically for addressing joint disease and arthritis in our patients. These diets are designed not only to deal with inflammation associated with joint disease but are excellent at addressing weight issues that will have the most impact on patient outcomes. Joint diets have had a major impact on how we manage joint disease over the past decade, and for many dogs on monotherapy have allowed us to replace drugs with food.

Therapuetants

Chondroprotectants - All dogs with any type of joint disease should be on chondroprotectants (glucosamine, with or without chondroitin) and this is usually prescribed and supplied in our hospital. Please note, glucosamine incorporated into dry dog food is not present in sufficient quantities to have a therapeutic effect – most of it is destroyed during processing as it breaks down under the high temperatures and pressures used to make dry kibble. It has to be added to the food after processing, usually as a top-dressing added at feeding time by the client.

NSAID's - All dogs presented for severe problems/ degenerative joint disease initially start on NSAID's as this is our primary means of immediately addressing pain and inflammation. Dogs with less severe clinical signs may may or may not be prescribed NSAIDs depending on the situation. While our other therapies are just as good at addressing these issues they all take a significant amount of time to start having an effect – drug therapy is immediate. Often we will withdraw the NSAID's if possible when other therapies have had time to take effect. A number of options are available, including some newer products that have a reduced incidence of adverse effects.

Regenerative Therapies

Laser Therapy – Therapy lasers have become increasingly popular in small animal practice since they became widely available in the past 5 years. Laser therapy allows us to treat both acute injuries and chronic disease with often spectacular results. It is also extremely helpful for managing post-operative pain, inflammation and swelling and is included in our post-operative management for all orthopedic cases. This treatment has had a major impact on dramatically lowering our post-op complication rate for a variety of reasons. A separate hand-out regarding this therapy is available.



Stem Cell Therapy – We have performed stem cell therapy on a great number of our patients concurrent with surgery. This treatment is appropriate for cases where significant joint disease is already present at the time of diagnosis. It is especially important in managing cases that have other concurrent diseases such as hip or elbow dysplasia. Stem cell therapy for these cases has produced excellent results and in many cases an obvious reduction in radiographic findings associated with osteoarthritis has been noted when follow-up x-rays were taken several



months later. A separate hand-out regarding this therapy is available.



Stem cells being processed from fatty tissue.

Surgical Management of Elbow Dysplasia/MCD

The surgical management of elbow dysplasia is dependant on the exact manifestation present in each individual patient. Almost all cases will involve arthroscopic assessment with or without surgical intervention.

An arthroscope is both a camera and a magnifying glass – up to 20X magnification. Arthroscopy is performed through 2 or 3 very small holes through which both the scope and miniaturized surgical instruments are passed into the joint. The entire joint is visually inspected and damaged cartilage or small bone fragments are very carefully debrided or removed. We are able to perform these procedures far more accurately and precisely arthroscopically than by open arthrotomy. Many lesions not visible to the naked eye are very easily visualized and treated with this minimally invasive approach. **As part of our commitment to provide the highest possible standard of care to our patients, we have invested the necessary**

resources so that every patient undergoing surgery for elbow dysplasia in our facility is scoped. In rare cases, it may also be necessary to perform an arthrotomy to correct certain problems such as when we need to access the joint with larger surgical instruments. When this is necessary we use a mini approach to minimize trauma to the soft tissues.

Further surgical management is broken down by syndrome below.

Un-united Anconeal Process

Surgical treatment for un-united anconeal process involves addressing the unstable fragment to prevent or minimize further trauma to the joint and associated inflammation. The fragment may either be permanently attached and stabilized by screw fixation just as would be done for a fracture, or it may be permanently removed. As the goal is to restore stability and joint congruency, the approach favoured by most orthopaedic surgeons is screw fixation. Wherever possible that is our preferred approach as well. It should be noted that some progression of degenerative joint disease will occur regardless of fixation. Our goal is to minimize progression as much as possible.

OCD

As OCD is a cartilage disease, it is most amenable to arthroscopic diagnosis and treatment. OCD is diagnosed by direct visualization of the lesion and palpation of the cartilage with a very small probe to detect loose or diseased cartilage. Once identified, the lesion is completely debrided or curetted with a combination of hand and motorized instruments.



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Once all of the diseased cartilage is removed, the exposed subchondral bone can be treated by one of several means.

Either abrasion arthroplasty or microfracture can be performed to stimulate the development of fibrocartilage. Fibrocartilage is a type of scar tissue that covers the exposed bone so that the joint has a better functional surface to work with, thereby decreasing inflammation and slowing the progression of the disease. Abrasion arthroplasty involves removing the surface of the subchondral bone until enough of the deeper layers are exposed so that some bleeding starts to occur. Microfracture involves using a motorized pick to cause small fractures in the surface of the subchondral bone to accomplish the same goal.

An alternative approach is to resurface the lesion with synthetic cartilage instead (synACART). Where possible, this is a preferable technique. Joint resurfacing works by using a small coring bit to cut a receptacle into the subchondral bone for the implant to nest into. The implant is press-fit and tamped in to seat it flush with the surrounding cartilage. It has a titanium-chrome mesh backing that the bone then grows into and becomes permanently attached to the humerus. Concurrent osteotomy of the ulna has been recommended when resurfacing humeral lesions. The surgeon will explain this in more detail on an as-needed basis.

Fragmented Coronoid Process (FCP)

FCP is the most common manifestation of elbow dysplasia and is managed arthroscopically. Once identified, the lesion is addressed by removal of the fragment and careful curettage of the remaining bone bed. If

a free fragment is identified then it is simply removed with a small pair of graspers. If any of the coronoid process remains attached to the ulna it is also removed before treatment of the bone bed.

If the coronoid process is diseased or fragmented but still attached to the ulna, a coronoidectomy is performed. This involves carefully passing a very small osteotome (similar to a chisel) into the joint and carefully cutting the coronoid free. It is then removed as previously described. Great care must be taken when performing this procedure and it is very important not to remove too much bone during the procedure (in case it is necessary to perform a CUE at a later date – see below).

It has recently been reported that performing this procedure in conjunction with stem cell therapy had a highly beneficial impact on patient outcome. We have seen similar results in our hospital and highly recommend combining these treatments whenever possible. This could probably reasonably be extrapolated to apply to elbow dysplasia in general.

Flexor Enthesiopathy, Elbow Incongruity

As these manifestations of elbow dysplasia require very specific management which can vary considerably between cases, they will be addressed in detail on a case-by-case basis by the surgeon.



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Medial Compartment Disease (MCD)

As previously discussed, MCD is frequently manifested as an advanced lesion associated with elbow dysplasia. As this represents generalized damage to the medial joint surfaces of the elbow, the most appropriate surgical treatment is joint resurfacing.

A special joint resurfacing technique has been developed for MCD called Canine Unicompartmental Elbow (CUE). The procedure starts by performing an osteotomy to move a piece of bone from the humerus that has several ligament and tendon attachments. This allows us to access the diseased joint surfaces. A special set of coring bits is then used to prepare receptacles for the implants as with synACART. The implants are then pressed and tamped into place. These implants provide a synthetic joint surface to the load-bearing surface of the elbow, allowing for normal, pain-free function of the joint again. The piece of bone that was moved from the humerus is then repaired with a lag screw.

As this is a highly invasive technique the recovery time is substantial. It is intended to treat dogs with severe or end-stage elbow dysplasia and is not appropriate for very young dogs or dogs that are in early stages of the disease. As with any joint replacement therapy, there is significant potential for complications. Dogs requiring CUE receive an extensive work-up and client consultation.

Post-Operative Care

Client compliance with post-operative care is extremely important – **failure to meticulously follow instructions can, and**

usually does result in severe complications and treatment failure. It is our preference whenever possible to provide complete and comprehensive case management for the entire post-op period. In our practise, we perform laser therapy during the first two weeks post-op to aid with recovery and pain management. Other pain management such as NSAIDs, opioids (codeine), bandaging, etc, are provided as is a short course of antibiotics. Physiotherapy is a crucial component of post-op management and is initiated immediately. Physiotherapy instructions are given at discharge and include massage, icing, passive range-of-motion exercises and controlled leash walks. Other than prescribed physiotherapy, absolute exercise restriction is necessary and off-leash activity is strictly forbidden. Unrestricted access to flights of stairs in the house is to be avoided, however going up and down exterior stairs to get in or out of the house is permissible (on-leash only!).

Sutures are removed after 14 days and post-op x-rays are taken as directed by the surgeon if necessary. Other care requirements are case-specific and will be provided in written form at surgical discharge. Our long-term goal for our patients is maintenance with glucosamine, joint diet and if necessary annual laser treatments. Patients with more advanced disease at surgery may require more aggressive treatment for arthritis in the long term.



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Cost

The cost of these procedures is as follows:

Orthopedic exam: \$450 + HST

(includes consult, sedation and whatever x-rays are necessary)

Surgical Procedures

(includes laser therapy sessions, all routine post-op medications, suture removal, rechecks, etc)

Arthroscopy (1 to 3 joints): \$1800 + HST

synACART: \$850 + HST per site/implant

Arthroscopy + Stem Cell Treatment:

\$3400.00 + HST

Canine Unicompartmental Elbow (CUE):

\$3500 + HST, includes arthroscopy

Un-United Anconeal Process (UAP): \$1500 + HST (unilateral), \$2200 + HST (bilateral)

Any questions or concerns can be addressed by the surgeon during the work-up/consult.

****A non-refundable deposit of \$250.00 is due at the time of booking any orthopedic work-up and/or surgery****