



FUSION VETERINARY ORTHOPEDICS

Cranial Cruciate Ligament (CCL) Disease

David L. Dycus, DVM, MS, CCRP DACVS-SA

Introduction:

Rupture of the cranial cruciate ligament (CCL) is the most common orthopedic disease we see in dogs. In fact about 35% of the time patients are referred to orthopedic surgeons for hip problems when in reality it is a ruptured CCL. It is considered analogous with an anterior cruciate ligament (ACL) rupture that we commonly hear of occurring in humans. The CCL is an important stabilizer of the stifle (knee) joint and once torn it leaves the stifle unstable. The three main functions of the CCL are to prevent hyperextension of the stifle, prevent internal rotation of the tibia (shin bone), and most importantly to prevent thrust or subluxation of the tibia in relation to the femur (thigh bone). The top of the dog's tibia is relatively steep when compared to humans. The easiest way to picture what is happening is to think of the CCL as a parking brake, the top of the tibia as a mountain, and the end of the femur as the car. Once the CCL is torn or beginning to tear we lose the parking brake and the car is able to slide down the mountain. Furthermore, once the CCL is torn dogs are then susceptible for a meniscal tear. The meniscus is considered a "shock absorber" between the femur and tibia. If it tears it can be extremely painful, and further the degree of osteoarthritis (OA).

How does this occur?

Typically, when humans tear an ACL it's after a traumatic event such as down hill skiing or playing back yard football. Unfortunately, in dogs the CCL begins to weaken over time; therefore, CCL rupture is considered a degenerative condition in dogs. Often times small to no trauma is noted when a dog tears his/her CCL. At the present time we don't know what causes the ligament to weaken. Multiple theories have been proposed such as underlying genetics, obesity, gender, immune-mediated disease, infection, etc. We do know that the underlying causes are likely multifactorial.

Clinical Signs and Diagnosis:

Often times there is no known trauma that occurred when a dog ruptures his/her CCL. The common history is that the dog was out for a walk and started limping, chased a rabbit and came back limping, or even was let out to go potty and came back limping. Commonly right after the rupture a cry may be heard and many dogs are non-weight bearing on the affected limb (for complete tears) or may be limping (for partial tears). After a few days the inflammatory response tends to lessen and it may appear as though they are getting better.

The ultimate diagnosis of a ruptured CCL is from an orthopedic exam and history; not radiographs (x-rays). At presentation dogs may only have a slight lameness or



FUSION VETERINARY ORTHOPEDICS

be completely non-weight bearing. Upon palpation of the affected limb excessive fluid (joint effusion) may be palpated. When the stifle is hyperextended often times dogs will be painful. Direct identification of a torn CCL is diagnosed from two orthopedic exam techniques: cranial drawer and cranial tibial thrust. Our team at Fusion Veterinary Orthopedics is very experienced when it comes to diagnosing a CCL tear. With the cranial drawer test our surgeon will place their hands on the femur and tibia. The goal is to try to move the tibia cranially (forward) in relation to the femur to check for instability. It is important that this is completed with the stifle both flexed and extended to decide between a partial tear and a complete tear. The cranial tibial thrust test is a passive test that “mimics” what is occurring when the dog is walking. Essentially, our surgeon holds the stifle at a walking angle and the hock (ankle) is flexed. If the CCL is torn then we will see cranial translation of the tibia in relation to the femur. In most cases these test are enough to diagnose the problem. However, radiographs are always indicated to rule out other concurring problems, evaluate the amount of joint effusion, surgical planning, and to gauge the degree of OA present.

How is this treated?

It is VERY important to understand that no matter what is done there will be arthritic changes in the joint after a CCL rupture. The goals of surgery are to stabilize the stifle, but also to slow down and minimize the progression of OA. Typically, there are two large options for treatment: conservative management and surgical management.

Conservative management is typically only reserved for patients that can't undergo surgery due to various reasons. A true conservative approach includes a period of exercise restriction, formal rehabilitation at Fusion Veterinary Orthopedics, and possibly intra-articular injections. For some patients, a custom fitted stifle brace may be recommended in addition to formalized rehabilitation therapy. We currently don't recommend buying a brace that is not custom fitted due to poor fitting and uncomfortable nature that some braces may cause. It should be realized that a stifle brace is only suitable for those patients that cant undergo surgery, not to replace surgery. The body will try to stabilize the stifle by developing scar tissue across the femur and tibia on the inside of the knee. This scar tissue will never be as strong as the CCL, and with each step the scar tissue is broken down so the body lays more scar tissue down. Unfortunately, in patients that continue to have an unstable stifle, OA tends to progress more rapidly. While patients may improve with a conservative approach, their overall activity intensity, frequency, and duration may be decreased.

Surgical management is typically always recommended to have a quicker return to function while minimizing progression of OA, even in patients with a partial tear. Treatment begins with a minimally invasive arthroscopic procedure (small camera



FUSION VETERINARY ORTHOPEDICS

inserted into the stifle) to confirm the degree of tear (partial vs. complete, evaluate the meniscus, and determine the degree of OA present). There are various surgical procedures, but Dr. David Dycus typically only recommends the tibial plateau leveling osteotomy (TPLO). Previous surgical methods such as the lateral suture (aka extracapsular repair) have fallen out of favor due the persistent instability noted after surgery in both small and large dogs along with a higher meniscal tear rate, higher complication rate, and lower return to function. Also, the lateral suture is not the same as the TightRope® procedure, which has been noted to be a misinterpretation. Two of the most common procedures that surgeons will typically recommend are the TPLO and the tibial tuberosity transposition (TTA). Both procedures have demonstrated adequacy; however, Dr. David Dycus has noted more instability, higher complications, and higher post operative meniscal tears following the TTA. For these reasons we don't currently recommend the TTA procedure for our patients at Fusion Veterinary Orthopedics.

The TPLO aims to stabilize the stifle by changing the biomechanics through the joint to eliminate the need for a CCL. The idea is based off taking the steep part of the tibia, making a circular cut, and rotating the top of the tibia so that it is flatter. Since we are making a cut in the bone it is secured with a locking plate and screws. Once the bone is rotated the instability is eliminated.

Dr. David Dycus has performed over 7000 TPLO procedures and is considered an industry expert in performing and teaching the procedure.

What happens after surgery?

After surgery you dog will need a period of rest and relaxation of about 8-12 weeks. This means no running, jumping, or playing. They will need to be taken outside on leash to urinate and defecate; excessive climbing up and down stairs or on and off furniture should be avoided. We recommend when not directly supervised that patients be placed in a crate, small laundry room or bathroom, or a small portion of the house sectioned off so that your dog can't overdo it. Excessive activity will lead to implant breakdown, soft tissue injuries, or delayed healing.

If staples/sutures are present they will be removed, or the incision evaluated at approximately 2 weeks after surgery and radiographs will be needed around 8 weeks and possibly 12 weeks after surgery to evaluate healing. At these rechecks an orthopedic exam will also be performed to ensure the surgical site is healing as expected.

Just as with people we recommend physical rehabilitation at Fusion Veterinary Orthopedics beginning 2 weeks after surgery. Rehabilitation will involve once to twice weekly formal rehabilitation sessions along with at home exercises. We have



FUSION VETERINARY ORTHOPEDICS

noted quicker healing, maintenance of muscle mass and range of motion, and superior outcome in the patients that undergo formal rehabilitation. Furthermore, rehabilitation offers an outlet of energy in controlled manner so that your dog is still able to maintain some activity while healing. Patients that have been treated conservatively usually require once to twice weekly rehabilitation for a period of about 3-6 months.

Following surgery, we recommend that patients begin oral joint supplements and omega-3 fatty acids, maintain a healthy body weight, and remain active once healed from surgery. These things will be the beginning blocks along with surgery to minimize and slow down the progression of OA.

Are there any complications?

Unfortunately, because this is a degenerative condition we know that about 50-60% of dogs that rupture one CCL will tear the CCL in the other stifle within about 15-18 months. Commonly, we see patients that have bilateral (both sides) CCL tears and we recommend staging the TPLO procedures in most situations.

At Fusion Veterinary Orthopedics, we take great pride ensuring our patients return to as normal function as soon as possible. Particularly, with the TPLO surgery, complications noted are implant breakdown (breaking/bending of the plate and/or screws), postoperative meniscal tear, infection, and soft tissue injuries. Postoperative meniscal tears happen infrequently following the TPLO (less than 4%). If a meniscal tear is noted after surgery, arthroscopy of the stifle is performed, and the torn portion of the meniscus is removed. Anytime implants are placed in a surgical site there is the chance of infection. Infection rates are low, and during surgery your dog will be given antibiotics and, in some cases, will be sent home with antibiotics after surgery. If an infection does occur, then once the bone is healed the plate and screws will be removed to resolve the infection. Implant break down and soft tissue injuries typically occur from over activity. Many of them will resolve with appropriate rest, rehabilitation, and medications.

Dr. David Dycus is the co-editor for the textbook on Complications in Canine Cranial Cruciate ligament surgery, which was written to assist other veterinarians on how to address complications from various surgical techniques.