

Cranial Cruciate Ligament (CrCL) Injury and The Newfoundland

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Your Newfoundland has a torn cranial cruciate ligament (CrCL)—some of the worst words any pet owner can hear. Unfortunately, this disease condition is one of the most common orthopedic issues we see in veterinary orthopedics. This happens in dogs as young as six months of age and as small as three pounds, to all the way in dogs as old as 16 years of age or as large as 250 pounds. Before deciding on the best course of action, it is wise to take a step back and realize why this disease occurs in the first place.

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What does the CrCL even do?

The CrCL has three main functions: limit stifle (knee) hyperextension, limit stifle internal rotation, and prevent excessive subluxation of the tibia (shin bone) in relation to the femur (thigh bone). When a dog's foot strikes the ground a force travels up the tibia. In the dog, at the stifle there is a natural motion of the tibia to move forward in relation to the femur. The intact CrCL prevents this motion from occurring. Unfortunately, once the CrCL is damaged, the prevention of the tibia moving forward in relation to the femur is lost and tibial thrust develops. In other words, once the foot strikes the ground, the shin bone moves forward, almost creating a sensation of the knee buckling if the CrCL is damaged. Dogs also have some anatomical differences compared to people. This is the *major* reason we can't address CrCL tearing in the dog the same way we do in people. The top of the human's tibia is pretty flat (like 4-5 degrees), while the top of the dog's tibia has a steep slope (like 26-30 degrees). Think about this scenario: a human standing upright has minimal to no stress on the Anterior Cruciate Ligament (ACL); however, if they were to get into an athletic position (think like a baseball player in the field ready to field a play) then there is a substantial load placed on the ACL. If that baseball player were to tear his ACL, he could still walk and function, but he would not

be able to get into that athletic position. A dog having a steep tibial angle essentially means they live their life in an athletic position. In other words, they have complete stress on the CrCL even standing still. The best analogy I use with others is think of the top of the tibia like the side of a mountain, the end of the femur like a car and the CrCL like a parking brake. Once the parking brake is gone, the car is going to slide down the mountain.

The Basics behind tearing of the CrCL

The cranial cruciate ligament in the dog is similar to the Anterior Cruciate Ligament (ACL) in a person. In veterinary medicine we use the term “cranial”, while in human medicine they use the term “anterior”. The major difference is how it happens. In humans an ACL tear is due to a traumatic event where excessive stress is placed upon an otherwise healthy ACL. In the dog on the other hand, the CrCL becomes degenerative over time. This means some process begins to cause weakening of the ligament. Over time the ligament becomes weaker and weaker until one day any normal stress upon the CrCL allows it to tear. In other words, a CrCL tear in the dog occurs with normal stress on an otherwise unhealthy CrCL. The problem we as veterinarians face, we have no idea what causes degeneration of the CrCL. Over the last 50 years we have investigated many causes such as age, sex, breed, body weight, neutering status, timing of neutering, conformation, genetics, infection, immune-mediated, etc. To this date we still have not figured out the exact cause; it is likely multifactorial in nature.

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What this means is that the day or two of a hind limb lameness that resolves, or the stiffness of the young Newfoundland where you thought “they slept wrong on the leg” is not to be taken lightly. Any hind limb issue needs to be addressed quickly no matter how minor or severe it is. Many times I see patients who have had an on again off again lameness for many months or even years before they become continuously lame. Once the process starts there will be weakening over time, in other words there is a partial tear that continues to compound until a complete tear develops. Think about the small snow ball rolling down a hill that gains power and gets larger and larger until hitting something and resulting in a catastrophic issue.

What clinical signs may you see at home?

Clinical signs will vary from an acute non-weight bearing injury to a long standing intermittent mild lameness. The thing to remember is if there is an acute non-weight bearing injury, the ligament was likely already weakened to begin with. For the acute lameness, many times dogs will hold the affected hind leg up in the air for some period, from hours to days. As the inflammatory phase subsides (typically this coincides with seeing your veterinarian and starting an anti-inflammatory medication) you will see some improvement from not using

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the leg to trying to use the leg but with a lameness. This *does not* mean they are healing; this is the natural progression of the injury. The more challenging cases are the chronic on/off again lameness. This on again off again issue can go on for weeks, months, or even years. When standing you may find that your dog does not want to put full weight on the affected limb (a term called “off-loading”). They may appear very stiff and sore in the morning and then warm out of the issue only to be lame after a day of activity. Please don’t think this for old age, a middle aged to older dog should be able to get up and get going without any major stiffness. You may also notice that your dog sits “sloppy” or keeps one hind limb straight out when sitting.

Anything out of the ordinary, even mild should prompt a visit to your veterinarian.

What to expect at the veterinarian

Your consultation with your veterinarian should include several basic things. Your veterinarian should watch your dog walk (remember no lameness at the veterinarian’s office does not mean it does not exist), then perform an orthopedic examination, and lastly, they *must* take radiographs (X-rays) of your dog’s leg. The orthopedic examination of the stifle should include testing for cranial tibial thrust, cranial drawer, and pain on hyperextension. For me as a specialist I measure joint angles, and measure muscle mass in addition. It is not uncommon at all to find muscle loss in the affected limb. A complete tear of the CrCL is typically easiest to diagnose as there is ample instability in the stifle. A partial tear is much more challenging to diagnose. Partial tears are the ones I see missed the most commonly. They are put off as a “strain” or a “soft tissue injury” or even a “hip issue”. The reality is that close to 40% of dogs sent to me for hip issues actually have CrCL damage. The number one thing that keeps a dog from having a total hip replacement is, you guessed it, CrCL damage. Radiographs are very important. Yes, the CrCL is a soft tissue structure and we can’t identify this on a radiograph. However, effusion (increased fluid in the knee) or osteoarthritis (OA) are two major signs there is an issue in the stifle. Also, something horrible like a bone tumor should be ruled out. I would even recommend your veterinarian take radiographs of the good knee (more on this in a moment). Do not go with the saying “let’s just see how they are doing in two weeks and if no improvement, then we will take radiographs”. Always, always have your veterinarian take good quality, diagnostic radiographs.

What type of discussion do I as a specialist have with owners?

Once a CrCL tear is diagnosed or suspected, I walk owners through some base line information, expectations and goals.

Baseline Information:

- No matter what is done our goal should be that your pet has a comfortable knee to run, jump, play and exercise.

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- Any abnormal motion in a joint (even with a small partial tear) has the ability to allow the development of osteoarthritis. So, our job is to attempt to slow down and minimize the progression of osteoarthritis.
- In dogs with CrCL damage, the meniscus (little shock absorber between the femur and tibia) is at risk of tearing, particularly the back inside portion. In fact, dogs are a “ticking time bomb” for this to happen in that the meniscal tear rate can be as high as 70%. So, we need to minimize this from happening.
- Because dogs tear their CrCL due to degeneration, when they tear one side, there is a 50-60% chance they will tear the CrCL in the other hind leg. So, this is why radiographs of the good leg are important. If there is effusion or osteoarthritis in the good leg this can increase the likelihood of tearing that CrCL from 50-60% to around 70-80%.

From a management standpoint there are really two avenues to proceed down:

Conservative management: The goal of this approach is not to heal the ligament; once damaged, it will not heal itself, and if partial, will likely continue to tear until a complete tear occurs. The goal of conservative management is simply to minimize the inflammatory response and allow the dog to compensate slightly better. For me this is achieved by injecting something into the stifle to calm the inflammatory response or I use an oral anti-inflammatory. Then I place patients into a formal rehabilitation program with exercise restriction for about 8-12 weeks. During this rehabilitation period they are working with a skilled therapist to build muscle mass, strength, and minimize compensatory issues. At the end of this period we have to determine what strategies work to keep the patient comfortable. A patient’s overall activity level will be decreased and the frequency and intensity of doing those activities will be decreased. In other words, the goal is not to return a patient to pre-injury status, it is simply to improve their quality of life. In addition, it is a lifelong management process.

Surgical management: The goal of this approach is to return a patient back to pre-injury status. Once you start doing a bit of research you will find there are many different types of surgical procedures. From a basic stand point these are broken into:

intra-articular repairs (we try to mimic the function of the CrCL by using something in the joint),
extra-articular repairs (we try to mimic the function of the CrCL by using something outside of the joint), and
osteotomy procedures (we change the biomechanics of the stifle so there is no longer a need for the CrCL).

I have been trained in virtually every type of CrCL repair so my goal as a surgeon is to determine what is the best surgical procedure for *your* dog, not what is the best surgical procedure

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for every dog. There is no argument in this day and age that some procedures are better than others, and all of them have pros and cons to them. This is where decision making can become very challenging.

So, let me try to break some of this down:

Intra-articular repairs are typically associated with high failure rates. In an ideal world we would be able to repair a canine CrCL tear similar to a human ACL tear; however, this is not the case (remember the steep slope to the top of the tibia). Once an intra-articular repair has been completed, the graft has to take the entire load right off the bat, so it never has time to heal and is immediately placed under stress thus increasing the chances of it tearing. From a research standpoint we are continuously evaluating methods and materials to make this happen but, currently I would not recommend an intra-articular CrCL repair.

Extra-articular repairs are also associated with high failure rates; but this is also due to where the material is placed. There is very much a right way and a wrong way to do this procedure. We are simply trying to mimic the function of the CrCL by stabilizing the stifle outside of the joint, and in the end letting scar tissue develop to try and help with stability. Sometimes this is referred to as an “extra-capsular” repair. Traditionally, it has been recommended more for smaller dogs. When the appropriate location of the material is used the success can be high (high 80 to low 90%), but as weight increases and as the angle to the top of the tibia increases this places more stress on the extra-articular material. Currently, I would not recommend this repair technique for medium to large breed dogs or small dogs with steep tibial angles.

Osteotomy procedures sound like a scary thing, but in reality are associated with a very high success rate. Essentially, we are cutting the bone to change the biomechanics to eliminate the need for the CrCL. So, technically, we are not repairing the CrCL at all. These procedures involve cutting the bone (typically the tibia) and changing something to eliminate the abnormal motion. The most common types of osteotomy procedures are the tibial plateau leveling osteotomy (TPLO), tibial tuberosity advancement (TTA), CORA based leveling osteotomy (CBLO), and the cranial closing wedge osteotomy (CCWO). In the right hands these procedures are associated with a very high success rate (93%+) with minimal complications. The great thing about these procedures is that once the bone has healed the stifle is stable for the remainder of the patient’s life. They can’t develop instability in the stifle ever again. The problem is there is no “best” procedure. If you get ten surgeons in a room you will get 25 different answers. Most surgeons are going to recommend what works best for them.

To try and make osteotomy procedures less confusing let’s take the TPLO for example. Let’s go back to our parking brake analogy.

The intra-articular repair is replacing the parking brake, the extra-articular repair is replacing things around and similar to the parking brake and the TPLO is taking away the need for the parking brake. In other words, instead of trying to repair or replace the parking brake, the TPLO procedure changes the terrain so there is no need for a parking brake at all.

So, how do you know what is best for your dog?

If your regular veterinarian has diagnosed a CrCL tear in your dog, it is always best to ask for a referral to a boarded surgeon. Technically, your veterinarian should offer a referral as best medicine. If they do not, then it is perfectly okay to ask for a second opinion. Just make sure you are seeing an individual that is board certified by the American College of Veterinary Surgeons (ACVS). They will have the letters DACVS or DACVS-SA behind their name. This means they have completed a formal surgical residency and have passed all the requirements to be a Diplomate of the ACVS. Technically, according to ACVS a person can only call themselves a “surgeon” if they are Diplomate of the ACVS.

If your veterinarian is recommending that they do the surgery, ask them why they are not recommending a referral? How many of these have they done? Is this the best option for *my* dog? What is their success rate (they should be able to give you an exact percentage, not what is quoted in the literature but their actual percentage)? What is their complication rate (they should be able to give you an exact percentage, not what is quoted in the literature but their actual percentage)? What happens if there is a complication? Can they handle the issue if a complication arises, or will they be sending you to a surgeon to handle the complication?

“From a referral standpoint, do your research and find someone you are comfortable with.”

From a referral standpoint, do your research and find someone you are comfortable with. At the consult, there should be no pressure to immediately jump right into surgery, but the surgeon should lay out the options and why they are recommending those options. However, from a surgeon’s standpoint surgical intervention in most cases is going to result in the best outcome. Once the surgeon recommends surgery, ask the following questions to make the best decision for your dog: How many of these have they done? Is this the best option for *my* dog? What is their success rate (they should be able to give you an exact percentage, not what is quoted in the literature but their actual percentage)? What is their complication rate (they should be able to give you an exact percentage, not what is quoted in the literature but their actual percentage)? What happens if there is a complication? Can they handle the issue if a complication arises, or will they be sending you to another surgeon? You should leave the consult feeling like the surgeon is confident and you fully understand what is going on, what the surgery entails, what the post-operative expectations are, and what the expectations for the future are.

“At the end of the day, you need to do what is best for your dog.”

I'm a huge fan of getting second opinions; however, use caution as I see patients as a second, third, or even fourth opinion. Once you start getting multiple opinions on what to do, it becomes even more confusing as you will ultimately get differing opinions. This does not mean one is right and one is wrong. For example, I primarily do TPLOs and CBLOs. I don't do TTAs. Therefore, in my consultations I don't discuss TTAs, but discuss and recommend TPLOs and CBLOs. However, some of my colleagues routinely perform TTAs with great success. Also, the internet can be a great wealth of information. Just be cautious of online search results that are not realistic, seem false, or are not from a verified scientific source. In

addition, I personally would pay little attention to online reviews about veterinarians. In most situations a negative review is only one side of the story and it usually does not portray what actually transpired.

At the end of the day, you need to do what is best for your dog. For me this commonly means surgery unless I have a reason why a patient can't undergo surgery. While a CrCL tear is something scary to deal with, at the end of the day when it is all said and done, many of the dogs are back to doing all the things they did before they injured themselves.
