CRUCIATE LIGAMENT RUPTURE IN DOGS

What and where are the cruciate ligaments?

There are two bands of fibrous tissue called the *cruciate ligaments* in each knee joint. They join the femur and tibia (the bones above and below the knee joint) together so that the knee works as a hinged joint.

They are called cruciate ligaments because they "crossover" inside the knee joint. One ligament connects from inside to outside the knee joint and the other outside to inside, crossing each other in the middle. See picture at end of handout.

The cranial cruciate ligament prevents the tibia from slipping forward out from under the femur.

How does a cranial cruciate injury occur?

The knee joint is a hinged joint and only moves in one plane, backwards and forwards. Traumatic cruciate damage is caused by a twisting injury to the knee joint. This is most often seen in dogs and athletes when running and suddenly changing direction so that the majority of the weight is taken on this single joint. This injury usually affects the anterior or cranial (front) ligament. The joint is then unstable and causes extreme pain, often resulting in lameness.
The injury also occurs commonly in obese dogs, due to added strain on the joints.

A more chronic form of cruciate damage can occur due to weakening of the ligaments as a result of disease. The ligament may become stretched or partially torn, and lameness may be only slight and intermittent. With continued use of the joint, the condition gradually gets worse until rupture occurs.

Diagnosis

Commonly, dogs will present "toe touching" lame in one of the hindlimbs and be painful/sensitive upon palpation of the knee joint and potentially have a history of high activity level just before injury or jumping off something.

The key to diagnosis is an abnormal movement of the knee joint called a positive cranial drawer sign. Another movement is called the tibial compression test that, if abnormal, can indicate a rupture as well. If the rupture is more chronic, some bony swelling on the medial aspect of the knee (called medial buttressing) may be present and be an indicator of possible knee instability as well. Unfortunately, especially if acutely torn, these movements can be painful and difficult to fully elicit the movements while awake and sedated examination often is recommended in addition to radiographs of the knee joint to evaluate for any other abnormalities, such as arthritis.

Other complications

Inside the knee joint are pieces of cartilage called *menisci*. The menisci act as shock absorbers between the femur and tibia. Many times these cartilages are also damaged when the cruciate ligaments rupture. They are usually repaired at the same time as the ligament surgery.

In some small dogs, medial luxating patellas may be an additional orthopedic condition that may require fixation to lower the risk of cranial cruciate ligament injuries as the abnormal movement of the kneecap can stress this ligament out leading to rupture.

When the knee becomes unstable, abnormal wear between bones and cartilage can lead to degenerative changes. Bony changes will occur in the joint, as this is the body's response to an

injury, leading to chronic pain and decreased joint mobility. This process can be slowed by surgical repair but cannot be completely reversed. Therefore, it is important to understand that osteoarthritis will develop regardless of which treatment avenue is pursued and most likely will result in some degree of lameness.

About 50% of the time, especially in large, overweight dogs, within 6 months of rupturing one cranial cruciate ligament, they will rupture the other side. Therefore, surgical repair is the gold standard for treatment in most cases.

Treatment

There are various techniques available to replace the action of the cruciate ligaments. These surgeries most often involve the placement of "artificial" ligaments along the outside of the knee joint, such as bone plates/screws or suture placement. Unlike in humans, the ligament cannot be "replaced" but instead procedures are done to re-establish stability within the knee joint. Every surgeon will have different preferences and different factors (i.e. weight, age, degree of osteoarthritis, etc.) will influence the technique chosen for repair for that patient.

1. **Tibial Plateau Leveling Osteotomy (TPLO) or Tibial Tuberosity Advancement (TTA)**
    a. These procedures is generally recommended for larger breed dogs
    b. These procedures basically change the biomechanics of the knee joint by requiring a bone cut and placement of a bone plate and screws
2. **Extracapsular Repair ("Ex-cap", "Lateral suture")**
    a. This procedure is generally recommended for smaller breed dogs
    b. This procedure includes using suture to mimic the function of the cranial cruciate ligament by placing it in a similar orientation to the original ligament.
    c. Goal is to have the body form scar tissue around the joint while the suture breaks down to provide stability
    d. Another similar procedure available that does require drilling holes into the bone to place the suture/toggle implant is called the **Tightrope procedure**

The **top surgical referral facilities in the area** that we commonly refer to for are:

1. Metropolitan Veterinary Hospital Akron: (330) 666-2976
2. MedVet Akron: (330) 665-5972
3. Yellow Creek Veterinary Surgery and Imaging: (330) 576-3017

Post-operative

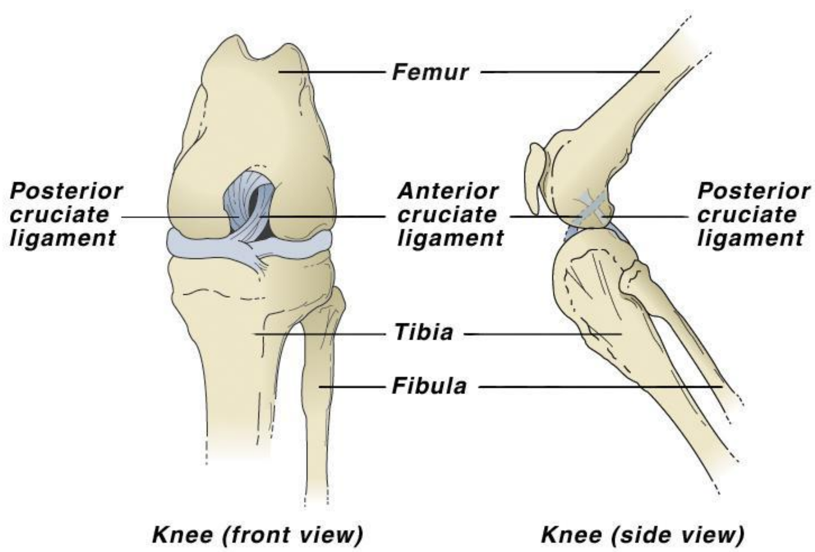
It is important that your dog has limited activity for six to eight weeks after surgery. Physical rehabilitation can speed recovery and improve outcomes as well. It is vital during this period to closely follow the post-operative instructions given.

What if surgery cannot be pursued?

In some cases, surgery is not recommended, or surgery is not a viable option for you and your family. As stated before, regardless if surgically repaired or not, the body will “heal” itself with a degree of osteoarthritis. Other options to aid in the pain associated with rupturing the ligament and long-term management include:

1. **Activity restriction**!!! This is the most important aspect to allow the joint to heal as much as possible and reduce the incidence of injuring other ligaments.
2. **Anti-inflammatories and other pain medications** (Rimadyl, Gabapentin, Amantadine, etc.)
3. **Physical therapy/rehabilitation**
4. **Glucosamine/chondroitin/omega-3 fatty acid supplementation**
5. **Weight management**
6. **Adequan injections** (polysulfated glycosaminoglycan) for restoration of joint lubrication, relief of inflammation and build of healthy cartilage
7. **Custom orthotics** – typically not recommended unless custom made and consulted with an orthopedic specialist due to the complications that can occur secondary to wearing a brace (i.e. making the injury worse). The ONLY recommended brand is Orthopet.

[1]



[1] Resources
ηττπσ://ϖετεριναρψπαρτνερ.ϖιν.χομ/δεφαυλτ.ασπξ?πιδ=19239&ιδ=4952244#:~:τεξτ=Τηε%20αντεριορ%2Φχρανιαλ%20χρυχιατε%20λιγαμεντ,ουτ%20φρομ%20υνδερ%20τηε%20φεμυρ.&τεξτ=Τηε%20ρυπτυρεδ%20χρυχιατε%20λιγαμεντ%20ισ,λιγαμεντ%20ρατηερ%20τηαν%20σομετηινγ%20ελσε.
ηττπσ://ωωω.αχϖσ.οργ/σμαλλ−ανιμαλ/χρανιαλ−χρυχιατε−λιγαμεντ−δισεασε/
This client information sheet is based on material written by Ernest Ward, DVM.