

# Cruciate Ligament Disease

## What is a cruciate ligament?

The “knee” or “stifle” joint is comprised bones, cartilage and ligaments, which keep the knee in alignment and prevent it from bending in ways it should not.

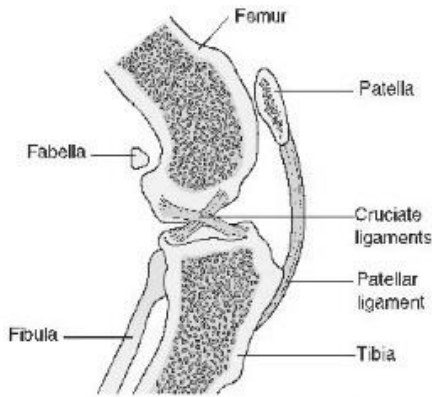


Figure 1: cross-section of a dog's stifle

The bones are:

- Femur: this is the thigh bone, which comes from above the stifle
- Tibia: this is the shin bone, which comes from below the stifle
- Fibula: this is the thin bone that travels along the tibia from below the stifle
- Patella: this is the knee cap, which sits in front of the stifle in, in a groove of the femur
- Fabellae: these are two small bean-like bones that sit behind the stifle

The cartilage are the soft medial meniscus and lateral meniscus, which fit between the femur and tibia and cushion the stifle joint

The ligaments are:

- Cruciate ligaments: “cruciate” in Latin means “cross-shaped”. There are two cruciate ligaments, the cranial cruciate ligament (anterior cruciate ligament or “ACL” in humans) and the caudal cruciate ligament (posterior cruciate ligament or “PCL” in humans). These are bands of fiber that cross each other and keep the tibia from sliding forwards (cranial CL) and backwards (caudal CL) relative to the femur.
- Collateral ligaments: the medial and lateral collateral ligaments run along the outside and inside of the stifle, respectively, and keep the tibia from bending outwards (medial CL) and inwards (lateral CL) relative to the femur.
- Patellar ligament: this ligament holds the patella in place within its groove

Disease in pets is almost always associated with cranial cruciate ligament, however traumatic injuries such as car accidents can involve multiple ligaments in the stifle or even all ligaments, termed “global knee”.

## Cranial cruciate ligament disease:

This is a condition in which the cranial cruciate ligament is fully or partially broken.

The ligament may be healthy one moment then the next moment is completely ruptured, much like in humans with ACL injuries. This can be seen in cats, overweight small breed dogs (especially those with a “luxating” or loose patella) or in young

athletic large-breed dogs that just turn the wrong way, for instance when catching a toy. These dogs will suddenly limp, and it will usually be easy for your veterinarian to diagnose the problem.

The other possibility is that the ligament has been broken down slowly over the years, then one day a totally normal movement causes the ligament to either rupture completely, or rupture enough that your dog begins to limp. This is more common in large breed dogs, but can be seen in small breeds as well. The exact cause of this degradation is unknown, but may be caused by poor conformation, immune-mediated disease, genetics or other unknown causes. This condition affects both stifles in 60% of cases, but usually one leg will be affected before the other. If the ligament is still mostly intact, it can be difficult for your veterinarian to be certain that the ligament is abnormal without direct visualization of the ligament itself through surgery or arthroscopy.

The medial meniscus is involved in 50% of cases; when the cranial cruciate ligament is unstable, the tibia will move around more, trapping this meniscus and damaging it.

If there has been instability in the stifle for some time due to cranial cruciate ligament instability with or without meniscal damage, degenerative joint disease or “arthritis” will develop as a result. While surgery can correct the instability, only a knee replacement can treat the arthritis. There are many medical treatments that can help pets with arthritis to be more comfortable and have a better quality of life; for more information on arthritis, please visit our Pet Health Library <http://lacostavet.com/pet-health-resources/pet-health-library.html>.

### **Diagnosis:**

Physical examination findings: if your pet is limping on a hind leg and your veterinarian feels inflammation and/or fluid in his or her stifle joint, this is very suspicious of cranial cruciate ligament disease. If this condition is chronic in your pet, your veterinarian will be able to feel that his or her stifle is thickened, termed “medial buttressing”. This is due to the body placing new bone on the inside of the stifle to improve stability of that joint. Your pet may also have arthritis, which your veterinarian may feel as stiffness in the joint and creaking/clicking as the joint is moved (termed “crepitus”).

Cranial drawer sign: This is a manipulation done with your pet laying on his or her side. Your veterinarian will hold the tibia in one hand and the femur in the other, and see if the tibia can be moved forward (towards the head or “cranially”) relative to the femur. If so, your pet has cranial cruciate ligament disease. If your pet is very protective of his or her stifle, they may need to be sedated for this test. If your pet’s cranial cruciate ligament disease is mild (the ligament is only partially broken), it may be difficult for your veterinarian to be confident that this test is positive, and they may recommend that your pet is seen by a specialist (orthopedic surgeon).

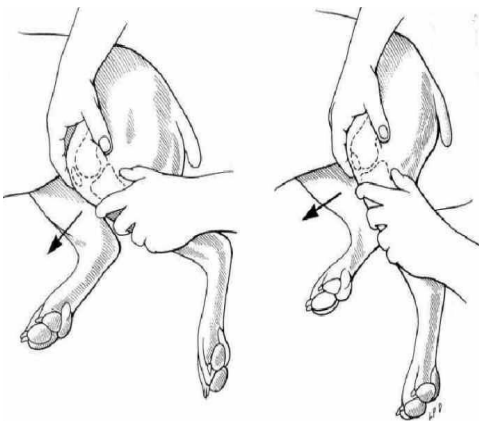


Figure 2: cranial drawer test

X-rays: x-rays cannot “see” ligaments, but they can see the secondary effects of a cranial cruciate ligament disease. In the early stages, this is usually fluid within the joint, termed “effusion”:



Figure 3: normal stifle

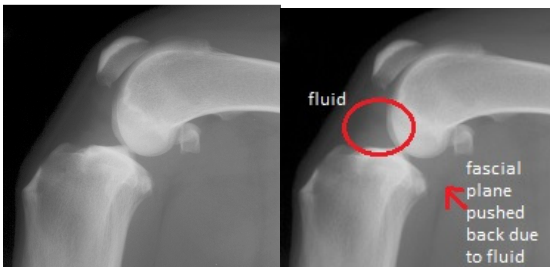


Figure 4: stifle effusion

In the later stages, arthritis may be visible:



Figure 5: stifle arthritis

### Treatment:

Surgical: In addition to repairing any meniscal tears and debriding the torn ligament, surgery will stabilize the stifle joint to prevent development of arthritis. If arthritis has already developed, this can be reversed only by knee replacement (“arthroplasty”) and surgery to stabilize the joint will be of little help. However it can be impossible to tell what the true cause of the limping is (arthritis vs. instability) until surgery has been done to correct the instability. The bottom line is: it is far better to do these surgeries early than it is to wait until arthritis develops. Many dogs that tear this ligament will improve dramatically after several weeks of rest and anti-inflammatories, however several return to normal and unless the instability is addressed, arthritis will be slowly developing. In most dogs, this rears its ugly head months to years later as arthritis. There are many surgical procedures; this list details the most common procedures, but is not exhaustive.

- *Extracapsular repair or lateral tibiofabellar suture*: this procedure is done on the outside of the joint capsule, so does not go into the joint. A large synthetic suture is passed through a tunnel made in the tibia then around the lateral (outside) fabella to stabilize the joint. Eventually the repair will break, but it is critical that this does not happen within the first 8 weeks of surgery; by 6-8 weeks after surgery, the body will have laid enough firm scar tissue around the joint to stabilize it even after the repair breaks. If the repair breaks before this point, the surgery will need to be repeated; this is much more likely in large breed dogs, which is why a TPLO is usually recommended for them. In dogs that do have an extracapsular repair, **strict** exercise restriction must be enforced for 8 weeks after surgery. Most dogs will hold the

leg up for 2 weeks, but over the next 2 months they will gradually increase the use of the knee and return to normal. The repair will break 2-12 months after surgery.

- *Tibial plateau leveling osteotomy (TPLO)*: this procedure involves taking a wedge of the tibia out, rotating it so that the top of the tibia (the “tibial plateau”) is flatter, then and replacing the wedge with a bone plate. This removes the downward slope of the front part of the tibial plateau, which the femur “slides” down as your dog walks (the cranial cruciate ligament normally stops this). Pets that have had a TPLO will forever have a cranial drawer sign, but will not have any stifle instability during normal walking or running. This procedure is recommended by most veterinarians for large-breed dogs as it provides them with the best prognosis for a life without limping. Most dogs begin touching the toes of the surgery leg on the ground by 10 days after surgery, though some dogs take 3 weeks. Exercise must be restricted for 8-12 weeks after surgery and dogs should be back to full function and normal activity by 3-4 months after surgery. Most veterinarians will refer this procedure to a specialist.

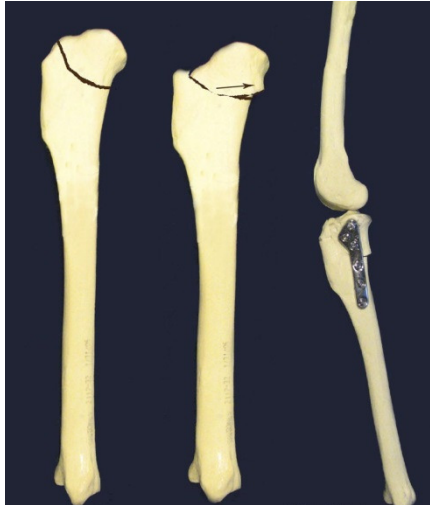


Figure 6: TPLO

#### Medical:

- *Cage rest*: if your pet is less than 20lbs and is not overweight, surgery may not be necessary. These pets can be put on anti-inflammatories and strict cage rest for 8 weeks—outdoors only to go to the bathroom, then back into the crate. If these recommendations are strictly observed, 85% of cases that weigh less than 20lbs can recover with this treatment alone. If you are not certain that you can observe these recommendations, you should not wait to pursue surgery; by the end of the 8 weeks, your pet will have arthritis.
- *Treatment of arthritis*: in chronic cases that have developed arthritis, whether or not surgery is pursued your pet will warrant supportive treatments to increase their comfort level. For more information, please visit our Pet Health Library: <http://lacostavet.com/pet-health-resources/pet-health-library.html>.

#### **Preventing surgery on the other knee....**

This may be an elusive goal: in dogs with the degenerative form of this disease, at the time of surgery on one stifle the other is already diseased. The best thing you can do to reduce the chance that your dog will need a second surgery is control his or her weight. Maintaining a stable plane of exercise day-to-day and avoiding fetch or other games that cause your dog to turn sharply on one leg will also reduce this risk.