

## Cruciate Ligament Disease or Injury

### What is the cranial cruciate ligament?

The job of the cruciate ligament is to hold the femur and tibia bones in place. If the ligament ruptures, the bones will slide on each other, causing crippling pain.

The cranial cruciate ligament (CrCL) in dogs is the same as the “anterior” cruciate ligament (ACL) in humans. It is a band of tough fibrous tissue that attaches the femur (thigh bone) to the tibia (shin bone), preventing the tibia from shifting forward relative to the femur. It also helps to prevent the stifle (knee) joint from over-extending or rotating.

Trauma to the equivalent ligament in humans is common, and damage most frequently occurs during some form of sporting activity (including football, rugby and golf). The nature of cranial cruciate ligament disease is very different in dogs. Rather than the ligament suddenly breaking due to excessive trauma, it usually degenerates slowly over time, rather like a fraying rope. This important difference is the primary reason why the treatment options recommended for cruciate ligament injury in dogs are so different from the treatment options recommended for humans.

### What is the cause of cruciate ligament injury in dogs?

Approximately 33 percent of all dogs experience cruciate ligament rupture. In the vast majority, the cranial cruciate ligament (CrCL) ruptures as a result of long-term degeneration, whereby the fibers within the ligament weaken over time. The precise cause of this is not known. Some breeds are predisposed to the problem, but any dog can develop a tear or rupture, large and small, all ages, and even cats. Many animals will rupture the CrCL in both knees, often relatively early in life. Other factors such as obesity, individual conformation, hormonal imbalance, incorrect tibial sloping and certain inflammatory conditions of the joint may also play a role.

### How can I tell if my dog has cruciate ligament disease?

Limping is the most common sign of CrCL injury. Dogs may feel pain in that joint and start limping on it, or stop using that leg altogether. This may appear suddenly during or after exercise in some dogs, or it may be progressive and intermittent in others. Some dogs are simultaneously affected in both knees, and these dogs often find it difficult to rise from a prone position. In severe cases, dogs cannot get up at all.

With increased pain, a dog will change his gait to alleviate the pain. This puts extra strain on the ligament causes it to tear and eventually rupture. In addition, the grinding motion of the bones will wear away cartilage and cause tissue around the bones to become inflamed.

## How is cranial cruciate ligament injury diagnosed?

Diagnosis in dogs with complete rupture of the CrCL is based on examination by an experienced veterinary surgeon, with demonstration of laxity of the joint by specific manipulations of the knee. In dogs with partial tears or early degeneration of the ligament, other tests may be necessary, including radiography (x-rays) or MRI scans. To be of maximum benefit, radiographs must be of optimal quality. In most dogs, exploratory surgery or arthroscopy (keyhole surgery) is used to confirm the diagnosis, and to investigate for possible cartilage tears or other problems.

## How is cranial cruciate ligament injury treated?

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### Tibial Plateau Leveling Osteotomy (TPLO)

The Tibial Plateau Leveling Osteotomy (TPLO) is considered to be the best repair option for canine cranial cruciate ligament (ACL) tears by the majority of board certified veterinary surgeons. In fact it has been considered the gold standard for nearly two decades. TPLO is arguably the most frequently performed small animal orthopedic procedure in history.

Experts use a wagon and hill diagram to explain how a dog TPLO procedure fixes the bone and ligament problem. Imagine you have a wagon on a sloped hill that is connected to a post via a cable. If that cable snaps, the wagon automatically slides down the hill. Using that mental picture, replace the cable with the cruciate ligament, the wagon with the femur and the slope as the tibia. When the cruciate ligament ruptures, the femur slips off the tibia, causing incredible pain and instability of the joint.

A tibial plateau leveling osteotomy involves removing any damaged cartilage and the torn ends of the cruciate ligament. The surgeon will remove as little as possible to avoid arthritis. Once this is done, the top of the tibia is cut to remove the slope and a plate is attached to the tibia to hold it in its new position during the healing process.

## What are the advantages of TPLO surgery?

Immediate benefits are apparent in a dog. Because bone healing is more efficient than ligament healing, these repairs have a reputation for being significantly more robust than surgeries designed to replace the damaged ligament. The major practical benefit is a very reliable return of limb use, with all dogs expected to start weight bearing on the operated limb within 1-3 days. Within the first week, the dog will start putting weight on the repaired leg. Within two weeks, many dogs are ready to get back to normal activity.

Veterinary surgeons generally have pet owners limit their dog's activity for eight weeks. After follow-up X-rays, the surgeon will increase the amount of daily exercise. At this point, short walks on a leash are often recommended. By four months, most dogs are back to normal activities. Working dogs may be required to wait until the sixth month before going back to hunting and agility routines.

The healing process depends on the depth of the original injury. Dogs with a fully torn cruciate ligament will require more rest than a dog with a partial tear.

## What are the success rates of TPLO?

Tibial Plateau Leveling Osteotomy (TPLO) surgery provides dogs with numerous post-surgery benefits. As a general rule, over 90% of dogs return to normal activity after TPLO. This generally means that dogs are so normal that owners are unable to detect lameness at home.

What are the potential problems or complications after cruciate ligament repair surgery?

Fortunately, complication rates are low (10-15%) when experienced surgeons perform a TPLO. The most common complications are incisional issues, implant infection and mechanical complications such as tibial crest fracture and implant failure. Infection is treated using antibiotics. In some cases, surgical irrigation is necessary, and in the worst cases where bacteria adhere to the implants, the implants must be removed after the bones have healed. In the vast majority of animals, the implants remain in place for life and cause no problems at all. Mechanical complications usually occur in dogs that are not properly restricted before the bones have healed (which takes 6-8 weeks). Many mechanical complications are managed with rest alone, although some problems require surgical revision. A rare complication of late injury to the menisci (buffer cartilages) within the operated knee joint can require a simple surgical removal. Other minor complications including sprains and strains around the knee joint can generally be managed using rest and medications alone.



Fig. 1 - Canine stifle joint with a corresponding x-ray

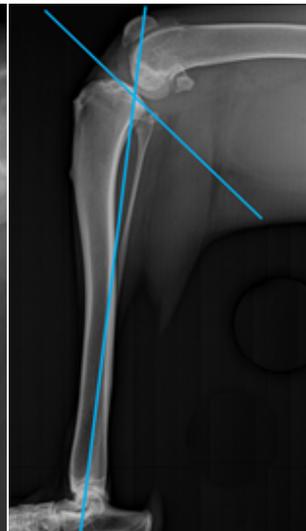


Fig. 2 - Dogs have downward backward sloping tibial plateaus

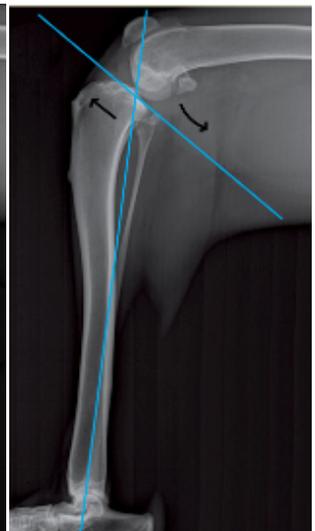


Fig. 3 - Weight bearing causes the femur to slide down and back



Fig. 4 – Post-op x-ray