



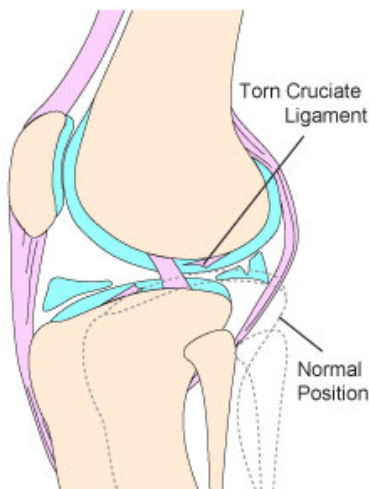
Cruciate ligament rupture in Dogs

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Introduction

Cranial cruciate ligament rupture (CCLR) is the most common cause of hindlimb lameness in dogs and is particularly common in certain breeds. The cruciate ligament is one of many ligaments that make up the knee (stifle) joint and maintain the stability of the joint. In people, the same ligament is called the anterior cruciate ligament. In both species the ligament may stretch or tear, leading to pain and osteoarthritis. CCLR can also lead to damage to the menisci in the knee. The menisci are two small cushions of fibrocartilage that sit between the bones of the knee. CCLR can make the menisci vulnerable to tearing, which is painful.



Movement of the knee with a ruptured cruciate ligament



see this so called degenerative "cruciate disease" in some dogs as young as 12 months old and in most cases both stifles are affected (bilateral disease). This common occurrence in certain breeds strongly suggests an underlying genetic breed-related influence which could be hereditary, although this has not been absolutely proven. Underlying causes such as an inflammatory or vascular disease could be implicated.

What are the signs of cruciate ligament rupture?

Stiffness rising after resting specifically after exercise is the most common sign of early CCL degeneration and partial rupture. This will often progress to lameness for the first few steps after rising. Chronic progressive lameness occurs and often the dog will become non-weight bearing frequently. If early bilateral cruciate disease is present then difficulty rising, problems negotiating stair and reluctance to jump into the car are evident.

Sprain injuries to the knee can aggravate lameness and result in significant deterioration of limb function. Dogs suffering from CCL disease/rupture will rarely cry or vocalise suggesting to owners that the dog is not suffering pain. Certainly, people with cruciate ligament ruptures report the condition to be extremely uncomfortable and frequently painful.

What causes the cruciate ligament to rupture?

The cause of CCLR and why it occurs so commonly in certain breeds is not fully understood. Certainly, traumatic rupture of the CCL can occur during traumatic injuries such as these sustained during a fall, twisting of the limb or catching the hindlimb in a gate or fence. However, it is known that the fibres that make up the CCL can degenerate and weaken leading to gradual tearing of the ligament over time. This leads to partial CCLR and once sufficient mechanical weakness occurs, the ligament can suddenly rupture completely. We can

There is no reason to think dogs are any different! Generally, the degree of lameness present equates to the degree of pain the dog is experiencing.

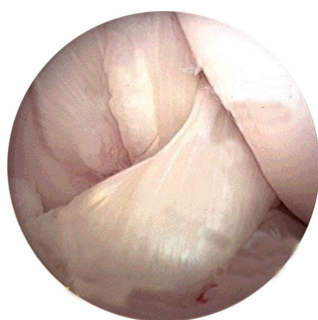


Demonstrating "cranial drawer" sign of instability

How is CCLR diagnosed?

CCLR is first diagnosed by palpation (examination and manipulation by hand – see image above). In a dog with a complete rupture, the clinician will be able to feel the instability present – so called "cranial drawer forward" sign. In dogs with a stretched or partially torn CCL there may be no instability present but a firm swelling on the inside of the knee may be evident and pain may be elicited on manipulation of the knee joint.

Radiographs (X-rays) of the joint will usually show early osteoarthritis with an increased volume of fluid (effusion). The actual CCL does not show on X-rays because it is soft tissue. The changes seen on X-rays are therefore not specific and other disease processes need to be considered. However, X-rays will rule out certain conditions such as fractures within the knee, infection and cancer. Aspiration and analysis of joint fluid can rule out other conditions such as infection or inflammatory diseases.



LEFT: Normal CCL

RIGHT: torn CCL

(as seen by arthroscopy)

CCLR may be diagnosed by arthroscopy (small camera inserted into joint) before surgical treatment of the ligament rupture. Arthroscopy may also be used to "clean out the joint" and treat

meniscal injuries with a smaller incision than would be necessary with traditional surgery. However, sole arthroscopic treatments of CCLR are not in widespread use mainly because they are technically challenging to perform and because of concerns about effectiveness. Currently, therefore, the treatment of CCLR in dogs differs dramatically from that in people.

Treatment of CCLR

Many surgical options for CCLR are available and there is widespread debate and disagreement about the usefulness of these treatments. In a very small number of dogs it is possible for the knee to improve in stability without surgery as the body lays down scar tissue. In most cases this is best achieved with several weeks to 2 months of strict rest, which helps the body to lay down fibrous (scar) tissue around the joint without the forces of vigorous activity. Treatment by rest alone may be attempted in any size dog but in most breeds, particularly large and active dogs, adequate stabilization of the knee will usually not be achieved, and the pain and lameness will continue and therefore surgery is recommended for most dogs.

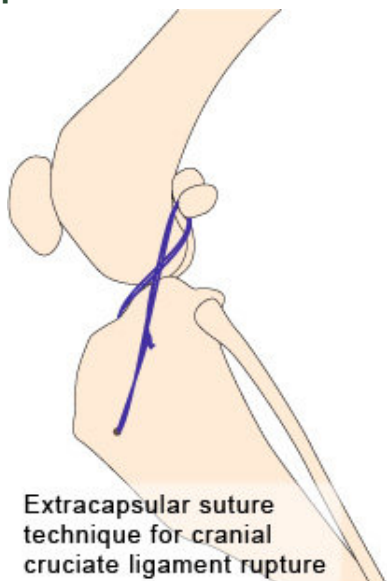


Model showing folded and crushed meniscus

Damage to the meniscus

The meniscus or menisci (plural) are two small cushions made of fibrocartilage that sit between the bones of the knee. These can be regarded as the "shock-absorbers" within the joint. In approximately one third of dogs they may be found to be crushed or damaged at the time of surgery. In addition to the CCLR, this causes significant pain that can only be resolved by removing the torn and damaged portion. Damage to the meniscus can sometimes also happen after surgery (so called late meniscal injury or LMI) although the incidence is usually low, particularly after procedures such as TPLO. There are certain techniques designed to prevent future damage to the menisci although the value of these techniques is still not clear. Careful examination of the menisci are necessary in every surgical case.

Extracapsular suture or Imbrication suture



Extracapsular suture technique for cranial cruciate ligament rupture

More traditional surgical treatments of CCLR involve replacing of the ligament with either a natural or synthetic material. In these procedures the patients own natural fibrous tissue (graft), a nylon prosthetic suture, or even wire is used to stabilize the knee. These procedures have been used for more than half a century, and the results can be good in many cases. The main concern with these techniques is that the stabilizing material can stretch or break, after which the knee is stabilized by scar tissue.

This may lead to a decrease in the range of motion of the joint and persistent lameness. We recommend extracapsular suture surgery for smaller dogs (less than 7-8kg) or when medical or financial limitations contradict or prohibit TPLO from being performed. Extracapsular suture may also be sufficient for less active large dogs living a more sedentary lifestyle – generally this does not apply to certain breeds! So called “standard” surgery can lead to unpredictable results and a less than optimal outcomes with a higher chance of the patient requiring a second operation.

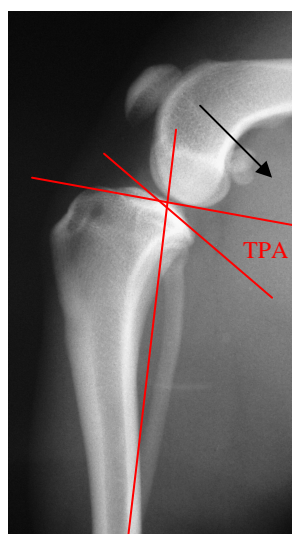
Tibial Plateau Levelling Osteotomy

The most widely used technique by referral orthopaedic veterinary surgeons in treatment of CCLR is the Tibial Plateau Levelling Osteotomy (TPLO). In this technique, the shin bone (tibia) that lies below the knee is cut and rotated to eliminate the abnormal motion of the knee during normal activity. The advantage of this procedure is that it does not rely on materials to stabilize the knee which can potentially stretch or break.

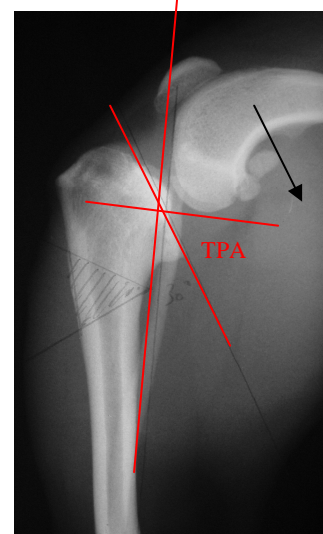
TPLO may give superior outcomes in larger dogs that place more force through the knee and are more likely to stretch traditional repair methods. This technique has gained widespread acceptance because of reports of improved clinical results, especially in larger, active dogs. We recommend TPLO in most of our patients with CCLR and particularly in dogs that are more active, naturally athletic and with exuberant characters.

How the TPLO Works

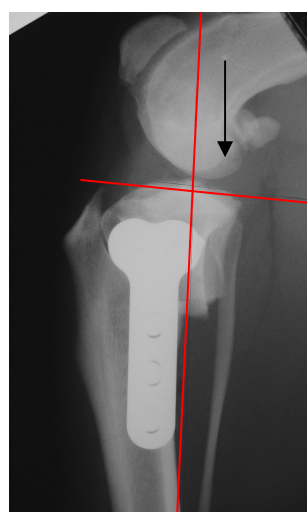
When CCLR occurs there is nothing to prevent the upper bone of the knee (femur/thigh bone) from sliding down the slope of the tibia (shin bone). Black arrows on the X-rays below illustrate this sliding force. This slope is termed the tibial plateau angle (TPA). Some dogs have an increased TPA which magnifies this sliding force. This constant sliding places strain on the joint causing pain and discomfort. Patients with an increased TPA may explain why the suture or other material used in “standard” techniques to fail prematurely. The TPLO procedure levels the tibial plateau angle to eliminate the sliding and the instability of the knee and in turn resolves the accompanying pain.



X-ray of normal knee: note small TPA



X-ray of abnormal knee with very sloped tibial plateau and large TPA



Post-operative x-ray after TPLO in a Boxer
Note: The TPA has been reduced and the sliding force neutralised.

Post-operative care

Aftercare following TPLO surgery is very important with rehabilitation taking around 3-4 months. Painkillers and a short course of antibiotics are prescribed at discharge. If the dog tends to excessively lick the wound it may be necessary to use a plastic Elizabethan collar. Visits to your own veterinary surgeon are necessary within the first two weeks to check the wound and remove sutures.

Exercise must be very restricted for the first few weeks until the soft tissues and cut bone heal. Exercise is primarily for toileting purposes. It must be on a lead or harness to prevent strenuous activity, such as chasing a cat or squirrel. At other times confinement to a pen or a small room in the house is necessary with avoidance of jumping and climbing. After a few weeks, exercise may be gradually increased.

Cruciate disease and osteoarthritis

It has been stated that TPLO slows the progression of the pre-existing osteoarthritis within the knee but "standard" surgery does not.

Although this may be true in some cases, this has not been clinically proven. However, the canine knee can cope with moderate amounts of arthritis without causing actual lameness.

Medical management of the pre-existing osteoarthritis after surgery is usually unnecessary, but in more severely affected patients medical management may be combined with surgical treatment to eliminate lameness and improve limb function.

Prognosis

The outlook with conservative management for most dogs with CCLR is usually guarded and the lameness usually persists particularly after exercise. Ultimately, hindlimb function deteriorates over time resulting often in a non-weight bearing lameness.

The prognosis is usually fair to good after "standard" extra-articular surgery and good to excellent after TPLO surgery, the latter technique restoring pain-free limb function in the short and longer term.