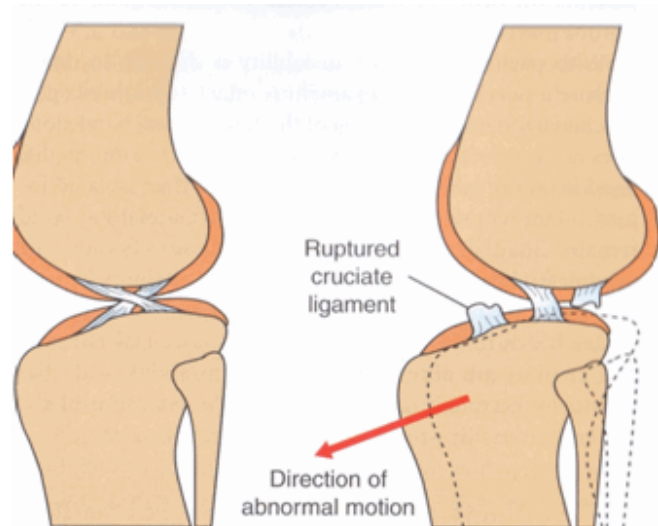
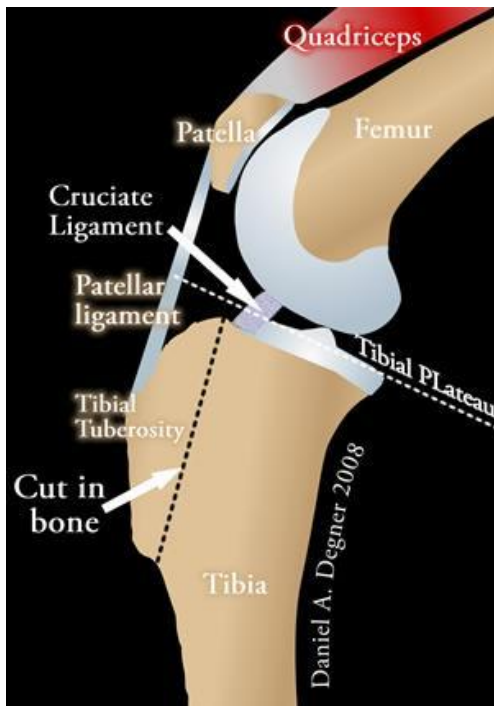


Cruciate Ligament Rupture



What is the Cruciate Ligament?

There are two cruciate ligaments in the stifle (knee) joint, the cranial (or anterior) cruciate ligament and the caudal (or posterior) cruciate ligament. These ligaments combine to enable the joint to function like a hinge. The cranial cruciate ligament prevents the tibia (shin bone) sliding forward abnormally against the femur (thigh bone) during the weight bearing phase of motion. It also prevents the tibia from rotating inwards and limits over extension of the joint. Other important structures in the stifle joint that ensure normal joint function are the Tibial Plateau and the Menisci. The Tibial Plateau is the sloping surface that articulates with the femur. The cranial cruciate ligament prevents the femur from sliding backwards down the slope. Menisci (cartilages) are crescent shaped pads that act as cushions or shock absorbers between the joint surfaces of the tibia and the femur. The cranial cruciate ligament and the medial meniscus are very commonly injured in dogs. These injuries cause instability of the knee that leads to other problems such as lameness, joint pain and osteoarthritis. Caudal cruciate ligament damage is uncommon.

Which animals are commonly affected?

In people, cruciate ligament injury usually occurs during sports such as skiing, rugby and netball. Acute injury can also occur in young athletic dogs and cats. Rapid twisting of the stifle, such as when retrieving, can overload then snap or tear the

ligament. Damage will often occur in cats after jumping off a wall. The cartilage may tear at the same time. However, with most dogs the mechanism of injury is quite different. The cruciate ligament seems to weaken gradually over time, particularly in some larger breeds, and may eventually rupture even during normal activity. Large breeds affected include Labrador Retrievers, Golden Retrievers, Rottweilers, Mastiffs, Boxers and Newfoundlands. They may rupture a cruciate ligament at an early age (1-3 years) and often in both knees. Obesity may also increase the risk of cruciate ligament rupture. Avoiding obesity certainly will reduce the severity and effects of arthritis in the stifle joint if cruciate rupture has occurred.

What causes Cruciate Ligament rupture?

The cause of the gradual degeneration of the cruciate ligament is not known. However, research indicates that the cruciate ligament may not be strong enough to handle normal loading during physical activity in dogs at risk of cruciate rupture. The ligament structure is altered so that it becomes prone to failure. There may also be a genetic basis for cruciate ligament disease.

What happens inside the affected stifle joint?

After the ligament tears or ruptures it will never heal. Instability and abnormal sliding motion down the tibial plateau and abnormal pressures on the menisci result in inflammation, joint surface (articular cartilage) damage and further meniscal damage. Osteophytes (bone spicules) and cartilage proliferation occurs around the joint. The joint capsule will become thicker as a result of fibrosis. These changes produce arthritis in the joint that will become evident as little as four weeks after ligament injury and progress throughout the remainder of the dog's life.

What are the signs of this condition?

Signs of cruciate rupture are variable. Sudden rupture of the cruciate ligament will usually result in acute pain and severe lameness. This will usually reduce after a few days but the pet will still be lame. Animals with a gradual rupture or partial tear may show mild lameness after rising or after exercising. When both hind legs are affected the dog may appear weak in the hind quarters and carry more weight on the front legs. As arthritis progresses the thigh muscles (quadriceps) may waste and the stifle will appear much thicker than the normal joint. Most of the swelling will be on the inside surface of the joint. If the medial meniscus is damaged the joint may make a 'clicking' sound as the dog walks. When sitting the affected leg will often be extended as bending the knee is uncomfortable.

How are these conditions diagnosed?

Clinical examination will usually reveal an abnormal sliding motion (anterior draw) in the joint. With partial tears this motion will be subtle and only evident with examination under heavy sedation or anaesthetic. With meniscal injury there may be a clicking sound as the joint is manipulated. X-rays may identify arthritis present in the joint and are required as part of pre operative planning for some procedures.

Surgical Management

Most patients with a ruptured cranial cruciate ligament require surgery. There are two different surgical procedures that can be performed to repair the affected joint.

External stabilisation method:



This surgical method relies on an artificial material or harvested tissue (muscle sheath) that is used to stabilize the joint and prevent the abnormal sliding motion that occurs with ligament rupture.

- Extra-capsular repair involves placing strong nylon (or other synthetic material) sutures outside the joint to mimic the function of the damaged or torn cruciate ligament. Over time these sutures can stretch, pull through the tissues or break. They usually work well in lighter dogs but have a higher failure rate in large heavier dogs.

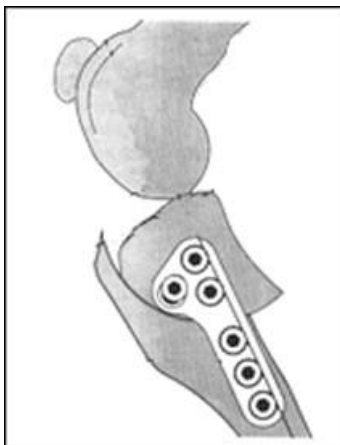
- Intra articular repair is similar to the process used to repair human cruciates. A muscle sheath graft harvested from the thigh is fashioned into a ligament then sutured into the joint. Results are very similar to extra-capsular surgery.

With the external stabilization technique the recovery period is much longer as the graft weakens before it becomes strong enough to support the stifle joint. Instability may return due to stretching of the graft.

Stifle Realignment Techniques

Recently techniques have been developed to alter the function of the stifle joint. These techniques have been developed in an attempt to reduce complications and poor outcomes of ligament replacement techniques particularly in very large dogs. They are designed to change the anatomy of the stifle joint and the forces that are distributed through the joint, so that the tibia does not slide forward when weight bearing. There are four ways this can be achieved.

- Tibial Wedge Osteotomy (TWO). (This has now been superseded). The procedure reduces the tibial plateau angle by cutting a wedge of bone from the shaft of the tibia and securing the osteotomy (bone cut) with a bone plate and screws.
- Tibial Plateau Leveling Osteotomy (TPLO).



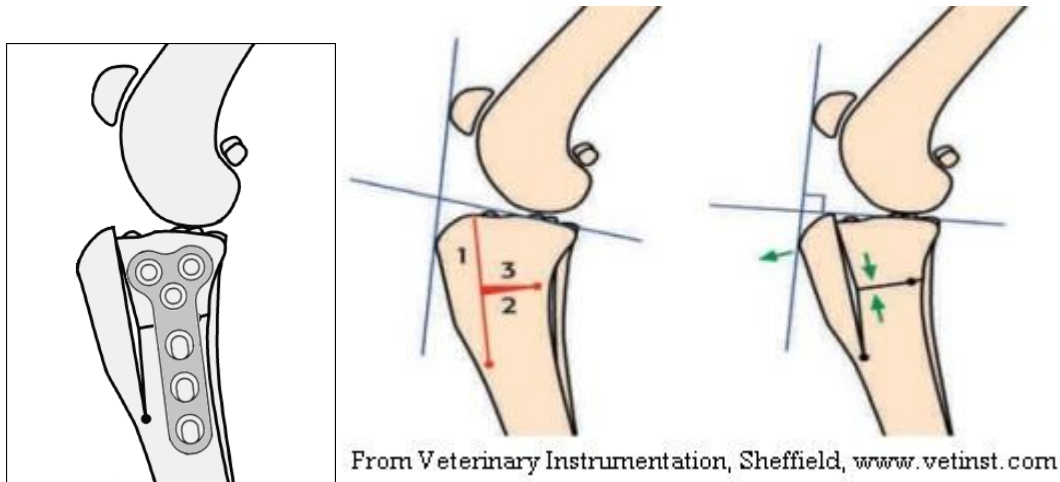
This is the most common realignment procedure. The angle of the tibial plateau is reduced by making a semicircular cut below the stifle joint. The cut bone is then rotated to a new position to reduce the tibial plateau angle and secured with a bone plate. The procedure requires a purpose built semicircular saw blade.

- Tibial Tuberosity Advancement (TTA).



This procedure involves a vertical cut down the front of the tibia. The cut piece of bone is moved forward a measured distance. This neutralizes the forces that cause the femur to slide down the tibial plateau. The Tibial Tuberosity is secured with a purpose designed plate, comb and a spacer basket. The procedure requires specialized instruments for plate application and ready access to a complete set of plates, combs and spacer baskets.

- Triple Tibial Osteotomy (TTO).



This procedure is a combination of the TWO, the TPLO and the TTA. A vertical cut down the front of the tibia enables the Tibial Tuberosity to be advanced. A small wedge of bone is removed from the tibia behind the first cut. The size of the wedge is predetermined by a system of mathematical calculation based on the X rays. This allows the tibial plateau slope to be reduced. The wedge osteotomy is secured with a bone plate and screws. The procedure minimizes potential complications that can occur when the tibial tuberosity is advanced a long way or the tibial plateau angle is very steep. The bone cuts can be made using normal orthopaedic bone cutting instruments. This is the procedure used at Vital Vet Animal Hospital

Surgery of the Meniscus

Damaged menisci are a common source of pain after cruciate ligament injury. The menisci are examined during surgery. Badly damaged menisci will be removed. Small tears may need treating. If the meniscus is too mobile and is likely to suffer ongoing damage, a technique called caudal meniscal ligament release will be used to reduce the risk of ongoing meniscal problems.

What are the possible complications of surgery?

With any surgical procedure complications may occur. Problems that have been reported after cruciate surgery include nylon failure, plate and or screw failure, joint infection, implant infection and wound breakdown. Some patients may have ongoing pain and lameness particularly if the meniscus is damaged. Infected implants may need to be

removed or replaced. With ongoing lameness the joint may need reexploration and removal of the remaining damaged meniscus. With extracapsular repair failure an osteotomy procedure such as TTO may be required. With good planning, selection of the appropriate technique and diligent aftercare the risk of complications is small.

What aftercare is required?

After surgery requiring bone cuts (e.g. TTO or TTA) strict rest for six to eight weeks to allow bone healing is essential. You will be given a physiotherapy handout and instructions regarding confinement and exercise.

With correct selection of the appropriate technique and good aftercare, the vast majority of patients will regain good function in the damaged stifle. All joints with cruciate ligament damage develop osteoarthritis even after surgical stabilization. However, most surgical patients will continue to have a good quality of life with minimal need for ongoing arthritis medication for many years.