

## Torn cranial cruciate ligament (CCL)

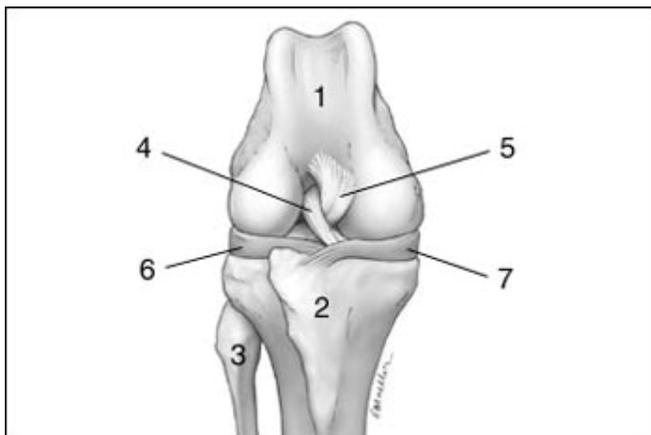
### Affected Animals:

Commonly, dogs and humans; less commonly, cats. Obese animals are at greater risk for suffering this injury. In addition, certain breeds of dogs are more susceptible than others to developing a ruptured cruciate ligament. Most commonly, these breeds include the rottweiler and cocker spaniel. The Labrador retriever, German shepherd, mastiff, golden retriever, miniature and toy poodle, Lhasa apso, and bichon frise are likely to suffer from the problem as well.

### Overview:

A normal dog's knee joint works like a hinge, keeping the animal's leg stable as it bends. When the knee has a ruptured cruciate ligament, the "hinge" becomes loose and no longer functions as effectively. This looseness prevents the knee from maintaining stability of motion. As a result, the dog suffers pain, inflammation, and eventually develops arthritis. This is a very common orthopedic disease in dogs.

When a knee injury occurs suddenly -- as it usually does among humans who suffer from injuries to the cruciate ligament due to a skiing, football, or other sports-related accident -- the ligament will tear rapidly. But usually with dogs, the tearing is partial and occurs gradually, resulting in low-level lameness that may improve initially over time. However, progressive injuries can be quite damaging; because of the trauma to the ligament, the knee joint becomes inflamed, leading to arthritis, which only grows worse with continued weight bearing.



1. Trochlea of femur
2. Tibia
3. Fibula
4. Cranial cruciate ligament
5. Caudal cruciate ligament
6. Lateral meniscus
7. Medial meniscus

In more severe chronic cases, the "shock absorbers" of the knee -- quarter-moon shaped sections of cartilage called the medial and lateral menisci -- tear or become crushed because of exposure to abnormal stress that occurs when the knee is loose. Animals with this condition often are severely lame and may not be able to put any weight on the affected leg.

Both surgical and non-surgical methods for treatment are available. Generally, dogs have a good chance of recovering normal, or almost normal, movement after surgery, but the arthritis that has occurred already will not be reversible. Additionally, dogs that have ruptured the cruciate ligament on one side are more likely to tear the ligament in the other knee.

Obesity is a major risk factor for this injury and certain breeds of dogs are more likely than others to rupture their ligaments.

#### **Clinical Signs:**

Clinical signs include acute non-weight bearing lameness; chronic progressive lameness; crepitus; pain; decreased range of motion; presence of medial buttress; presence of meniscal click; stifle effusion; thickened joint capsule; positive cranial drawer test; positive tibial compression test; reluctance to sit with normal flexed stifle tucked under the body; and inability to rise or walk if the condition is bilateral.

#### **Symptoms:**

Rear limb lameness, sudden onset lameness that either improves slightly and remains chronic or worsens again. The affected knee may feel thicker than the normal one. The dog may sit with its injured leg held out to the side, rather than tucked up underneath. The lameness should worsen with exercise. The knee may sound "crunchy" when put through a range-of-motion test.

#### **Description:**

Found in every joint of the body, ligaments are bands of tough, fibrous tissue that hold two or more bones in proper position. One of the ligaments that stabilizes the knee joint when the leg bends and moves is called the cranial cruciate ligament. When this cruciate ligament becomes loose, it is no longer able to ensure stable movement, and damage to the cartilage in the knee joint, leading to arthritis.

Ligaments are very strong tissues, but once they are damaged, they tend to heal slowly and incompletely. In people, cruciate ligament tears are often the result of rapidly occurring trauma, such as injuries resulting from skiing, football, soccer, and other sports accidents. Although this type of injury can also occur in dogs -- jumping up to catch a Frisbee, for example, can cause rapid trauma -- ruptured

cranial cruciate ligament injury in the canine usually occurs progressively, over a period of time. There is often a partial tearing, which may show up as a low-level lameness and appears to improve in days to weeks. This partial tearing sets up inflammation within the knee joint, and the weakened ligament is further damaged with continued weight bearing. Eventually, this leads to complete rupture.

Due to a possible genetic component, some breeds, such as the rottweiler and cocker spaniel, are very prone to this disease. They may have some underlying genetic, conformational, or inflammatory disorder that predisposes the ligament to rupture; their susceptibility to the injury is a topic of research at many veterinary institutions. Obese animals are also at increased risk for this disease. However, dogs of all sizes and breeds can develop ruptured cranial cruciate ligaments.

Dogs with a ruptured cranial cruciate ligament in one knee have a 20 to 40 percent chance of injuring the other side, making a full recovery less likely.

#### Diagnosis:

The diagnosis of a ruptured cranial cruciate ligament usually can be made upon physical examination. Two tests, the positive cranial drawer test, and the positive tibial compression test, will confirm the diagnosis. The positive cranial drawer test, in which the dog's knee is bent slightly and pressure is applied to the bones comprising it, is performed to check for instability within the joint. A positive tibial compression test also assesses the stability of the knee joint; this test may be more sensitive in detecting looseness in heavily muscled dogs. It may be necessary to sedate large dogs before performing the test. When the injury is chronic, the cranial drawer and tibial compression tests may be less effective assessments because their results will be more difficult to evaluate, since the body will have built up scar tissue in the joint capsule in an attempt to limit the abnormal motion.

If the dog's meniscal cartilage -- the knee's "shock absorbers" -- has been torn, the veterinarian may feel a "meniscal click." Thirty to 50 percent of dogs that have knee joints with chronically ruptured cruciate ligaments will experience damage to their cartilage, resulting in arthritis. X-rays can help confirm the diagnosis and give an indication of how much arthritis already is present. This information may be important for determining prognosis. X-rays can also rule out diseases such as rheumatoid arthritis and fractures that may display similar symptoms.

Occasionally, the veterinarian will obtain and analyze a sample of joint fluid in an attempt to rule out other types of arthritic diseases. However, this procedure usually will not be performed unless there is suspicion that an underlying disease is causing the ruptured cruciate ligament.

### Prognosis:

The prognosis depends on a number of factors. The longer the injury has been present, the more arthritic the joint and the more guarded the prognosis. If the meniscal cartilage is torn, the prognosis is more guarded as well. Obese animals tend to recover more slowly than animals in good shape. Animals with torn cruciate ligaments on both sides take longer to recover than animals with an injury on only one side. Dogs with underlying diseases such as rheumatoid arthritis, lupus, or immune mediated polyarthritis have a decreased prospect for a full recovery.

In general, animals stabilized with any surgical technique will require three to six months of rehabilitation. After that time, depending on how arthritic the joint was before surgery, they should return to fairly normal activity levels, although they are unlikely to regain 100 percent of their pre-injury function. These dogs may be sore after heavy exercise and occasionally may require pain medication. Athletic animals will have some decrease in function and will be unlikely to return to competition. Hunting dogs may not be able to hunt as frequently or for extended periods of time as they did prior to injury. The TPLO- surgery is purported to be able to return animals to performance levels; however, definitive objective studies have not been published to date.

### Transmission or Cause:

The cause can be traumatic, or can occur as a result of chronic inflammation in the knee joint. There may be no known cause to the inflammation. However, the ligament may rupture as a result of the following diseases: medial patellar luxation, a disease in which the kneecap pops in and out of joint; rheumatoid arthritis; lupus; immune mediated polyarthritis; septic arthritis, an infection in the joint; osteochondrosis, which is a cartilage development problem; and problems related to the animal's build or body conformation.

Dogs that are obese are much more likely to develop this disease than dogs that are of normal weight. In addition, certain breeds are more prone to developing the disease, especially the rottweiler and cocker spaniel.

### Treatment:

The treatment for this disease can be surgical or non-surgical. Non-surgical management consists of exercise restriction, anti-inflammatory medications, physical therapy and weight loss. These therapies can be effective in very small animals such as cats and dogs weighing less than 15 pounds, although these animals will develop some arthritis, they may regain almost normal function.

Most veterinarians will recommend surgery for treatment of a ruptured cranial cruciate ligament. The many surgical procedures that are available for treatment can be organized into three basic categories: intracapsular stabilization, extracapsular stabilization, and a patented procedure called the Tibial Plateau Leveling Osteotomy® (TPLO).

Intracapsular ligament replacement involves either transplanting tissue from other parts of the dog's body, such as the patellar ligament or fascia lata, into the knee joint. Other options for ligament replacement include a synthetic graft made from materials such as Gore-Tex® or ligament from a tissue bank. The goal of intracapsular ligament replacement is to position the replacement ligament in an anatomically correct configuration.

Extracapsular stabilization stabilizes the knee joint, using materials such as fascia lata, which is a strong fibrous sheet of tissue surrounding the muscles in the outside of the leg, monofilament nylon or other suture material, or stainless steel wire. Fibular head transposition is an extracapsular technique that allows another ligament in the knee joint, the lateral collateral ligament, to replace the function of the cranial cruciate ligament. These techniques are not performed inside the joint; rather, they function to counteract the instability in the joint by acting in a manner similar to an intact cranial cruciate ligament.

Tibial Plateau Leveling Osteotomy® (TPLO) is a technique that utilizes a different approach to treating cranial cruciate ligament injury. Rather than trying to oppose the forces acting on the cranial cruciate ligament in the normal knee joint, a TPLO® eliminates these forces -- and thus the need for a cranial cruciate ligament -- by changing the anatomy of the knee joint. This procedure requires that a bone cut be made in the tibia, which is then stabilized with a specialized bone plate. Only veterinarians that have been trained and licensed by the developer of the technique are permitted to perform this surgery. In general, dogs weighing less than 40 pounds are too small for this procedure.

There are advantages and disadvantages to each of these techniques. The results of these procedures are generally very good; however, some surgeries are more promising than others for complete return to function. There also can be substantial differences in cost and recovery time. A veterinarian can detail these surgical options and further explain the various procedures. Although cruciate ligament surgery can be very demanding, many veterinarians have a great deal of experience and success with these procedures.

Rehabilitation regimens vary, but most veterinarians recommend range-of-motion exercises, gradual return of activity, swimming, weight reduction, and pain medication.

**Prevention:**

While prevention of injuries is difficult, there are some factors that can decrease the likelihood of rupturing a cranial cruciate ligament. First and foremost is avoiding obesity. A veterinarian can assess the dog's body condition and provide guidelines for a healthy diet and ideal body weight. Exercise is also important for dogs, just as it is for people, since a daily exercise regimen will lessen the likelihood of injury. Because animals with other orthopedic diseases of the knee joint, such as a luxating patella, may be more prone to cranial cruciate ligament

rupture, early surgical correction of such orthopedic problems is an important preventative measure.