Anterior Cruciate Ligament Rupture

Cranial Cruciate Ligament Rupture

Ruptures of the cranial cruciate ligament are one of the most common orthopedic injuries in the dog. It is the major cause of arthritis of the stifle or knee joint. The strength of a dog's cranial cruciate ligament deteriorates with age. Large breed dogs develop these changes at an earlier age.

Dogs with cruciate ligament rupture frequently are overweight. Obesity places additional stress on the ligament and can contribute to rupture.

Often the rupture occurs acutely during normal levels of activity. The dog may have been jumping off the couch or deck, or running in the yard. The injury occurs from twisting the knee during partial flexion or hyper-extending the joint. The dog may vocalize and hold up the injured leg. In other cases the rupture may have a more chronic course without a single traumatic event.

In these cases the dog may have a chronic, episodic lameness that worsens with vigorous exercise.

In many cases, especially smaller breed patients, there can be a hormonal imbalance of too little thyroid (hypothyroidism) or too much cortisone (Cushing’s disease) that weakens the ligament. If your veterinarian suspects one of these conditions, they can be diagnosed with blood tests. Rarely, an autoimmune disease similar to rheumatoid arthritis, will cause the body to attack the soft tissues of the joint (as opposed to the bone in rheumatoid) and weaken the ligaments as well.

Normal Anatomy
The cranial cruciate ligament originates on the lateral or outside aspect of the femur (thigh bone), crosses the knee joint at an angle to attach to the front, inside aspect of the tibia (shin bone). The ligament prevents forward movement of the tibia, internal rotation and hyperextension of the knee. Rupture of the ligament results in instability of the knee. This results in pain, lameness and later arthritis. The instability or cranial drawer motion is used for diagnosis of the problem.

There is a medial and lateral meniscus in the knee joint. These are made of fibrocartilage, are crescent shaped and are situated between the femur and tibia. Damage to the medial meniscus is present in a significant number of dogs with cruciate ligament ruptures. The medial meniscus may be torn acutely at the time of the initial cruciate rupture or more often becomes damaged as a result of the chronic instability. An audible click may be heard during flexion and extension of the knee in dogs with meniscal damage. The surgeon will evaluate the meniscus at the time of surgery and if damaged, a partial or complete removal of the meniscus will be performed.

Normal Radiograph

Abnormal Anatomy
Clinical Signs and Diagnosis

The diagnosis of cruciate ligament rupture is based on history, physical examination, and possibly radiographic evaluation to rule out other problems. The diagnosis is confirmed during surgery. The history typically involves an acute onset of lameness after minor trauma. Generally the dog will initially not bear any weight on the leg and will begin to place some weight on the leg after two to three weeks. However, the dog will remain mild to moderately lame on the leg. The lameness may worsen with the development of a meniscal injury or secondary arthritis.

In acute cases physical examination will reveal increased fluid within the joint. In chronic cases, the knee will be very thickened with a firm swelling at the inside of the knee. During the physical examination cranial drawer motion will be present in cases of cranial cruciate ligament rupture. Such motion is the ability to move the tibia forward while holding the femur stable. In very large or tense dogs, sedation or even anesthesia may be necessary to produce cranial drawer motion or administer steroids ahead of time to decrease swelling and facilitate the examination.

Radiographs may be taken to eliminate other possible causes of lameness. The actual cruciate ligament rupture is not visible radiographically, but many times we will see the soft tissue swelling of the joint capsule and displacement of the tibia forward. In chronic cases of cranial cruciate ligament rupture, arthritis will be present in the knee joint and can be demonstrated radiographically.

Medical Treatment

Rupture of the cranial cruciate ligament will produce progressive arthritis or degenerative joint disease due to instability in the knee joint. Close confinement for 4 to 8 weeks has been reported to yield satisfactory results in the majority of small dogs (less then 15 pounds) if no meniscal damage is present. All these animals develop advanced arthritis. It is our recommendation that the best treatment for this injury is surgical stabilization of the joint. This is not considered an emergency surgery; however, it is advisable to have surgery performed within a few weeks of the injury. If surgery is postponed too long, arthritis will develop, chances of meniscal injury increase, and the benefit of surgery will be decreased.

Surgical Treatment

If causing persistent problems, and especially in larger dogs, the condition is best treated with surgery to stabilize the knee. There are many different surgical techniques for treating the condition and even specialty surgeons disagree regarding the best option. There is a lack of good scientific data to guide the surgeon and pet owner and surgeon preference for a particular technique is an important factor. Some of the common surgical techniques used to treat the condition include:

- Over-the-top fascial graft technique
• Lateral fabellar imbrication suture (most common method of repair)
• Tibial plateau leveling osteotomy (TPLO)
• Tibial Tuberosity Advancement (TTA)

There is no agreement as to which is the best technique. Recent data would suggest that if there are differences between the techniques, these are minimal.

In the long run, all joints with cruciate ligament rupture will develop some degree of osteoarthritis. However, for most dogs the response to surgery is good and the osteoarthritis is minimized in patients having surgery compared to patients that do not.

We prefer the lateral fabellar imbrication suture technique during which we open the joint to inspect the cruciate ligaments, menisci, joint lining and cartilage. The torn ends of the cruciate are removed and the menisci may be removed if damaged. The joint is then closed and the remainder of the surgery is performed under the skin and muscle, but outside the joint. The technique involves placing heavy gauge suture material around the fabellar bone and through a bone tunnel drilled tibial tubercle. The sutures are secured with special grommets very tight to eliminate almost all instability. In chronic cases with a large amount of joint swelling, your veterinarian may elect to administer some steroids pre-operatively to decrease this swelling. These patients will almost always develop some degree of joint laxity after surgery as the additional swelling subsides, but this is normal. Ultimately all surgical repairs rely on fibrosis or scar tissue formation to achieve long term joint stability.

Postoperative Care and Prognosis

We have a very detailed handout (which you may request) on home care and rehabilitation after surgery. In summary though, the patients are restricted to very short leash walks only with no free running, jumping or playing for at least 6 weeks after surgery. We will recheck your dog and remove the sutures 10-14 days after surgery. We then request a second recheck exam 6 weeks after surgery to monitor recovery. At that time we may suggest gradually increasing levels of activity over the next several weeks. Most dogs are returned to normal activity within 3 to 4 months of surgery but chronic cases will take longer. Remember, all dogs will develop some arthritis but the surgical results are generally very good. Owners may report an occasional lameness or stiffness in the leg, particularly after a large amount of activity, after lying down for extended periods or in very cold weather.

Complications are very few with these procedures. Infection occurs in 1 to 2% of the cases. We routinely administer antibiotics at the time of surgery. Rarely, the dog will be overly active the first few weeks after surgery and can breakdown the repair. Fortunately, that only occurs in 1 or 2% of the cases. In 5 to 10% of the cases, the dog may have a reaction or infection associated with the heavy gauge suture material and it may need to be removed. Generally this occurs after the joint is stable and it can be removed without requiring any additional stabilization. Damage to the peroneal nerve which runs alongside the knee can occur with suture placement, but this is also very rare. Up to 25% of the dogs will go on to eventually rupture the cranial cruciate ligament in their opposite knee. Unfortunately, it is difficult to prevent this problem unless there...
is a treatable underlying cause like hormone disorders, and keeping the dog's weight under control. It is not uncommon to rupture the other leg during surgical recovery as it will be carrying all or most of your pet’s weight for the first month or so after surgery.

Partial Cruciate Rupture

More recently we are recognizing partial tears of the cranial cruciate ligament in about 8% of all cruciate rupture patients. These are much more difficult to diagnose than complete tears. They are usually seen in medium to large breed young dogs (6-24 months) that have rear leg lameness, pain in the knee region and no detectable instability in about half the cases. Eventually these will progress to complete tears. Up to 20% of these cases will have meniscal damage. Often an exploratory of the joint, a CAT scan or MRI is necessary to confirm the diagnosis and treat the injury. Although they are often difficult to diagnose, the treatment is the exact same as complete tears because the remaining ligament is often no longer functional and will usually break down to become a complete tear. Failure to diagnose these cases early can lead to irreversible osteoarthritis which makes surgical treatment less successful.

Cruciate Rupture in Cats

Cruciate ligament ruptures are rare in the cat. Up to 16% are due to trauma and the remainder is of unknown cause. Diagnosis is based on lameness and a positive cranial drawer sign or instability. Conservative treatment is recommended for the majority of cats. This consists of confinement indoors, restricted activity and weight loss in obese cats. Most cats will return to full use of the leg without surgery in an average of 4.8 weeks. Surgery is indicated in cats when lameness persists despite conservative treatment or if other problems exist. In either case, the prognosis for cats with cruciate ligament injuries is very good.