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Cranial Cruciate Ligament Injury

What are the Cruciate Ligaments and Where are They Located?

The knee (or stifle) is a complex joint made of up bones, tendons, ligaments and cartilage. The femur is the bone above the knee, while the tibia and fibula are the bones below the knee. The patella, or kneecap, is located at the front of the knee. 2 pieces of cartilage called the lateral meniscus and the medial meniscus cushion the knee while multiple ligaments serve to stabilize the knee and allow it to perform its hinge-like motion. Two of these ligaments are the cranial cruciate ligament (CrCL) and the caudal (CaCL) cruciate ligament, each of which connects the bottom of the femur to the top of the tibia. Rupture of the CrCL is the most common orthopedic injury in dogs and an uncommon condition in cats. This is a similar injury to the anterior cruciate ligament (ACL) rupture that occurs in humans. Injuries to the caudal cruciate ligament are uncommon in both dogs and cats.

What Causes Rupture of the CrCL?

In dogs, CrCL rupture is usually due to chronic degeneration rather than acute trauma, although both are possible. While the cause is unknown, it is likely that genetics and body conformation are important factors. Dogs with a more straight-legged hind leg conformation or more likely to have CrCL injuries than dogs with a more flexed hind leg conformation.
CrCL injuries can occur in dogs of all ages. Large breed dogs are more prone to CrCL injuries, especially rottweilers, Labrador retrievers, Newfoundlands, and Staffordshire terriers.

What are the Clinical Signs of CrCL Rupture?

Patients with a CrCL rupture typically present to the veterinarian with a history of variable lameness of one or both hind legs. The lameness is often worse with exercise and can range from a mild weight bearing lameness to a more severe lameness where the patient is often not bearing weight on that limb. In some cases the lameness will be more severe in the acute phase and improve somewhat with time. The patient will often sit in an asymmetric position, with the affected leg extended out to the side. Swelling of the affected knee and thickening of the surrounding tissues are often present.

How is a CrCL Rupture Diagnosed?

The CrCL helps to prevent forward movement of the tibia relative to the femur, hyperextension of the knee and internal rotation of the knee. A CrCL rupture is typically diagnosed based on a thorough physical exam and radiographs (x-rays) of the knee. During the physical exam the veterinarian will feel for swelling and thickening of the knee, as well as for abnormal motion of the knee called the cranial drawer sign. The cranial drawer sign is forward motion of the tibia and fibula relative to the femur. In normal dogs, an intact CrCL prevents this motion, however when the CrCL is ruptured, this movement can occur. Additionally, a clicking sound called a meniscal click may be heard if the meniscus is involved in the injury.

Ligaments such as the CrCL are not visible on radiographs, however other characteristic changes of the knee related to a ruptured CrCL can be seen. These include swelling of the joint as well as degenerative osteoarthritic changes, depending on the duration of the injury. Evidence of cranial drawer is often visible on radiographs as well.

How is a CrCL Rupture Treated?

The pain and inflammation due to CrCL rupture are typically treated with anti-inflammatory medications called NSAIDs. Some dogs, especially small dogs may return to close to normal function with medical treatment and time, although the ruptured ligament will not heal. For many patients however, the only way to effectively treat a ruptured CrCL is with a surgical procedure. The two most common surgical procedures to treat a ruptured CrCL are the MRIT (modified retinacular imbrication technique) and the TPLO (tibial plateau leveling osteotomy). A third procedure called a TTA (Tibial Tuberosity Advancement) may also be considered, although it is less common.

1. MRIT (Modified Retinacular Imbrication Technique) or Lateral Suture Technique – The knee is inspected and damaged menisci may be removed if necessary. Then a thick suture is placed to mimic the function of the torn CrCL and stabilize the joint.
2. TPLO (Tibial Plateau Leveling Osteotomy) – The knee is inspected and the menisci assessed. With this procedure, the torn ligament is not replaced, but instead the geometry of the joint is adjusted so that the ligament is no longer necessary for stabilization. This is done by making a semi-circular cut through the tibia and rotating the top of the tibia so that the femur now bears weight on a flat horizontal surface of the tibia, which allows for stabilization of the joint. A metal plate is placed on the tibia where the cut was made, and the bone heals with time.

Both surgical procedures are associated with high success rates, although the TPLO may allow for quicker return to full weight bearing function. In practice, the MRIT procedure is often recommended for smaller dogs while the TPLO is often preferred for larger, more active dogs.

Dogs must have limited activity after surgery, often for a period of 6-8 weeks, and then will gradual increase activity level back to normal. If the patient is overweight, weight loss will help with recovery from the ruptured CrCL and also help to prevent other injuries in the future. Physical rehabilitation is also an important part of treatment for a ruptured CrCL, whether or not surgery is elected. In addition to NSAIDs, other medications such as glucosamine chondroitin supplements may be used to help prevent osteoarthritis.

What is the Prognosis with CrCL Rupture?

The prognosis for long-term function with either surgical procedure is good. Most dogs can return to close to normal function following surgery, although they may be prone to osteoarthritis of the affected joint(s). It is important to note that rupture of the CrCL of the other knee occurs in approximately 40%-50% of patients and this must be taken into account when planning treatment for the initial injury.