CRANIAL CRUCIATE LIGAMENT RUPTURE

ANATOMY
There are two cruciate ligaments in the canine knee joint: the cranial and caudal cruciate ligaments (CrCL and CaCL). The same ligaments are present in human knees, except they are called anterior and posterior cruciate ligaments (ACL and PCL). The CrCL (or ACL) is most commonly injured in both dogs and people, resulting in knee instability. Two cartilage pads called menisci are also found within each knee (medial and lateral meniscus).

WHY DID THE CrCL RUPTURE?
In contrast to people, where ACL rupture is almost always caused by trauma, most dogs suffer from a slowly progressive CrCL degeneration. The resulting weakened CrCL can rupture with minimal trauma. The cause of CrCL rupture is not fully understood. Because CrCL degeneration occurs in both knees, there is a 20-40% chance that dogs will rupture the CrCL in their opposite knee in the future.

CLINICAL SIGNS
Lameness is the most common symptom seen with CrCL rupture. Lameness can vary from mild and intermittent to non-weight bearing. Some patients experience a clicking or popping in the knee during walking. This may indicate meniscal damage.

DIAGNOSIS
CrCL rupture is diagnosed by palpation (feeling the knee) and radiographs (x-rays). Most dogs with CrCL rupture have instability in the knee called cranial drawer. It may be difficult to detect cranial drawer in dogs who are very tense or dogs who have chronic or partial CrCL rupture. Radiographs are helpful in these patients and often show osteoarthritis and joint swelling.

SURGERY
Surgical stabilization of the knee is recommended for treatment of dogs with CrCL rupture. While many different procedures exist, three procedures are performed at Wilson Veterinary Hospital. With all techniques, the meniscus is evaluated. If the meniscus is intact, a meniscal release may be performed to minimize the chance of future tearing. If the meniscus is torn, it is removed, and fibrocartilage (scar tissue) will later fill the void and replace the function of the damaged meniscus.
TIBIAL PLATEAU LEVELING OSTEOTOMY (TPLO)

The TPLO was developed approximately 20 years ago to treat CrCL rupture in large breed dogs. It has become a commonly-performed surgery and is the procedure we recommend for large breed, young, active dogs. Dogs who have a TPLO tend to use the affected limb sooner than dogs who have other procedures to repair the CrCL. There is also growing evidence that dogs who have a TPLO develop less osteoarthritis than dogs with other procedures. Dr. Wilson started performing the TPLO surgery in 2006.

**Technique:**
The procedure produces functional stability of the knee by changing the tibial plateau slope. This is done by sawing the top of the tibia (osteotomy) and leveling the tibial plateau to prevent cranial tibial thrust during weight bearing. The saw cut is stabilized with a special bone plate and screws that hold the bone while it heals. Normally, the intact CrCL stops cranial tibial thrust, a force resulting from tibial compression generated during weight bearing. After a TPLO, weight bearing that will cause caudal tibial thrust is stopped by the caudal cruciate ligament. Changing the tibial plateau slope stabilizes the knee during weight bearing.

**Recovery:**
After surgery, your pet will be required to stay the night, and the affected leg will be iced every 4 hours while in the hospital. There will be a protective barrier over the incision which will be removed 3-5 days after surgery either at home or at the hospital. Your dog’s activity must be restricted to leashed walks for a period of eight weeks after surgery. Restricting your dog’s activity level plays a major role in the success of the surgery.

**Recheck:**
A recheck examination will be required with Dr. Wilson 12-14 days, 30 days & 60 days after surgery. Radiographs will be taken at 30 and 60 days.

**Complications:**
The following complications have been documented: infection, inflammation of the patellar ligament, fracture of the tibial tuberosity, breakage or loosening of the bone plate or screws, delayed healing of the osteotomy site, rupture of the caudal cruciate ligament, and post-operative meniscal injury. Some of these complications require additional surgery. These complications have been uncommon at Wilson Veterinary Hospital.

**Prognosis:**
The TPLO is the recommended procedure to treat large breed dogs with CrCL rupture because dogs treated with TPLO have a better functional outcome, as well as decreased development of osteoarthritis than dogs treated with “traditional suture” methods. Depending upon the severity of osteoarthritis and cartilage damage your dog already has, he/she may show signs of lameness early in the morning, after heavy exercise, or on cold days. Dogs with severe osteoarthritis may have a persistent lameness.

LATERAL SUTURE TECHNIQUE (LST)
**Technique:**
To prevent cranial tibial thrust, the knee is stabilized using strong nylon sutures placed on the outside of the joint capsule. These sutures are anchored at the back of the femur and then passed through a hole drilled in the tibial tuberosity (see picture). Eventually scar tissue aligns itself around the nylon sutures, and ultimately it is this scar tissue that holds the knee stable (since the suture will eventually stretch or break).

**Recovery:**
Your dog will be released the same day as surgery, later in the evening. Activity must be restricted to leashed walks for a period of eight weeks after surgery. Restricting your dog’s activity level plays a major role in the success of the surgery. Physical therapy exercises can be done to help expedite your dog’s recovery. It generally takes up to 3-4 months before your dog will be fully recovered and using the leg well.

**Recheck:**
A recheck examination is required at **12-14 and 30 days** with the surgeon.

**Complications:**
The following complications have been documented: irritation, breakage and/or infection of the heavy nylon stabilizing sutures, and post-operative damage to the meniscus. Some of these complications require additional surgery.

**Prognosis:**
The prognosis following surgery is generally good. About 90% of dogs will go on to have normal pet function. However, they will have slightly decreased range of motion (stiffness), and osteoarthritis will still progress. Depending upon the degree of osteoarthritis and the presence of cartilage erosions, your dog may show signs of lameness early in the morning, after heavy exercise, or on cold days. Dogs with severe osteoarthritis may have a persistent lameness.

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**TIBIAL TUBEROSITY ADVANCEMENT (TTA)**
The TTA is a geometry-altering technique similar to the TPLO. Tibial thrust is controlled by changing the biomechanics of the stifle. Patient selection is similar to the TPLO; specific indications in our hospital are dogs that have concurrent ACL injury with a luxating patella. There are less data on the TTA than the TPLO, but results are similar. The reported advantage of the TTA over the TPLO is less trauma during the procedure. Very large dogs, greater than 150 pounds, and dogs with a high angle of inclination are not ideal candidates for a TTA. Dr. Wilson started performing the TTA surgery in 2012.

**Technique:**

The procedure produces functional stability of the knee by advancing the tibial tuberosity. This is done by sawing the tibial crest (the osteotomy) and advancing it cranially. A special cage and bone plate are used to fix the tibial crest in its new position. Normally, the intact CrCL stops cranial tibial thrust, a force resulting from tibial compression generated during weight bearing. Advancing the tibial crest in the cranial-cruciate-deficient stifle stabilizes the joint by altering shear forces during weight bearing.

**Recovery:**

After surgery, your pet will be required to stay the night, and the affected leg will be iced every 4 hours while in the hospital. There will be a protective barrier over the incision which will be removed 3-5 days after surgery either at home or at the hospital. Your dog’s activity must be restricted to leashed walks for a period of eight weeks after surgery. Restricting your dog’s activity level plays a major role in the success of the surgery.

**Recheck:**

A recheck examination will be required at **12-14 days, 30 days and 60 days** after surgery with Dr. Wilson. Radiographs will be taken at **30 and 60 days**.

**Complications:**

The following complications have been documented: infection, fracture of the tibia, breakage or loosening of the bone plate or screws, delayed healing of the osteotomy site, luxating patella, and post-operative meniscal injury. Some of these complications require additional surgery.

**Prognosis:**

Some data show that large breed dogs with CrCL rupture treated with TTA have a better functional outcome and decreased development of osteoarthritis than dogs treated with “traditional suture” methods. Prognosis is good, and most owners report good or excellent function of the leg after healing. Depending upon the severity of osteoarthritis and cartilage damage your dog already has, he/she may show signs of lameness early in the morning, after heavy exercise, or on cold days. Dogs with severe osteoarthritis may have a persistent lameness.