

# ACL Surgical Repair Including the TTA-2

Due to the high incidence of the problem and the clinical success of surgical techniques, surgical repair of the cranial cruciate ligament is one of the most common small animal orthopedic procedures.

## Lateral Suture

The lateral suture method involves placing a nylon material on the outside of the knee in a similar orientation to the injured cranial cruciate ligament. This stabilizes the joint and allows fibrous tissue to develop which provides long term stabilization after the nylon degrades. The majority of dogs recover back to 80-85% of normal within 6 months and may improve further by 1 year. However, smaller dogs or cats are better candidates for this procedure compared to larger dogs, active dogs, or working dogs.

## Tibial Tuberosity Advancement (TTA/TTA-2)

The Tibial Tuberosity Advancement (TTA) technique was developed in 2004 in efforts to improve the outcome of surgically repaired cruciate injuries and reduce the severity of osteoarthritis (arthritis) that follows. The procedure is designed to surgically change the biomechanics of the knee joint to compensate for the deficient cruciate, and therefore help return the pet to full function. The TTA is accomplished through an osteotomy (cutting off a section of the bone) of the tibia and by moving the attachment of the straight patella tendon forward using cages, screws and bone plates. Compared to other repair methods, the TTA offers a lower complication rate and excellent recovery.

In 2014, after 2 years of testing began to explore the next step in the TTA evolution, the TTA-2 became commercially available. TTA-2 involves an incomplete osteotomy (cutting partially through the bone) of a portion of the tibia. The patellar ligament is moved forward without the need for screws or bone plates like the TTA. The TTA-2 surgical technique uses less implant material yet is just as strong and effective as the TTA and eliminates stress risers created by the plate, fork, and screws used in the

TTA. In addition, the TTA-2 reduces surgical trauma by preserving bony attachments and blood supply, reduces the risk of infection and surgery time, accelerates incorporation of the implant into the bone, and thus provides surgeons and their patients with noticeable benefits.

## Benefits of TTA-2

- Rapid recovery: full weight bearing within 2 weeks for most cases
- Good prognosis for return to full athletic activity and reduction of lameness
- Protection of articular cartilage through rapid return of normal joint range of motion
- Decreased progression of arthritis over time
- Less invasive than TTA and TPLO
- Lower complication rate

Typical recovery for pets undergoing this procedure is limited activity for 8-10 weeks, but most are full weight bearing within 2 weeks. Pet's receiving this repair have a good to excellent prognosis for returning to full athletic activity. Additionally, associated osteoarthritis (arthritis) formation within the knee joint is lower with the TTA-2 compared to other repair techniques. Dogs of all sizes, breeds, and ages can benefit from the TTA-2.

### **What is the ACL (Anterior cruciate ligament) in pets?**

Although we may commonly refer to this ligament as an ACL, in dogs and cats it is actually termed the cranial cruciate ligament (CrCL). The cranial cruciate ligament is located inside your pet's knee. This ligament connects the femur (thigh bone) and tibia (shin bone) and helps provide stability to your pet's knee. If this ligament becomes injured, either from a partial or complete tear, every time your pet tries to stand or put weight on the injured leg, the instability between the femur and tibia causes increased motion and rubbing which can lead to significant pain and discomfort for your pet unless corrected. In addition, it is also important to know that due to the instability this ACL injury creates in your pet's joint, it is also one of the main causes of degenerative joint disease (DJD), more commonly known as arthritis in dogs.

### **What causes an ACL tear in dogs?**

The two most common causes of an ACL tear in dogs are due to acute traumatic injury and/or degenerative changes of the ligaments within the joint. Acute or traumatic ACL tears are the result of a twisting injury during forward motion that leads to excessive force being placed on the ligament that it is unable to withstand. This most commonly occurs when the dog is running and suddenly pivots or changes direction.

The chronic form of ACL damage is believed to be the most common cause and occurs from progressive degeneration and weakening of the ligament. Initially, degeneration of the ligament

leads to disruption of fibers which weaken the ligament leading to partial tears and cause inflammatory changes within the joint. Progressive degeneration and continued use of the leg eventually leads to a complete ligament rupture. This may occur during something as simple as a non-stressful walk around the block or getting up. Often, these knees will have developed advanced arthritis before the ACL ever completely ruptures.

Although all dogs, including small breed dogs, are at a potential risk of tearing their ACL, the most commonly reported dogs with ACL injuries are active, large-breed dogs, such as Pitbulls and Labrador Retrievers.

It is important to note, obese dogs appear to be more predisposed to developing ACL tears. In addition, certain conformation abnormalities such as **patella (knee cap) luxation** can also contribute to repeated stress and injury to the ACL.

Unfortunately, dog's who rupture one ACL are more predisposed to rupturing the ACL in the other knee.

### **What signs may I notice if my pet may have a ruptured ACL?**

In acute traumatic ACL tears, you may often see and hear your dog yelp after running in the yard and suddenly begin to limp on one of their back legs. In other situations, you may never witness an event but notice the dog limping or not putting any weight on the back leg.

In chronic ACL tears, the symptoms are often less obvious. Your pet may demonstrate stiffness, most notably after rest, when trying to stand up or when walking or climbing stairs. You may also notice a reluctance to go on walks or tiring more easily during a walk. In addition, your pet may become more reluctant to jump into the car or onto furniture. However, with continued activity and progression of arthritic and degenerative changes, symptoms tend to become more pronounced.

Another subtle sign commonly seen with ACL tears may include an abnormal sitting posture, either with the affected hind leg held out to the side or protected underneath your pet's body when sitting.

### **How is an ACL tear diagnosed?**

Despite the high frequency of ACL injuries, because the majority of ACL damage is caused by slow degeneration of the ligament rather than a sudden tear, they can often be misdiagnosed. About 35% of patients are referred to orthopedic surgeons for hip problems when in reality it is a torn ACL. Therefore, it is imperative that you seek the opinion and recommendations of a veterinarian who is familiar with diagnosing and treating ACL injuries.

While X-rays can provide beneficial information, an exam by an experienced veterinarian is often the only thing necessary to make a proper diagnosis. During an exam, your pet's overall mobility will be observed and the knee palpated for signs of discomfort, fluid or swelling, as well as any instability or abnormal movement in the knee that would suggest the ligament has been

damaged. During this exam, it may be necessary to administer a sedative to help relax your pet for the best results.

After the exam, typically x-rays of the knees and hips are performed. This is a great way to rule out other causes of lameness such as fractures or hip problems. In addition, x-rays may help identify arthritis and confirm the suspicion of an ACL injury. In cases where the ACL is damaged and needs surgical repair, these X-rays are necessary for surgical planning.

### **What are the treatments for an ACL tear?**

Rupture of the ACL results in progressive and degenerative changes within and around the knee joint, therefore, surgery is the most proven and consistent way to treat an ACL tear. Even with partial ACL tears, early surgical management is typically always recommended as surgical treatment has demonstrated a more complete and quicker return to function while minimizing the progression of arthritis or weakening of the ACL in the opposite leg.

There are various surgical techniques performed to stabilize the knee joint following cruciate rupture that vary in preferability based on dog breed, age and size. In large breed dogs, the two most common procedures that surgeons will recommend are the tibial plateau osteotomy (TPLO) and the **tibial tuberosity transposition (TTA)** [\[link to page\]](#). Both procedures have demonstrated success.

In smaller breed dogs (<30lbs) and cats, often times an extracapsular repair, also referred to as a **lateral fabellar suture repair** [\(link to page\)](#), may be recommended.

At Roanoke Animal, our doctor's are trained and proficient to perform the extracapsular suture technique as well as the second generation of the TTA, known as a TTA2.

### **What is an extracapsular suture repair?**

The extracapsular suture repair is known by many names including lateral suture technique and lateral fabellar suture technique. The extracapsular suture repair involves placing nylon material on the outside of the knee in a similar orientation to the injured cranial cruciate ligament. This stabilizes the joint and allows for fibrous (scar) tissue to develop and provide long term stabilization once the nylon degrades. The majority of dogs recover back to 80-85% of normal within 6 months and may improve further by 1 year. However, smaller dogs or cats are better candidates for this procedure compared to larger dogs, active dogs, or working dogs.

### **What is the TTA2 procedure?**

The TTA2 surgery is one of the procedures indicated for medium and large breed dogs with ACL injuries. The TTA2 is the second generation of the TTA and is less invasive than the original TTA procedure. The TTA2 involves an incomplete osteotomy (cutting partially through the bone) of a portion of the tibia. The patellar ligament is moved forward without the need for screws or bone plates like the TTA. Therefore, the TTA2 surgical technique uses less implant material yet is just as strong and effective as the TTA and eliminates stress risers (areas where complications can occur due to the implant) created by the plate, fork, and screws used in the TTA. In addition, the TTA2 reduces surgical trauma by preserving bony attachments and blood

supply, reduces the risk of infection and surgery time, accelerates incorporation of the implant into the bone, and thus provides surgeons and their patients with noticeable benefits.

### **What is the prognosis after surgery?**

Regardless of which procedure is performed, pet's who have surgery performed for an injured ACL do much better than those that do not receive surgery. Pet's that don't receive surgery to help stabilize the knee will develop significant arthritis over the subsequent months and years, which will contribute to significant limping and ultimately a decreased quality of life.

The surgical success rate with the TTA2 has been reported to be 90-95% of dog's having a good to excellent long term outcome, whereas the extracapsular suture technique typically achieves an 80-85% success rate. However, early diagnosis and treatment is critical for improving the long term prognosis and will minimize the progression of degenerative joint disease (DJD) or arthritis. The worst-case scenarios are the dogs with partial ACL tears that goes undiagnosed for an extended period of time as the chronic instability in the joint leads to significant arthritis.

Unfortunately, regardless of the technique used to stabilize the joint, arthritis is likely to develop in the joint as your pet ages. However, arthritis develops more slowly and to a lesser degree if surgery is performed. Weight control and nutritional supplements such as Dasuquin Advanced or Adequan may help delay the onset of arthritis in your pet.

### **Are there risks or complications with ACL surgery?**

While most pet's improve from having surgery performed, complications can occur in ~5-10% of cases. If a complication occurs, recovery may be delayed and the need for a second surgery or an additional procedure may be necessary. Performing physical therapy after surgery can help speed recovery and reduce complications.

The risks associated with surgery can include:

- Anesthetic risks because full general anesthesia is required for the surgical procedure
- Hemorrhage or bleeding
- Nerve damage
- Infection in the incision or implant
- Implant failure
- Delayed healing
- Patellar luxation
- Bone fracture
- Meniscal injury

For more information or to schedule a consultation at Roanoke Animal Hospital, please call our hospital (540-343-8021) or schedule online using our [pet Page app \(links\)](#)