

**HOW TO TREAT A RUPTURED ACL:****Choosing between the TTA procedure, the extracapsular stabilization procedure, and conservative management****Overview—"I don't understand what an ruptured ACL is; please help me understand the condition and the treatments available."**

Ligaments are strong, tight, short, fibrous bands that connect bones to each other; they look like a bundle of small cables all bunched together doing the same job. They do not have a good blood supply by design, and they are very, very poor healers. Most commonly, when they are damaged, we are **replacing or augmenting instead of repairing** the actual ligament.

The knee joint is made up of two bones, the femur (thigh bone) and the tibia (shin bone). The ends of these bones are covered with hyaline cartilage that is found only in a joint; when it goes away, it is not repaired (it is sometimes replaced with a different type of "bandaid cartilage" called fibrocartilage (not as nice as the original hyaline cartilage.)) There are also two pieces of cartilage sitting in the knee joint acting as cushions between the femur and the tibia; they are different than the cartilage covering the joint surface. These are called menisci (one is called a meniscus), and they are very poor to heal if torn or crushed as well. In veterinary medicine we are most often removing damaged portions of menisci, rather than repairing them.

There are four important ligaments that stabilize the knee joint in dogs (and people!) such that it only bends or moves in the correct direction. Two **collateral ligaments** (medial/inside surface of knee; lateral/outside surface of knee), and two **cruciate ("crossing") ligaments** (cranial or anterior/attached to front of tibia; caudal or posterior/attached to back of tibia).

The most common ligament injury in a knee (dog, cat or human) is a partial tear or full rupture of the cranial/anterior cruciate ligament ("ACL" for short). These can start as on-off/progressive limping on the back leg or a sudden non-weight bearing limp after vigorous activity. On **physical exam**, your veterinarian or surgeon will confirm the diagnosis by demonstrating a "cranial drawer sign"—an abnormal sliding of the tibia relative to the femur. A normal knee and ACL cannot make this sign. **X-rays** are used to support this diagnosis and eliminate other causes of limping or knee pain.

Up to 40-50% of patients will have cruciate disease or an acutely ruptured cranial cruciate **in both limbs** in their lifetime. This is NOT likely due to stressing the normal leg while limping on the bad leg. It is more likely related to the underlying reason they develop this condition in the first place...which remains highly debated. The current prevailing theory of cause is an increased stress on the ligament based on anatomy and knee biomechanics. That said, there are many patients (classic is the middle aged female dog-- beagles, boxers, others) who develop x-ray and physical exam findings consistent with osteoarthritis before a loose ligament. These are the "partial tears" we talk about but can't get the cranial drawer sign, (I call them "cruciate disease") and the x-rays look chronic. A chronic, degenerative process is likely at work and the inflamed knee environment leads to ligament damage. This scenario is usually at work in both knees around the same time.

**"Why is treatment being recommended for my pet?"**

The looseness and active sliding motion that a pet experiences when walking on a knee without an ACL likely feels odd. Dramatic pain is not common, like you would see with a broken bone. Pets just don't trust full weight applied to the abnormal knee, and so they limp. As time goes by, the rubbing of cartilage in the knee will cause damage to the hyaline cartilage. We call this progression—osteoarthritis. The abnormal sliding motion will also injure the (medial) meniscus, resulting in the feeling of "a rock in your shoe".

Treatment is aimed at cleaning out damaged structures, reducing that looseness, and slowing the progression of osteoarthritis.

### “What options do I have to treat my pet’s ACL injury?”

Veterinary data is not black-and-white, clear-cut about treatment. Decades of medical studies have filled the veterinary literature. My recommendations are a digest of that data and my clinical observations for 20 years. As with everything medical, we make decisions using data about populations. How an individual patient outcome unfolds is unique and somewhere on a bell curve. When making decisions about our own pets, this can be very frustrating. We want THE right choice. Your job is to work through the problem and make the choice that is right for you and your pet, balancing all the available information.

A knee without an ACL will experience looseness on exam (**cranial drawer sign**) and with weight bearing (we call this motion a **cranial tibial thrust**). The **tibial tuberosity advancement** (TTA) and the **tibial plateau leveling osteotomy** (TPLO) *dynamically* stabilize the knee by changing the biomechanics of the femur, tibia and knee cap. Biomechanical testing has suggested that adjusting these structures will result in a knee that does not slide during walking and running—there is no cranial tibial thrust laxity. (The TTA and TPLO are technically different while achieving the same goal; surgeon’s preference on technique unless you have a specific request. See additional commentary-- [www.directvetsurg.com](http://www.directvetsurg.com) Pet Owner’s Portal under *DVS Resources*)

An **extracapsular stabilization** involves implanting a heavy gauge “pseudo-ligament” on the outside of the joint, to mimic the missing ligament function, as a *passive* and *dynamic* stabilizer. Over months, if the implant remains stable, scarring will align along that implant to take-over stabilization of the joint.

**Conservative management** of a loose stifle with torn ACL is geared toward quieting the early inflammation of knee injury and allowing time to pass while stability develops though thickening of the joint capsule.

**Meniscal injury** in pets happens after the ACL is injured and the knee is unstable, not before. It can occur before or after stabilization of the stifle. A typical history is an initial limp that gets somewhat better with time (the ACL injury), followed by a sudden, more dramatic limp that does not resolve with time (the meniscal injury). *The first lameness I describe to owners as “not trusting their leg to bear full weight; not especially painful”, and the second lameness as “a rock in their shoe; painful to step down”.* Surgery to stabilize the knee must (and does in my hands) involve a thorough investigation of the menisci, removal of any portions that are damaged (usually the back half of the medial meniscus). Additionally, I release a normal meniscus with the goal of having it move out of harm’s way postoperatively.

### “Will you briefly summarize risks and benefits of each option?”

	TTA	Extracapsular stabilization suture	Conservative management
<b>Patient (normal) BW</b>	>20#	Any; ideal <30#	Any; ideal <20#
<b>Post treat lameness</b>	8-12wks	8-12wks	8-12wks
<b>Activity restriction</b>	8wks	8wks	8wks
<b>Less than optimal outcome</b>	5-10%	15-20% (ideal BW) 25-30% (overwt/obese)	25-30% (ideal BW) 50-75% (overwt/obese)
<b>Worst case scenario complication</b>	Implant/bone breakage/infection; major reoperation	Implant infection/minor reoperation; implant break/major reoperation	Poor leg use; excessively stiff knee

**“What postoperative complications do I need to know and understand when considering this surgery?”**

All dogs with a ruptured cranial cruciate will develop DJD/arthritis in their lifetime. This manifests as stiffness when rising, limping after vigorous activity. **Optimal outcome** *for any treatment/management of a cruciate injury is the delayed development of DJD and the comfortable use of the leg for activities typical to the pet’s lifestyle.* For an improved postoperative period, an assistive sling is beneficial ([see Help ‘em Up harness online.](#))

**“How is my pet’s life and lifestyle likely to change after this ACL treatment?”**

All knees that experience the loss of an ACL will never be normal—whether surgically treated or not. They can be highly functional (probably higher functioning with surgical stabilization and meniscal treatment), but will always have some degree of stiffness and decreased function related to osteoarthritis. Maintaining a **very lean body condition** (*please consult with your veterinarian about an appropriate body condition in this age of pet obesity*) and maintaining a **moderately active/low impact lifestyle** are our primary tools in managing osteoarthritis. (See additional Conservative Osteoarthritis information... [www.directvetsurg.com](http://www.directvetsurg.com) )

**“Are there things I can do to confirm that my pet will likely benefit from surgical treatment?”**

Time can be helpful in making decisions. If something doesn’t get better, we look to additional options. For the presumed or confirmed ruptured ACL, allowing time to pass with moderately restricted activity is reasonable.

For medium and large breeds, 2-3wks will allow inflammation to subside. In many cases of a partial ACL tear (just a few fibers; like a major sprain), time and rest will improve a pet’s comfort. These episodes of “get worse, then get better” may continue for weeks to months as more and more fibers tear; the knee becomes looser each time and the meniscus is under more stress. Soon, there are more bad days than good days, and surgical treatment becomes more logical. Waiting too long (> 1mo) with a confirmed tear is not beneficial and may reduce overall positive outcome.

For toy and small breeds, a longer trial of rest and activity restriction is reasonable because many knees in these light weight dogs (cats) will become comfortable and stable enough over a 6-8wk period (steady progress and improvement is essential). If these pets have very few bad days and remain highly functional, they may not benefit from surgical treatment. For those small pets with no steady improvement and very loose knees, surgical stabilization can be very helpful.

Obesity plays a large role in successful surgical and conservative outcomes. Any patient carrying over ~10% excess body weight for their frame will have more trouble with recovery, more trouble with the progressive arthritis of ACL injury, and more trouble with aging in general. A large study demonstrated 1.7yrs longer lifespan in lean-ideal body weight Labrador retrievers. (Ex. ¾# in an ideal 8# cat; 1# in an ideal 10# dog; 3# in an ideal 30# dog; 10# in an ideal 70# dog, etc.)

For all patients with an obvious meniscal injury (based on exam), very loose knees (based on exam), and ongoing limping with muscle atrophy, surgical treatment of the meniscal injury and stabilization of the joint will likely result in a better long-term outcome.

It is important that you have proper expectations about these procedures; your experience and you pet’s outcome will benefit greatly. Please discuss this information with your veterinarian when working through the decision-making process regarding a treatment for a **ruptured cranial cruciate ligament**.

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(See additional materials at [www.directvetsurg.com](http://www.directvetsurg.com) for pet owners and veterinary professionals.)