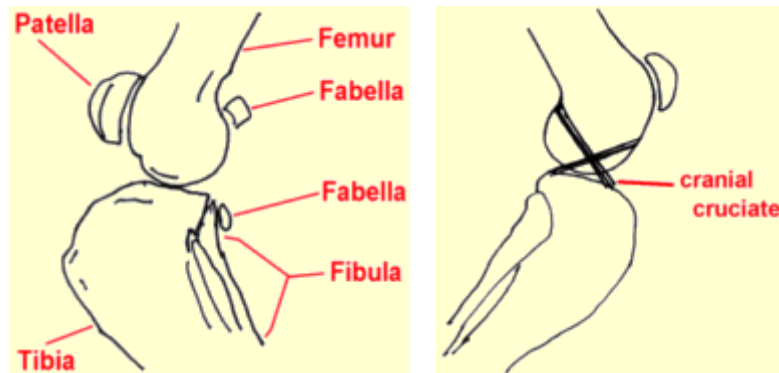


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Ruptured Anterior (Cranial) Cruciate Ligament



The knee is a fairly complicated joint. It consists of the femur above, the tibia below, the kneecap (patella) in front, and the bean-like fabellae behind. Chunks of cartilage called the medial and lateral menisci fit between the femur and tibia like cushions. An assortment of ligaments holds everything together, allowing the knee to bend the way it should and keep it from bending the way it shouldn't.

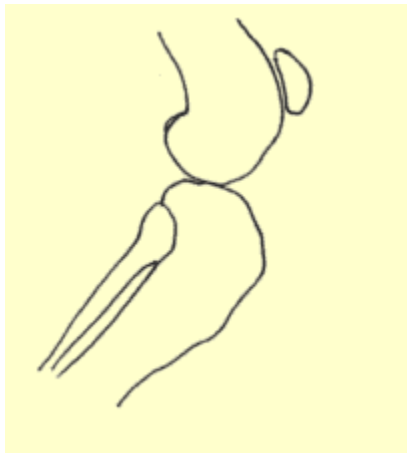
There are two cruciate ligaments that cross inside the knee joint: the anterior (or, more correctly in animals, cranial) cruciate and the posterior (in animals called the caudal) cruciate. They are named for the side of the knee (front or back) where their lower attachment is found. The anterior cruciate ligament prevents the tibia from slipping forward out from under the femur.

Finding the Rupture

The ruptured cruciate ligament is the most common knee injury of dogs; in fact, chances are that any dog with sudden rear leg lameness has a ruptured anterior cruciate ligament rather than something else. The history usually involves a rear leg suddenly so sore that the dog can hardly bear weight on it. If left alone, it will appear to improve over the course of a week or two but the knee will be notably swollen and arthritis will set in quickly. Dogs are often seen by the veterinarian in either the acute stage shortly after the injury or in the chronic stage weeks or months later.

The key to the diagnosis of the ruptured cruciate ligament is the demonstration of an abnormal knee motion called a drawer sign. It is not possible for a normal knee to show this sign.

The Drawer Sign



The veterinarian stabilizes the position of the femur with one hand and manipulates the tibia with the other hand. If the tibia moves forward (like a drawer being opened), the cruciate ligament is ruptured.

Another method is the tibial compression test where the veterinarian stabilizes the femur with one hand and flexes the ankle with the other hand. If the ligament is ruptured, again the tibia moves abnormally forward.

If the rupture occurred some time ago, there will be swelling on side of the knee joint that faces the other leg. This is called a medial buttress and is a sign that arthritis is well along.

It is not unusual for animals to be tense or frightened at the vet's office. Tense muscles can temporarily stabilize the knee, preventing demonstration of the drawer sign during examination. Often sedation is needed to get a good evaluation of the knee. This is especially true with larger dogs. Eliciting a drawer sign can be difficult if the ligament is only partially ruptured so a second opinion may be a good idea if the initial examination is inconclusive.

How The Rupture Happens

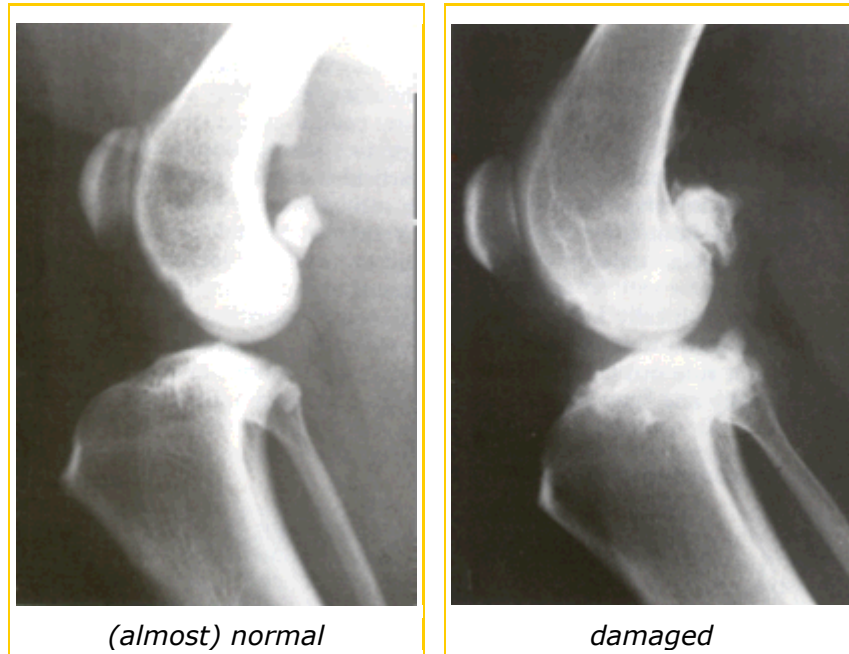
Several clinical pictures are seen with ruptured cruciate ligaments. One is a young athletic dog playing roughly who takes a bad step and injures the knee. This is usually a sudden lameness in a young large-breed dog.

A recent study identified the following breeds as being particularly at risk for this phenomenon: Neapolitan mastiff, Newfoundland, Akita, St. Bernard, Rottweiler, Chesapeake Bay retriever, and American Staffordshire terrier.

On the other hand, an older large dog, especially if overweight, can have weakened ligaments and slowly stretch or partially tear them. The partial rupture may be detected or the problem may not become apparent until the ligament breaks completely. In this type of patient, stepping down off the bed or a small jump can be all it takes to break the ligament. The lameness may be acute but have features of more chronic joint disease or the lameness may simply be a more gradual/chronic problem.

Larger overweight dogs that rupture one cruciate ligament frequently rupture the other one within a year's time. An owner should be prepared for another surgery in this time frame.

What Happens if the Cruciate Rupture is Not Surgically Repaired



Without an intact cruciate ligament, the knee is unstable. Wear between the bones and meniscal cartilage becomes abnormal and the joint begins to develop degenerative changes. Bone spurs called osteophytes develop resulting in chronic pain and loss of joint motion. This process can be arrested or slowed by surgery but cannot be reversed.

- Osteophytes are evident as soon as 1 to 3 weeks after the rupture in some patients. This kind of joint disease is substantially more difficult for a large breed dog to bear, though all dogs will ultimately show degenerative changes. Typically, after several weeks from the time of the acute injury, the dog may appear to get better but is not likely to become permanently normal.

What Happens in Surgical Repair?

There are three different surgical repair techniques commonly used.

Extracapsular Repair

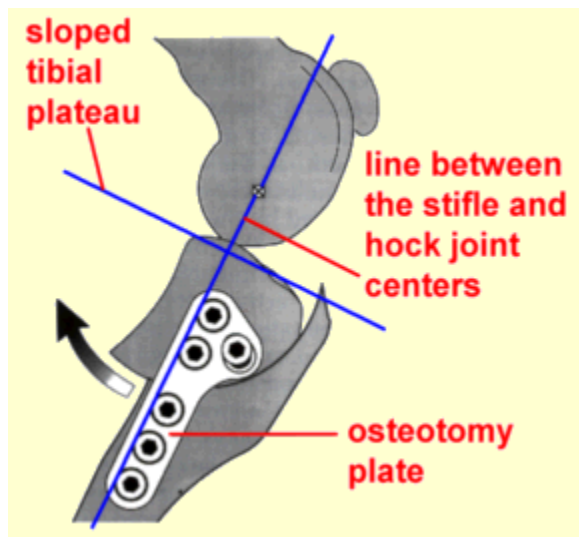
This surgery is currently favored in small dogs as it can be performed in a relatively shorter time than the other procedures and does not require specialized equipment. A large, strong suture is passed around the Fabella behind the knee and through two holes drilled in the front of the tibia. This tightens the joint to prevent the drawer motion, effectively taking over the job of the cruciate ligament.

- Typically, the dog may carry the leg up for a good 2 weeks after surgery but will increase knee use over the next 2 months, eventually returning to near normal.
- Dogs that undergo post-op rehabilitation, especially underwater treadmill and laser therapies, return to function quicker and more completely.
- The suture placed will break 2 to 12 months after surgery and the dog's own healed tissue will hold the knee.



Lateral orthopedic wire is shown taking the place of the anterior cruciate ligament. Usually thick suture is used rather than wire but for illustrative purposes the wire shows where the suture would be placed around the knee.

Tibial Plateau Leveling Osteotomy (TPLO)



This procedure uses a different approach to the biomechanics of the knee joint and is meant to address the lack of success seen with the above technique long term in larger dogs. With this surgery, the tibia is cut and rotated in such a way that the natural weight-bearing of the dog actually stabilizes the knee joint.

This surgery is complex and involves specific training in this technique. Many radiographs are necessary to calculate the angle of the osteotomy (the cut in the tibia). This procedure typically costs substantially more than the extracapsular repair as it is more invasive to the joint.

- Typically, most dogs are touching their toes to the ground by 10 days after surgery, although it can take up to 3 weeks.
- Dogs that undergo post-op rehabilitation, especially underwater treadmill and laser therapies, return to function quicker and more completely. This is even more important with TPLO and TTA surgeries
- Full function is generally achieved 3 to 4 months after surgery and the dog may return to normal activity.

Tibial Tuberosity Advancement (TTA)

The TTA represents another take on how to use the biomechanics of the knee to create stabilization. The theory behind this procedure is that when the cruciate ligament is torn, the tibial plateau (the top of the tibia) and the patellar ligament should be repositioned at 90 degrees to one another to combat the shear force generated as the dog walks. To make this happen, the tibial tuberosity (front of the tibia where the patellar ligament attaches) is separated and anchored in its new position by a titanium or steel cage, "fork," and plate. Bone grafts are used to assist healing. This procedure was developed in 2002 at the University of Zurich and since then over 20,000 patients worldwide have had this surgery. Some experts prefer it to the TPLO while others prefer the TPLO. Both procedures require specific equipment and expertise and, again, no procedure has demonstrated clear superiority; controversy continues.



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General Rehabilitation after Surgery

Rehabilitation can begin as soon as the pet goes home. Be aware that exercise restriction is important for 4 weeks with the Lateral Fabellar technique, and 8 weeks for the TTA or TPLO techniques. The area can be chilled with a padded ice pack for 10 minutes three times daily. (Do not try to make up for a skipped treatment by icing the area longer; prolonged cold exposure can cause injury.) Gentle hip extension is the most important exercise to perform at home. Passive range of motion exercise where the knee is gently flexed and extended can also help. It is important not to induce pain when moving the limb. Let the patient guide you. Avoid twisting the leg. On release of your pet the day after surgery, one of our doctors will show you these techniques. A doctor will meet with you at your suture removal appointment, and discuss your pet's progress. After the stitches or staples are out (or after the skin has healed in 9 to 14 days), underwater treadmill exercise and laser therapy will greatly enhance your pet's recovery. The minimum recommended time for this is twice weekly for one month. A Chiropractic adjustment and an exercise therapy session are recommended at the end of therapy. For more information on at-home rehab, visit our website at leparvet.com, for a link to TTA Rehab. This plan can be followed for all three of the procedures. For more information on therapies, visit chicagoanimalrehab.com

What if the Rupture Isn't Discovered for Years and Joint Disease is Already Advanced?

A dog with arthritis pain from an old cruciate rupture may still benefit from a TPLO surgery or from the TTA. Ask your veterinarian if it may be worth having a surgery, some cases must make do with medical management.