

Your dog's knees do tricks too (part II)

Cranial Cruciate Ligament Rupture:

The number one reason why a dog (and sometimes a cat) is presented for rear limb lameness is a ruptured Cranial Cruciate Ligament (called the Anterior Cruciate Ligament in humans). This ligament is located inside of the knee. Its job is to help stabilize the knee and prevents the shin (tibia) from moving forward when the knee bends. There is also a Caudal Cruciate Ligament that helps to maintain stability. These two ligaments form a cross shape, which is where the term Cruciate comes from.

This injury occurs for a variety of reasons. It can be due to an acute injury such as rotation, blunt trauma, or a leg caught in a hole, etc. it can also be due to a degeneration of the ligament (much more common.) This degeneration can be due to excessive weight (obesity), repeated smaller traumas, knee deformities (such as luxating patellas), or genetics (familial tendencies do exist although the genes responsible are unknown at this time. Because of the degenerative nature of this disease, and that once injured, more weight is placed on the other leg, more often than not within 6 months, the Cruciate ligament on the other knee will rupture.

What are the symptoms of a Cruciate rupture?

They are quite variable. With slow, steady rupture, slow progressive and intermittent lameness on the leg maybe all that we see, with thickening of the knee joint, muscle atrophy, and sometimes an audible click. With acute ruptures, there is a complete non-weight bearing of the limb (no weight placed at all or toe-touching the ground and then lifting the leg.) The history is usually they were doing fine and they are all of a sudden lame. Within a few days the lameness tends to improve for a few weeks until the degenerative arthritis sets in.

What happens to the knee when the cruciate ligament tears?

Basically, with the ligament no longer functioning a few things happen:

- The tibia starts to slide forward when the knee bends. This abnormal motion is quite painful and causes lameness
- The meniscus (a small protein/cartilage disk in the knee that acts as a "shock absorber") may tear causing pain.
- Eventually, the instability and abnormal motion will cause rubbing of the cartilage in the joint. Once the cartilage is worn off, this causes bone-on-bone contact, which is quite painful. Eventually as a response, the body will form new bone in abnormal places. These bony spurs are called osteophytes and can also cause problems. This degenerative arthritis is why dogs that rupture their ligaments slowly or have a recurrence of symptoms weeks after the initial injury.

How can the doctor know the ligament is ruptured?

- During the initial examination, the doctor will feel all the joints. If there is a ligament rupture, the joint may be hot and swollen. Lameness would be evident. With careful palpation, the doctor may be able to feel the sliding of the tibia and the femur (called a drawer sign). Due to the pain involved, sedation is frequently necessary for evaluation.



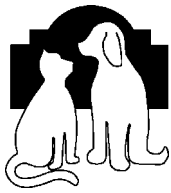
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- Radiographs (x-rays) can also detect joint effusion (excessive fluid in the joint due to inflammation), abnormal joint position, and degenerative changes. Even more important, radiographs can rule out other causes of knee swelling a pain such as fractures, rheumatoid arthritis, and cancer of the joint.
- The first two tests make us highly suspicious. But neither can allow visualization of the ligament (can't see it on a radiograph). To see the ligament would require MRI, arthroscopy (putting a scope into the joint), or visualizing the ligament during surgery. Usually, these imaging tests are unnecessary, as index of suspicion is usually quite high and surgical evaluation and repair is recommended.

How can the doctor know the ligament is ruptured?

This is considered a surgical disease. Without surgical intervention, degenerative arthritis will occur, which can be crippling, especially to overweight, larger dogs. The earlier surgery is performed, the better the outcome. Degenerative arthritis can set in after just a couple of weeks. There are many surgical techniques. There is, at this time, no consensus on which technique is best, although there is a study being performed to try to determine this. Generally, the technique performed is the one that the individual surgeon is most comfortable with. The surgery is routinely performed by general practice veterinarians due to its high prevalence, but is also performed by surgical specialists (orthopedic surgeons) more and more. The ligament is never simply re-sutured, as the weakness which caused it to break once, will likely cause it to break again. Instead, the goal is to replace the function of the ligament to reduce sliding and increase stability by mimicking the physiological function of the ligament. At the same time, a torn meniscus can be repaired or removed, and any osteophytes removed. Some types of the surgery include:

- Fascia lata graft: this is using the covering over the thigh muscle to string through the joint. This brings about a good return to full function. It is the type of Cruciate surgery we perform here.
- Litter-line (sterilized heavy fishing line) or nylon suture can be strung through the joint to mimic the function of the ligament.
- Arthroscopy: a scope can be used to initially evaluate the joint. Working channels can be used to remove some osteophytes.
- The fibula (other shinbone) can be moved forward and pinned in place. This is called a fibular head transposition and like other procedures, it mimics the function of the Cruciate ligament.
- TPLO: tibial plateau leveling osteotomy. This is the newest procedure. Because it is a patented procedure and requires any surgeon to perform it to be licensed, it is a much more expensive procedure and generally performed only by board-certified surgical specialists. It may end up being the most effective of the methods of correction, as large active dogs can tear any artificially constructed ligament. It was originally designed for dogs over 40 lbs., but some surgeons have modified it for smaller dogs. Basically, the tibia is reshaped and re-directed to prevent the sliding motion. This effectively eliminates the need for the cranial Cruciate ligament.
- Choosing which technique will depend on many factors: size of your dog, activity level, weight, other orthopedic problems, and diagnostic tests. Certainly, referral to a specialist for evaluation is always an option. Unfortunately, because of the patent on the TPLO, it is a very expensive surgery to learn,



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which makes it a more costly surgery to perform. Generally, for other techniques, including all medications, anesthetic, surgery, and lab work average estimate is \$1000. For the TPLO or a referral specialist, the average estimate is about \$2500. These numbers are averages and vary quite a great deal and for your pet an individualized estimate should be requested.

If I have the surgery performed, what is the likelihood of return to normal and how soon?

Recovery generally takes 6-8 weeks of strict rest, followed by a gradual return to normal activity. Strict exercise restriction is required to prevent tearing of the fixation. After 3-4 months, full recovery is expected. Even dogs that are quite athletic can return to normal activity in most cases. The knee will never be "normal" but most dogs do not require anything more than a dietary supplement to help their knees and diet to keep their weight down. The more degenerative changes at the time of surgery, the less successful (but better than before surgery). Generally, with prompt attention after acute rupture recovery is 75-95% to full function. With chronic cases, it is 65-75%. After surgery, especially the first month, the following are important:

- **Rest:** no running, jumping, or playing. Leash walks to go to the bathroom only. After the 6-8 weeks is up, the doctor will determine an activity schedule
- **Weight reduction:** the decrease in activity will increase weight, which is harder on the repaired knee and the healthier one as well. Weight reduction diets are usually required.
- **Pain medication:** a combination of narcotics for acute post surgical pain and non-steroidal anti-inflammatory help with post-surgical pain. Humans with this surgery are usually bedridden and there is no reason to believe that dogs and cats feel any less pain (they just don't show it as well). Generally the anti-inflammatory drugs are continued until the lameness stops. Sometimes they are used continuously, especially in dogs with degenerative arthritis in the joint. **NEVER USE HUMAN MEDICATIONS, ESPECIALLY ANTI-INFLAMTORIES WITHOUT YOUR VETERINARIAN'S AUTHORIZATION—THEY CAN BE QUITE TOXIC.**
- **Adequan:** This injection given every 4 days in the muscle is a proteoglycan. It was originally developed for racehorses, but is now approved for use in dogs. It has minimal side effects. It helps to restore healthy cartilage, strengthen proteins in the joint, remove free radicals from the joint fluid, and reduce inflammation in the joint. It helps the healing process. 8 injections are generally given.
- **Chondroitin sulfate/glucosamine:** This is a dietary supplement. It works in a similar fashion to the Adequan. It generally takes about 4-6 weeks to reach effective blood levels, so it is started when the Cruciate rupture is diagnosed. There are two recommended forms. Because it is not a drug and purity is an issue, we recommend Cosequin (a brand with independent laboratory verification of purity and nice liver flavored chewable tablets) or in the food (pet diets are regulated). For diet, we recommend Eukanuba Senior Plus because it is designed to help with arthritis by having high levels of chondroitin sulfate and glucosamine and it is designed for weight control/loss as well.

Also remember, that the other knee is likely to have a Cruciate rupture. Prompt attention and proper post-operative care are essential to make sure the first knee is back to normal before the second becomes a problem.

Hopefully, these articles addressed your concerns about knee problems in dogs (and cats). If you suspect a problem with your pet's knees, please seek veterinary attention right away.