



# Small Animal Orthopedic Surgery

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## Cranial Cruciate Ligament Disease and the Tibial Plateau Leveling Osteotomy (TPLO)

### **The basics**

Tears of the cranial cruciate ligament (CCL) are the most common injury affecting the knees of dogs. The CCL is a major ligament inside the canine knee, which runs from the femur proximally to the tibia distally. It is analogous to the anterior cruciate ligament (ACL) in people. Normally, the CCL stabilizes the knee when the dog places weight on the leg. When the ligament is either completely or partially torn, the knee becomes destabilized. Inflammation and osteoarthritis follow and the knee becomes a chronic source of pain and disability for the dog.

Much research has been conducted on CCL injuries in dogs because of how common the condition is. As in people, many CCLs are injured as a result of excessive force placed on the ligament during activity or trauma. However, a larger percentage of cases in dogs will rupture spontaneously, without a traumatic occurrence. How and why this happens is still incompletely understood.

### **Treatment options**

There are many ways to treat a CCL injury in the dog. Most treatments start with getting a diagnosis which starts with doing a complete orthopedic examination. This is followed by palpation of the knee while the dog is both awake and sedated. Next, radiographs, or X-rays, are taken of the knee to look for signs consistent with a torn CCL. Once diagnosed, a variety of treatment options are available. Medical, or nonsurgical management can be pursued. However, research has shown that dogs will never recover fully with this course of action and will always possess a lameness. Alternatively, surgical stabilization can be pursued. There are many surgical techniques described in the literature to treat CCL injuries in dogs. However, one technique has undergone more research than any other, and consistently has proven to be the safest, most reliable and effective treatment when compared to all others. That technique is called the Tibial Plateau Leveling Osteotomy, abbreviated as the TPLO.

### **Technique**

The objective of the TPLO is to alter the biomechanics of the knee to reorient the forces that used to run through the CCL and place them on another ligament in the knee, the caudal cruciate ligament instead. This is accomplished by making a curvilinear cut in the proximal tibia called an osteotomy. Once the cut has been made, the proximal tibia, also known as the tibial plateau, is rotated in such fashion to level it. This is how the technique got its name: tibial plateau leveling osteotomy. To stabilize the tibia while it heals, we place a plate and screws on the bone. This is a plate that is specially designed just for this purpose. Until the bone heals, the bone plate and screws are the main elements stabilizing the tibia, so resting the dog after surgery is critically important.

## **Outcome**

Studies have shown that if no serious complications arise during or after surgery, dogs undergoing the TPLO technique can return to full normal function by a year postoperatively. They will begin using the leg more comfortably than they could preoperatively by as soon as a couple months. Dogs undergoing the TPLO technique are expected to be able to run, jump and play again after healing has been confirmed. They will always possess arthritis in the knee, however. This is an unavoidable consequence of tearing a major ligament in the knee. But their quality of life is far superior following TPLO than if no surgery, or other techniques, are pursued.

## **What to expect at your visit:**

Bringing your dog in for a surgical consultation is never a fun process. No one likes to think about their pet undergoing an invasive procedure. We want to make this process as easy and non-stressful for you and your dog as possible. When you come in to see the orthopedics team at the University of Missouri's Veterinary Health Center, several things will happen, and the more prepared you are ahead of time, the easier the process will be.

- 1) Consider bathing your dog both the week and the night before your appointment. This reduces the bacterial burden on your dog's fur and skin and reduces the risk of getting an infection postoperatively.
- 2) Do not feed your dog after 10 p.m. the night before your appointment. Having access to water is fine. We will need to sedate your dog for their examination and want to reduce the risk of complications associated with nausea during the sedation. If you do forget to fast your dog, please let us know. We may not be able to move forward with sedation.
- 3) If your dog is on anti-inflammatories or pain relievers, please discontinue these seven days prior to your scheduled appointment. You may continue any other medications, but please make us aware of what those are and bring any and all medications your dog is taking with you to your appointment.
- 4) During your appointment, we will be doing a full orthopedic examination, and then will need to sedate your dog to palpate the knee and get X-rays. This process will take between one-and-a-half and two hours. During this time, you are welcome to leave the hospital to get something to eat or drink, or wait in our lobby. We will call you when the diagnostics are complete so that we can review them with you.
- 5) Remember that we are a teaching hospital, so the first individual you will interact with is a veterinary student. Learning client communication is a critical part of their education and we appreciate your patience in letting them ask you questions and conduct a cursory examination of your dog. If, at any time, you are uncomfortable with this process, just let them or us know. The students' roles are observational and to provide assistance during the procedure. They will not be doing the surgery.
- 6) The clinician helping you will either be a surgical resident (a veterinarian with years of internship experience who is now specializing in small animal surgery) or a board-certified veterinary surgeon (a veterinarian who has completed a surgical residency and has passed a board examination by the American College of Veterinary Surgeons with years of specialized training in orthopedic surgery).



Recognize that if you do have a resident helping you, that they are conferring and completing the surgery under the direct supervision of the attending surgical faculty. If you would like to speak with the attending surgeon at any time during your pet's stay, just let us know.

- 7) In most cases, the TPLO will be completed the day after your appointment. Most clients elect to have us hospitalize their dog the night of the appointment and in preparation for surgery the following day, however you are welcome to stay in a local pet-friendly hotel the night before. If you choose this option, you will need to drop your dog off at 7:30 a.m. the day of surgery.
- 8) The procedure usually takes about one-and-a-half hours to complete. The anesthetic period lasts longer; however, as we need to take post-operative X-rays, apply a bandage and get them settled into the Intensive Care Unit following completion of the surgery. Our team will call you as soon as the procedure is completed and your dog is awake from the anesthesia.
- 9) All dogs recover from surgery in the Intensive Care Unit, where they receive pain medications, fluids and are observed constantly by a team of veterinarians and technicians.
- 10) Most dogs are able to go home the day after the surgery. They will be more painful on the operated leg so expect them not to use it as well for a period following surgery. You can also expect the leg to be completely shaved to minimize risk of infection. You will notice some bruising and swelling of the limb, which is completely normal.
- 11) At the time your dog is discharged, specific instructions will be reviewed with you regarding the postoperative care of your dog. These will include the necessity to cage restrict your dog with absolutely no running, jumping, playing or stairs for the first eight weeks following surgery. All outdoor activities are restricted to short leash walks for elimination purposes only. You will use a sling to assist your dog walking over slick surfaces for two weeks and any sutures placed in the skin will be removed by your veterinarian or us two weeks following the procedure. We will need to see you back in eight weeks to complete more X-rays to assess healing. This appointment will be charged separately.

### **Cost of the technique**

The complete charge of a TPLO for small to large dogs is between \$4,000 and \$4,500. This includes everything at your first visit, but does not include the recheck examination at eight weeks. For giant breeds, such as great Danes or mastiffs, the estimate is \$4,500 to \$5,000 to accommodate a larger bone plate and additional screws. Different situations may arise which can alter this estimate. This will be reviewed with you at the time of your appointment.

### **Risk of complications**

As with any elective orthopedic procedure, there is a risk of complications. We use implants and techniques that have been scientifically shown to mitigate this risk to be as low as possible, but it still a possibility. The risk of all complications is less than 10 percent with the risk of major, serious complications being less than 5 percent. Possible complications include, but aren't limited to, infection, implant failure and hemorrhage.



