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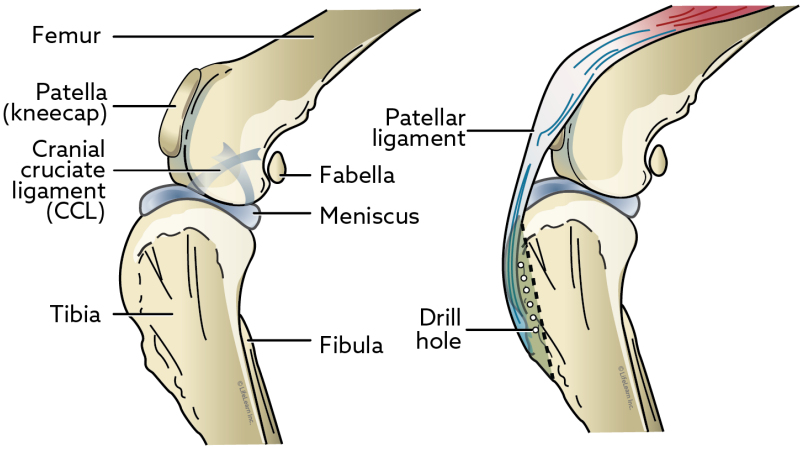
Cranial Cruciate Ligament Repair: Tibial Tuberosity Advancement (TTA)

One of the most common injuries to the knee in dogs is tearing of the cranial cruciate ligament (CCL). This ligament is like the anterior cruciate ligament (ACL) in humans.

There are actually two cruciate ligaments inside the knee: the cranial cruciate ligament and caudal cruciate ligament. They are called cruciate because they cross over each other inside the middle of the knee. For more information on these ligaments and how they can become damaged, see the handout "Cruciate Ligament Rupture in Dogs."



The configuration of the femur and tibia prior to TTA surgery.

In the TTA surgery, a cut is made through the front of the tibia in order to move that segment forward.

When the CCL is torn or injured, the shin bone (tibia) slides forward with respect to the thigh bone (femur). This movement is known as a positive drawer sign. Most dogs with this injury cannot walk normally and they experience pain. The resulting instability damages the cartilage and surrounding bones and leads to osteoarthritis (OA).

What options are there for repairing my dog's torn CCL?

When the cranial cruciate ligament is torn, surgical stabilization of the knee joint is often required, especially in larger or more active dogs. Surgery is generally recommended as quickly as possible to reduce permanent, irreversible joint damage, and to relieve pain.

Several surgical techniques are currently used to correct CCL rupture. Each procedure has unique advantages and potential drawbacks. Your dog's surgeon will evaluate the joint geometry to determine which CCL repair procedure is ideal and will guide you through the decision-making process and advise you on the best surgical option for your pet.

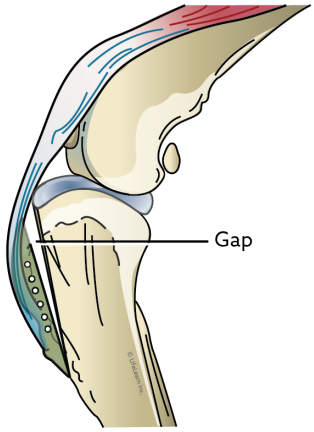
This handout describes tibial tuberosity advancement (TTA) surgery. For information about other types of surgery used to correct CCL injuries in dogs, see the handouts “Cranial Cruciate Ligament Repair: Tibial Plateau Leveling Osteotomy” and "Cranial Cruciate Ligament Repair: Extracapsular Repair".

My veterinarian has suggested surgically fixing my dog's CCL using a tibial tuberosity advancement (TTA). What does this surgery involve?

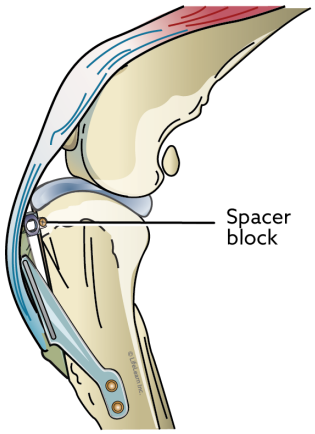
The TTA procedure is more commonly performed in dogs with a steep tibial plateau (the angle of the top part of the tibia).

The front part of the tibia is cut and separated from the rest of the tibia. A special orthopedic spacer is screwed into the space between the two sections of bone to slide the front part of the lower knee forward and up.

This moves the patellar ligament (the thick fibrous band that runs on the front of the knee from the top to the bottom of the joint) into better alignment, thereby removing some of the abnormal sliding movement. A bone plate is then attached to hold the front section of the tibia in the proper position.



The front part of the tibia is advanced to make room for the spacer.



The complete TTA procedure showing the spacer in place and the special bone plate securing the tibial tuberosity so it can heal.

By changing the alignment of the patellar ligament, the forces that cause the femur to slip backward when the CCL is torn instead move straight down the tibia, resulting in less shearing force or instability.

How long will it take for my dog to recover from TTA surgery?

Healing from TTA surgery is generally rapid.

- About half of all canine patients begin walking on their injured leg within 24 hours of surgery.
- Two weeks after the operation, most dogs bear moderate to complete weight on the affected leg.
- By ten weeks, most dogs do not have a noticeable limp or gait abnormality.
- Four months after the operation, most dogs can begin walking and playing normally, with only the most stressful activities restricted.
- Within six months, most dogs can resume full physical activity.

Pain management during and after knee surgery is critical, so be sure to give all medications as prescribed and use them until they are gone. Post-operative physical rehabilitation will speed up healing. Ask your veterinarian about incorporating rehabilitation into your dog's recovery plan.

The most common complication after TTA is infection. Studies assessing outcome show various rates of complications, with an average of roughly 26% experiencing postoperative problems. Studies conclude that infection occurs in less than 10% of all patients, with many surgeons reporting much lower complication rates. Your dog will need several recheck examinations and X-rays (radiographs) to ensure the area is healing properly.

What is an MMP?

MMP stands for Modified Maquet Procedure, one of several variations of the TTA procedure. Instead of placing an orthopedic spacer in the front part of the tibia, a porous titanium implant is used that provides support to the cut bone when the dog bears weight.

Is TTA better than other types of CCL surgeries?

TTA offers some benefits over older procedures such as extracapsular repairs (ECLS), especially for larger or athletic dogs. Dogs undergoing TTA tend to heal faster, resume normal activities quicker, and have a better range of motion in the knee.

Currently, most veterinary surgeons consider TPLO or TTA to be the preferred treatments for larger, more active dogs. Your veterinarian will guide you through the decision-making process to determine which procedure will provide your dog with the best chance of full recovery.