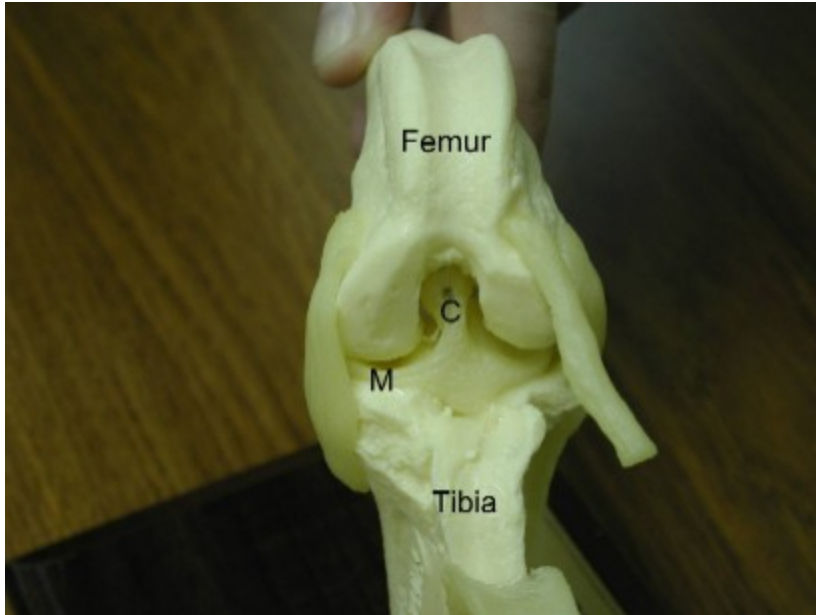




Tibial Plateau Levelling Osteotomy (TPLO)

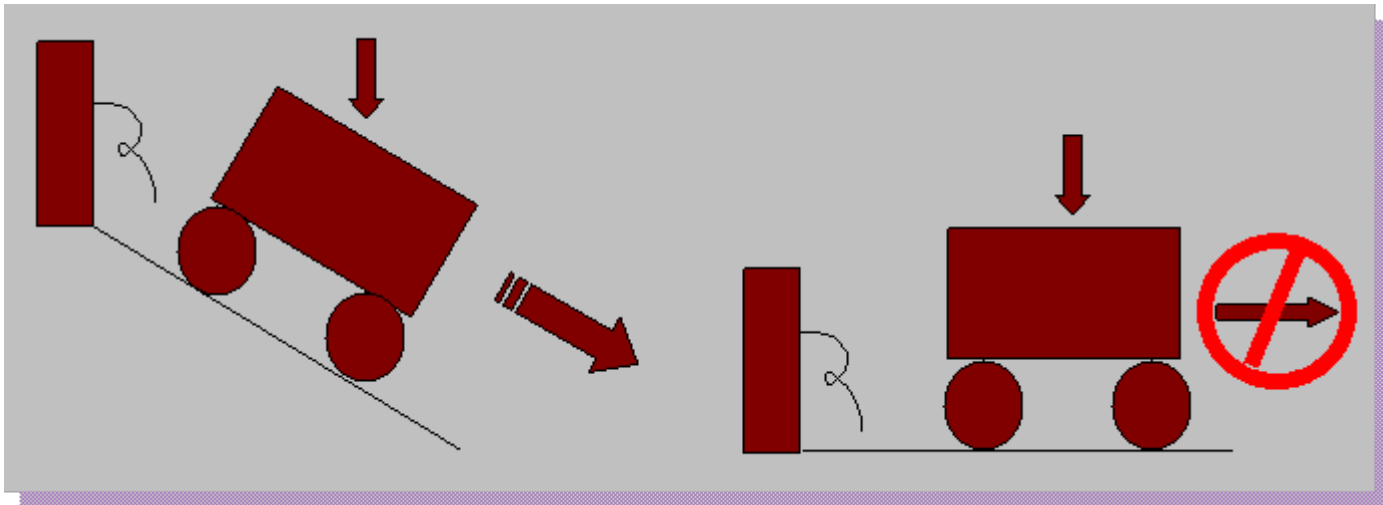
Introduction

- The stifle joint (in layman's terms called the knee) of the dog is similar to a human's knee. The cranial cruciate ligament is located inside the joint and is responsible for maintaining a stable joint. One of the important functions of the ligament is to prevent forward and backward sliding of the femur on the tibia bone (drawer motion).
- Cranial cruciate ligament rupture is the most common orthopedic condition that we treat.
- This problem afflicts all ages and breeds of dogs.
- Frequently cruciate ligament rupture is a gradual process and not simply due to a single traumatic injury. Most dogs have a predisposing factor such as age-related ligament degeneration, pre-existing inflammation, anatomical abnormalities, and excessive slope of the top of the tibia bone, which cause the ligament to rupture.
- Clinical signs of early cruciate disease includes stiffness or very mild lameness. As the disease advances and the ligament progressively tears, the lameness becomes more pronounced. Complete tears initially result in nonweight-bearing on the limb, but as time goes on the dog will start to use the limb. It is unusual that the lameness will resolve in a large breed dog with no surgery.
- Rupture of the cruciate ligament in both knees is common. In fact, one out of three dogs will also develop a cruciate rupture of the opposite stifle.
- Below is a photo of a front view of the stifle joint in a dog illustrating the cranial cruciate ligament (labeled C) and the front horn of the medial meniscus (labeled M), which is a cartilage pad located within the stifle joint that is commonly damaged with cruciate ligament tears.

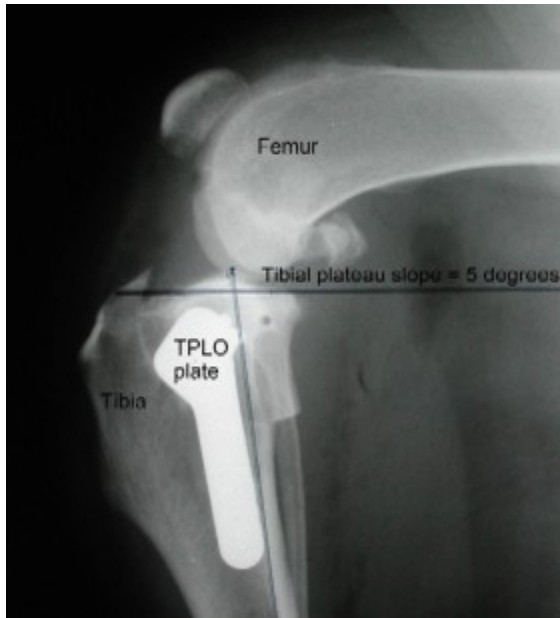
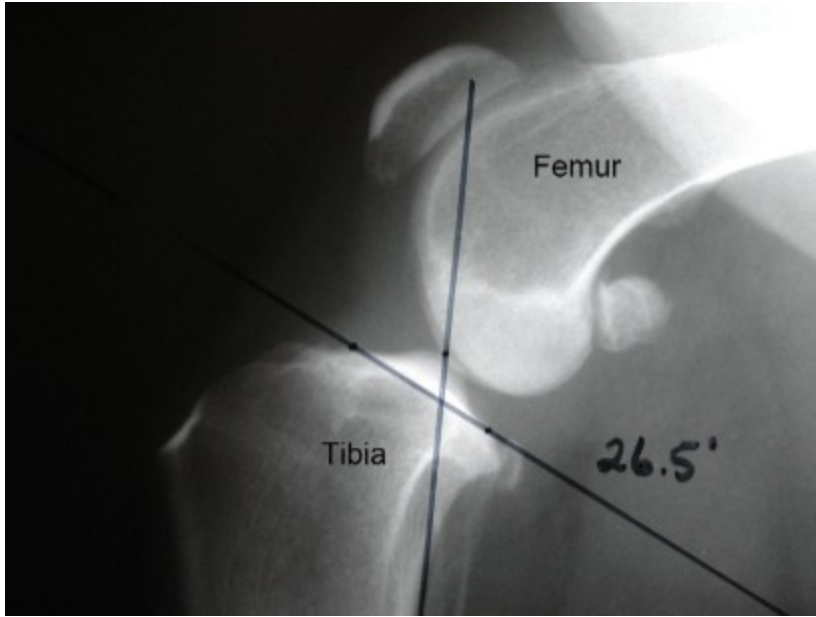


Wagon Model Used to Explain Instability of the Knee Joint

- The tibial plateau of a dog's stifle is sloped.
- Understanding the importance of the tibial slope when the cranial cruciate ligament is torn is somewhat difficult. We therefore present a model of a wagon on a hill, which is tied to a fence post.
- The slope of the hill represents the tibial plateau, the wagon represents the femur bone, and the cable represents the cranial cruciate ligament.
- If the cable is torn, the wagon will roll down the hill (see fig below). Likewise, when cranial cruciate ligament is torn the femur bone will slide down the slope of the tibial plateau.
- When surface that the wagon is placed on is level and weight is put in the wagon, it does not to roll backward (see fig below).
- In the dog, the tibial plateau leveling osteotomy levels the slope of the tibial plateau so that the femur no longer slides down the plateau. Thus a dynamically stable joint is created even when no cruciate ligament is present.



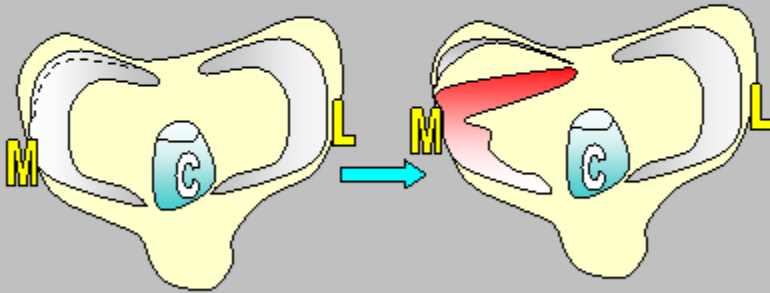
- Below are radiographs showing the side view of a stifle before and after surgery. Take note that the slope of the tibia prior to surgery is 26.5° and the final slope is 5° . Prior to surgery, the femur bone slides down the slope with weight-bearing, but cannot slide backward after the slope has been leveled with surgery.



Tibial Thrust

- When the cruciate ligament is ruptured, the slope of the tibial plateau, along with the forces exerted by the calf and quadriceps muscles cause the femur bone to slide down the top of the tibia bone called the tibial plateau. This in essence causes the tibial plateau to thrust forward with each weight-bearing stride and is called cranial tibial thrust.
- This thrusting results in excessive wear of the cartilage of the joint. In addition, as the tibia thrusts forward it stretches the tissues which surround the joint, which causes pain.

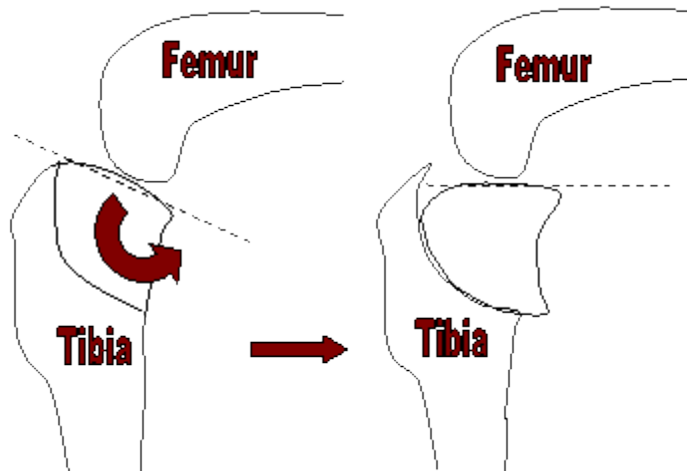
Tear of the Medial Meniscus



- Excessive cranial tibial thrust also can tear one of the cartilage pads in the knee called the medial meniscus. This usually results in a meniscal bucket handle tear or crush injury.
- The tibial plateau leveling osteotomy or TPLO can eliminate cranial tibial thrust, thus creating a dynamically stable stifle and sound gait.

TPLO Surgery

- The first part of the surgery involves removing the torn ends of the cruciate ligament and examining the medial and lateral meniscus cartilages. If a tear of either meniscus is found, the damaged part of the meniscus is removed.
- Below is an illustration of the top view of the tibia after the femur bone has been removed; it shows the medial meniscus (M), the cruciate ligament (C) after it has been cut and the lateral meniscus (L); the dashed line shows the typical location of a tear of the medial meniscus; the drawing below on the right shows the torn part of the meniscus that has been pushed forward.
- The tibial plateau leveling osteotomy - TPLO involves making a curved cut in the top of the tibia bone (osteotomy) to include the tibial plateau. The tibial plateau (the dashed line denotes the top of the tibial plateau) is then rotated along the curved osteotomy in order to level the slope. A plate and screws are used to hold the tibial plateau in place so that the bone can heal well. Below is an illustration demonstrating the curved cut in the tibia bone and rotation of the tibial plateau; below right is a photo of a plastic bone model demonstrating the TPLO; take note of the metal plate and screws that hold the bone together while healing takes place.



- Healing Phases Following TPLO surgery:
 - Unlike the convalescence from other extra-articular or intra-articular techniques, recovery from TPLO surgery frequently is more rapid and complete. In our experience, about 50% of the dogs will start to walk on the limb within 24 hours after surgery. Within 5 days after surgery most dogs will begin weight-bearing on the operated limb.
 - By 2 weeks after surgery, a moderate amount of weight-bearing can be expected. Dogs with partial tears tend to recover quicker than dogs having complete ligament tears.
 - Radiographs taken at 6 to 8 weeks post-op should reveal healing of the osteotomy site. At this time most dogs have mild or no lameness; when we evaluated our patients having TPLO, the average time for the lameness to resolve was 10 weeks.
 - At 2 months after surgery, exercise in the form of leash walks should be gradually increased each week. Increasing the number of walks per day tends to be better than just increasing the duration of each period.
 - Complete recovery may take 3 to 5 months.
 - At 4 months after surgery most restrictions of exercise can be lifted. Full working activities (hunting, agility, etc) can begin at 6 months after

surgery. Unconstrained activity prior to this time can cause spraining of the soft tissues of the stifle (patellar ligament sprain) resulting in a prolonged recovery.

- Yearly radiographs of the stifle should be taken to evaluate the degree of arthritis. The TPLO procedure should minimize the progression of degenerative joint disease. One study demonstrated a four fold reduction in the progression of arthritis following TPLO surgery, versus dogs that received the other repair techniques

Success

- A successful outcome will return your dog to full function on the limb. About 90% of the dogs having the TPLO regain normal or near normal function of the limb (full weight-bearing). The remaining 10% of dogs that do not do as well have concurrent arthritis of other joints on the limb or advanced degenerative joint disease; most of these dogs in this group are also helped with the surgery.
- Many working dogs return back to full function.
- Only a small percentage of patients do not respond well to this type of surgery.
- Dogs that have been previously operated using another technique frequently are improved with the TPLO surgery, but the outcome may not be as good, versus a virgin knee that has received the TPLO surgery.

Potential complications

- As with any surgery, complications may arise. Even though rare, anesthetic death can occur. With the use of modern anesthetic protocols and extensive monitoring devices (blood pressure, EKG, pulse oxymetry, inspiratory and expiratory carbon dioxide levels, and respiration rate), the risk of problems with anesthesia is minimized.
- Infection is an unusual complication as strict sterile technique is used during the surgery and antibiotics are administered during the procedure.
- Poor healing of the bone can occur if the pet is too active, especially during the first 2 months after surgery. Breakage of plates or screws or backing of screws out of the bone can occur if activity is not limited during the first 2 months. Even after the bone has healed, the soft tissues need to also heal.
- If activity is unleashed prematurely, straining of the patellar ligament can occur. Rest and anti-inflammatory medication is used to resolve this problem.
- Fracture of the narrow front part of the tibial crest can occur. This is not common, and usually will heal without any surgical intervention. Recovery will be delayed, but the final result still should be very good.
- Arthritis usually is present at the time of surgery. Unfortunately we cannot reverse the arthritic and degenerative state of the joint, but the surgery can help to minimize the progression of this. Clinical signs of arthritis include stiffness

associated with heavy exercise and cool damp weather. Anti-inflammatory medications are useful to ameliorate a flare-up of arthritis.

- Tearing of the meniscus (cartilage pad in the knee) may occur following TPLO surgery and additional surgery would be needed. This complication occurs less frequently following the TPLO versus when other surgical techniques used to stabilize the stifle joint.

Who should have a TPLO?

Anybody with a dog over 80lbs should consider a TPLO, especially if they are a working dog or active in any dog sports. Many dogs will do very well with other (less expensive, less invasive) techniques.

Smaller dogs that are very active may be good candidates for a TPLO especially if they have poor angulation (conformation) in their hindquarters.

In order to help decide what surgery is best for your dog you should consult with a veterinarian who is familiar with the TPLO and other cruciate repair techniques.

Physical Rehabilitation After Cruciate Repair

Whatever surgical repair that you chose for your dog post operative rehabilitation is very important to promote weight bearing and regain strength and proper gait.

Phases of Rehabilitation Post TPLO

- In the first week after surgery it is important to encourage early (The next day) weight bearing. This is done through frequent icing, massage and range of motion exercises in the first week.
- After about a week more weight bearing can be introduced as well as neuromuscular electrical stimulation to start to build back the thigh muscles
- After 2 weeks when the incision is healed and sutures (or staples) removed, hydrotherapy consisting of slow walking on an underwater treadmill can be initiated. **Actual swimming should not start until after 6- 8 weeks when evidence of bone healing has occurred!** Walking underwater on a treadmill is less stressful on the repair then walking outside to the bathroom! This is due to the buoyancy of water resulting in decreased weight bearing on the leg.
- Over the next 2 months progressive exercise and hydrotherapy should be used to regain strength and balance.
- With rehabilitation working dogs and high level canine athletes can often return to full work/competition in as little as 3 months

**26841 Fraser Highway
Aldergrove, BC, Canada
604 856 7707**