

## Clinical Signs (Symptoms)

Once the cranial cruciate ligament ruptures, the tibia can slide forward and the femur is free to ride down the slope of the tibial plateau, just as the car rolls down the hill once the cable is cut (Fig. 3A). The meniscus is often damaged as the femur rides over the top of it. When the ligament tears, pain, swelling, and lameness will occur. A torn meniscus may cause an audible clicking sound. If not stabilized, the joint will become dramatically arthritic over time. Rest and anti-inflammatory medications have limited effect on the pain and lameness the dog experiences.

## Diagnosis

Diagnosis is made upon eliciting forward motion of the tibia. This is easy in acute, complete ruptures but may be subtler in chronic or partial tears. To obtain proper diagnosis, a mild sedation may be given to allow muscle relaxation. Radiographs (x-rays) are then taken to document joint swelling and arthritic changes.

## TPLO Surgery

The tibial plateau leveling osteotomy is used to neutralize the effect of cranial tibial thrust (Fig. 5). The procedure levels the tibial plateau, thereby eliminating the need for the cranial cruciate ligament as a restraint against cranial tibial thrust (Fig. 3B). In other words, rather than replacing the cable, which broke in the first place, this procedure will level the surface and eliminate the need for the cable. Meniscal injuries are also corrected during the surgery in order to reduce pain and further arthritic changes in the joint. Removal of a torn meniscus can provide significant relief, comparable to removing a pebble from your shoe.

## Postoperative Care

One night of hospitalization is required following surgery and sutures or staples are removed 10-14 days after surgery. The padded bandage placed following surgery should be removed 2-3 days after taking your dog home. Healing takes about two months for the bone and slightly longer for the soft tissues. Strict confinement (to a kennel or small room) is mandatory during the healing process. Controlled leash walks to go outside are required during the healing period. Because the plateau leveling allows the joint pain to rapidly subside, the major problem during recovery is excessive patient activity prior to the completion of bone healing. Excessive activity could cause breakage or damage to the implants. Most patients return to off-leash activity in two months and full activity in three to four months. Patients can usually return to athletic competition (field trial, hunting, agility trials) by six months postoperatively.

## Surgical Cost and Follow-up

The cost of a TPLO procedure is greater than traditional techniques. The TPLO requires specialized equipment and orthopedic implants, as well as advanced training and additional personnel in surgery. An estimate tailored to your dog can best be provided after a thorough exam and consultation with the surgeon. There is no charge for the staple removal visit. A recheck examination and follow-up x-rays under light sedation are required about 8 weeks following surgery to assess healing. A cost estimate can be provided for this visit.

**References:** *Cranial Cruciate Ligament*, by B Slocum, TD Slocum, slocumenterprises.com

*The Stifle Joint*, by Brinker, Piermattei, and Flo, Small Animal Orthopedics and Fracture Repair 4<sup>th</sup>

# TPLO

## Tibial Plateau Leveling Osteotomy



*Our single focus is your companion's health care*



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## TIBIAL PLATEAU LEVELING OSTEOTOMY

The most common cause of rear limb lameness in dogs is a rupture of the cranial (anterior) cruciate ligament. This is often called a “torn ACL” or “CCL”. The ligament may rupture due to degeneration of the ligament, excessive stress or a severe athletic injury, or a combination of factors. (Fig.4) Research is ongoing as to the cause of CCL injuries, since so many injuries are spontaneous and certain breeds are predisposed. This injury leads to degenerative changes (osteoarthritis) in the stifle (knee joint) including cartilage damage, osteophyte (bone spur) production, and meniscal injury. Tibial plateau leveling osteotomy (TPLO) has proven effective in returning these knees to function.

### Biomechanics

The knee joints in both dogs and humans are similar in construction, but the forces applied to the surfaces of these joints during weight bearing are quite different. In humans, the hip, knee, and ankle joints are parallel to each other and perpendicular to the weight-bearing surface (the feet). Humans can stand easily with little stress on any ligamentous structure. Dogs, however, stand on their toes with their ankles up in the air and their knees bent forward placing additional stress on the cranial ligament (Fig.1). The upper portion of the canine tibia (the tibial plateau) is sloped toward the back of the joint. Standing itself can create a force that pushes the femur down the sloping tibial plateau, thereby moving the tibia forward. This force is called cranial tibial thrust. It is opposed only by the cranial cruciate ligament (Fig.2). The cranial cruciate ligament acts like the cable in Figure 3A to restrict the downhill roll of the femur on the tibial plateau. When the ligament ruptures, stability is lost, and tibial thrust is unrestricted.

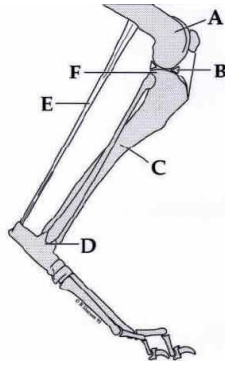


Fig. 1

A Femur  
B Meniscus  
C Tibia  
D Tarsus  
E Achilles tendon  
F Tibial Plateau

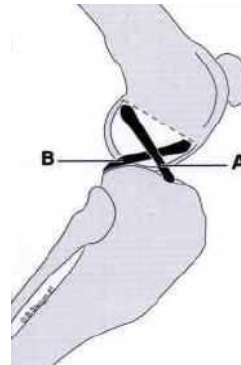


Fig. 2

A Cranial Cruciate Ligament  
B Caudal Cruciate Ligament

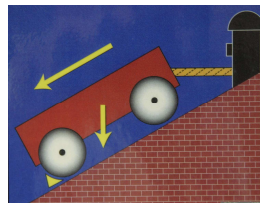


Fig. 3A

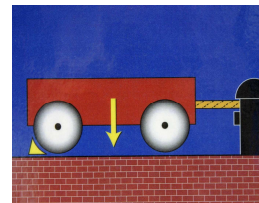


Fig. 3B

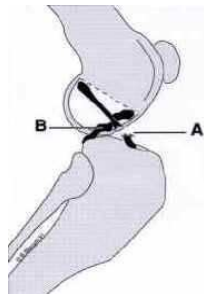


Fig. 4

A Ruptured Cranial Cruciate Ligament  
B Caudal Cruciate Ligament

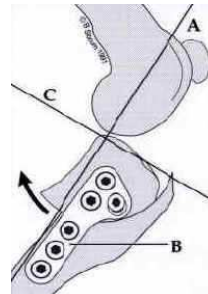


Fig. 5

A Tibial Axis  
B TPLO Plate  
C Tibial Plateau

## Types of Injury

Cranial cruciate ligament ruptures can occur in several different ways. Some injuries occur as a single incident, resulting in a sudden complete rupture of the ligament with severe pain and non-weight bearing lameness. The second type of cranial cruciate ligament rupture can occur in small increments or a little bit at a time. These are known as partial ruptures of the cranial cruciate ligament. These partial ruptures cause a smaller amount of pain and a mild or moderate lameness. When partial ruptures proceed to complete ruptures, the transition is often gradual. Dogs with a cruciate ligament rupture have a 30-40% chance of rupturing the opposite ligament within two years.

Two other important structures in the knee are the medial and lateral menisci (cartilage pads). The medial meniscus is particularly prone to injury when the stifle joint is unstable from a cruciate ligament tear. Depending on the type of injury, either partial or complete removal of the medial meniscus may be necessary. In the case of a partial ligament injury, the meniscus may be undamaged. A procedure called a meniscal release may be performed in order to prevent future damage to the meniscus.

The TPLO procedure is used mostly for large, active dogs due to the stability it provides under extreme repetitive stress. Traditional surgical techniques require prolonged healing while scar tissue augments the stability of the synthetic ligament replacement. These surgical repairs may fail due to the difficulty in confining large, active dogs for prolonged recovery periods. Activity may lead to stretching of the artificial cruciate ligaments and a loss of joint stability.