

Okanagan Veterinary Hospital

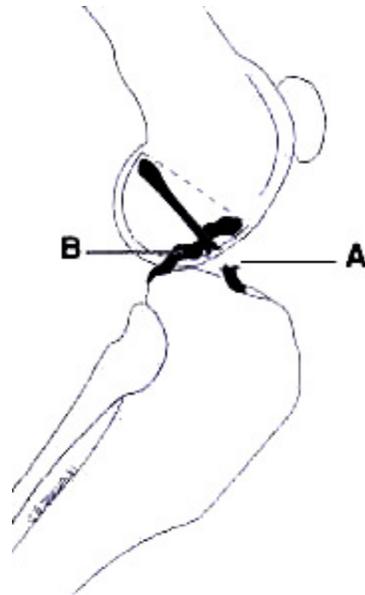
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CRUCIATE LIGAMENT RUPTURE

What and where are the cruciate ligaments?

There are two bands of fibrous tissue called the *cruciate ligaments* in each knee. They stabilize the femur and tibia (the bones above and below the knee) together so that the knee works as a hinged joint.

They are called cruciate ligaments because they “cross over” inside the knee joint. The ligament that runs from the back of the femur to the front of the tibia (**A**) is the anterior cruciate ligament or ACL, the other (**B**) the posterior cruciate ligament.



How does the injury occur?

- Traumatic cruciate damage can be caused by a twisting injury to the joint. This is most often seen in dogs (and humans) when running and suddenly changing direction so that all forces rest on this single joint. This injury tears the ACL. The joint is then unstable and causes extreme pain, resulting in lameness.
- Dogs commonly suffer from a more chronic form of cruciate damage that occurs due to weakening of the ligaments as a result of disease. The ligament becomes weakened and partially torn and lameness initially may be only slight and intermittent. With continued use of the joint, the condition gradually gets worse until full rupture occurs.

How is it diagnosed?

- The usual history is that the dog was running and suddenly stopped or cried out and was then unable to bear weight on the affected leg, although many dogs already exhibited periodic mild lameness before.
- Many pets will “toe touch” and place only a small amount of weight on the injured leg.
- During the examination, the veterinarian will test for laxity in the knee joint. Some dogs will require mild sedation or pain medications to perform this test. Other diagnostic tests such as radiographs (x-rays) or arthroscopy may also be necessary.

Is other joint damage common?

Inside the knee joint are pieces of cartilage called *menisci*. These cartilages can also sustain damage when the ACL ruptures. They are usually repaired at the same time as the ligament surgery. The risk of ACL rupture in the other knee over time can be as high as 50%.

Is an operation always necessary?

Dogs under 10 kgs (22 lbs.) may heal without surgery. These patients are often restricted to cage rest for two to six weeks. Dogs over 10 kg. (22 lbs.) require surgery to heal. Unfortunately, most dogs will eventually require surgery to correct this painful injury.

What does surgery involve?

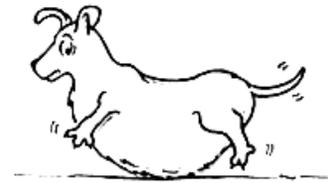
There are several techniques available to stabilize the knee after ACL rupture. The traditional methods usually involve the placement of artificial ligaments along the outside of the knee joint. A new approach is the tibial plateau leveling osteotomy (TPLO). This technique alters the biomechanics in the joint and is especially suited for active and/or large breed dogs. Many universities and referral clinics now prefer the TPLO technique. Your veterinarian can discuss with you the best treatment option for your dog.

Is post-operative care difficult?

It is important that your dog have limited activity for six to eight weeks after surgery. Provided you follow your veterinarian's instructions, reasonable to good function should return to the limb within three months. Depending on the technique used to stabilize the joint, arthritis may develop resulting in stiffness later on. Weight control, special diets and/or nutritional supplements such as glucosamine / chondroitin may help reduce the risk of arthritis in your pet.

Is obesity such a problem?

Obesity is a risk factor for both cruciate ligament rupture and knee arthritis. If your dog is overweight, the recovery time will be much longer and the animal may not do as well as its lean counterparts. Weight loss is as important as surgery in ensuring rapid return to normal function and leads to better overall health.



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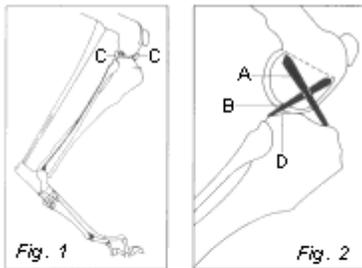
TIBIAL PLATEAU LEVELING OSTEOTOMY

FOR TREATMENT OF A RUPTURED CRANIAL CRUCIATE LIGAMENT

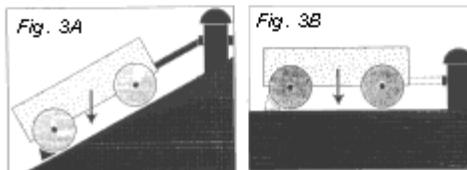
The most common cause of rear limb lameness in the dog is rupture of the cranial (anterior) cruciate ligament. This derangement results in degenerative changes (osteoarthritis) in the stifle (knee) joint, including cartilage damage, osteophyte (bone spur) production, and meniscal injury. The Tibial Plateau Leveling Osteotomy (TPLO) has proven effective in returning these deranged stifles to full function.

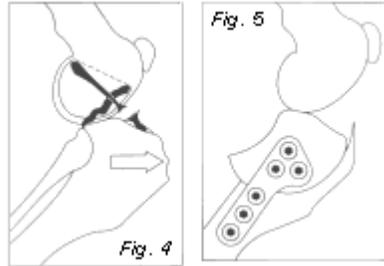
● BIOMECHANICS

Although the knee joints of dogs and humans are similarly constricted, the forces applied to the surfaces of these joints during weightbearing are vastly different. This is due to the differences in anatomic configuration. Just as a car resting on a flat surface has no tendency to roll, in humans, the hip, knee, and ankle joints are parallel to each other and perpendicular to the weightbearing surface (foot). We 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 (Fig.1). The upper portion of the canine tibia (the tibial plateau) is sloped. Weightbearing creates a force that pushes the femur down the sloping tibial plateau, thereby moving the tibia forward. This force is the cranial tibial thrust. It is opposed only by the anterior cruciate ligament (Fig.2). Just as a car resting on a hill would tend to roll down the hill, the ligament acts as a cable attached to the car to resist that downhill roll (Fig.3A). With every step a dog takes, stress is applied to the ligament. Over time, dogs with a high tibial plateau slope (like a steep driveway) place enormous stress on the ligament. Therefore, when the cranial tibial thrust is too great, the anterior cruciate ligament ruptures (Fig.4).



A=CRANIAL CRUCIATE LIGAMENT
B=CAUDAL CRUCIATE LIGAMENT
C=MENISCUS
D=TIBIAL PLATEAU





Ruptures come in several varieties. There are singular incidents which cause a sudden complete rupture with severe pain and a nonweightbearing lameness. Other ruptures occur in small increments or a little bit at a time. These are known as partial ruptures of the anterior cruciate ligament. They cause a small amount of pain and a mild lameness with poor performance. When partial ruptures proceed to complete ruptures, the transition is often gradual.

Two other important structures in the knee are the medial and lateral menisci (cartilage pads) (Fig.1). They are also prone to injury when the stifle is unstable from a cruciate ligament tear.

The TPLO procedure is most applicable to large, active individuals due to the inherent stability it provides under extreme repetitive stress. Traditional surgery in these individuals requires prolonged confinement to allow healing of the synthetic or natural anterior cruciate ligament replacement. These materials may fail because confining these active individuals for prolonged recovery periods can be all but impossible. Any activity may lead to stretching the artificial and collateral ligaments, incomplete flexion of the stifle, poor athletic performance and an incomplete return to thigh diameter.

■ CLINICAL SIGNS

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.3#A). The meniscus is often damaged as the femur rides over the top of it. When the ligament tears, pain, swelling in the knee, and marked lameness will occur. If not stabilized, the joint will become dramatically arthritic over time. Rest and anti-inflammatory medications have little effect upon the pain and lameness the dog experiences.

■ DIAGNOSIS

The diagnosis is made upon eliciting forward motion of the tibia (cranial drawer sign). This is easy in acute, complete ruptures, but may be more subtle in chronic or partial tears. Mild sedation to allow muscle relaxation and radiographs (x-rays) to demonstrate arthritic changes and swelling may be necessary to obtain a diagnosis



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 prevent further arthritic

changes in the joint.

• **POSTOPERATIVE CARE**

Healing takes about two months for the bone and slightly longer for the soft tissues. Strict confinement is mandatory during the healing process. 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. Most patients return to controlled activity in 2 months, and full activity in 3 to 4 months. Patients can return to athletic competition (field trial, hunting, agility trials, Schutzhund) usually by 6 months postoperatively.

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Slocum[®] Post-operative Care for TPLO Surgery

For the first **EIGHT weeks** following surgery, a strict confinement regime is required with three important principles.

1. <animal> can be inside, on carpeted surfaces, **under your direct supervision**. <he> can wander around the room at a slow walk as long as it is not constant. Running, jumping, bounding, playing, etc., are **NOT allowed**.
2. <animal> must be **on a leash at all times when outside**. If <he> has to cross slick floors or uneven ground, you may need to use a "belly-band" in case <he> slips or stumbles. The "belly-band" is not used for support but rather as a safety net to protect <animal>. *<animal> is **NOT allowed to be off leash when outside or to go for an actual walk***. You can take <him> for 10 minutes walks ON A LEASH up to 4 times a day in order to maintain muscle mass.
3. When not under your direct supervision, <animal> is to be **confined in an area where <he> cannot injure <him>self**. A pen, kennel or room without furniture to climb on, are some examples.

General Information:

- a. Playing with other animals is **NOT allowed** during confinement. If there are other pets in your household, you will need to keep them separated.
- b. During confinement, <animal>'s food intake needs to be reduced to help prevent weight gain. Most dogs will maintain their current weight if their food intake is cut in half. Water consumption should remain normal.
- c. The first two weeks following surgery you will need to monitor <his> incisions. Licking or chewing can cause infection or sutures to loosen. If you notice that <he> has started licking, you will need to take steps to discourage <him> from doing so. You may need to pick up an Elizabethan collar. Dogs do NOT lick their wounds clean; their mouth contains bacteria we do not want to see in their incision.
- d. It takes a minimum of six to eight weeks for bones to heal.
- e. One of the most difficult aspects of confinement is that our patients will frequently feel better long before they are healed. At this point <animal> will start being more careless of the operated limb and is then more likely to be overactive and injure <him>self. Until the bone is healed, you must adhere strictly to the confinement guidelines and not allow <him> to do more.
- f. If <animal> is jumping or bouncing in its confined area, <he> is being too active. Tranquilizers may be required to help alleviate <his> anxiety or control <his> activity.
- g. If at any time during <animal>'s recovery and healing <he> does anything that causes <him> to cry out or give a sharp yelp, contact your veterinarian.
- h. Following surgery <animal> should always *maintain at <his> current level of function, or improve*. If at any time during <his> recovery and healing <he> has a set back or decreases in function, contact us immediately.
- i. It is imperative that you inform us at once if <animal> does something that is potentially harmful to the surgery. If something has occurred which jeopardizes the outcome of surgery, it is usually less difficult to correct if it is caught right away, which leads to a better outcome for <animal>.

- j. If <animal> is too active during <his> confinement <he> may injure <him>self or slow healing which increases the amount of time <he> must be confined.
- k. Follow up appointments are usually needed 5 days post-operatively to remove the pain patch and 2 weeks after the surgery to monitor incisions and healing. At eight weeks post-operatively radiographs are taken at which time <animal> is started on a regulated activity regime.

We do recommend feeding <animal> ROYAL CANIN Veterinary Diet canine Mobility Support. This diet is formulated for the adult dog and contains a unique ingredient, Green-Lipped Mussel Powder (Perna canaliculus), to help promote joint health. More information on this diet can be found at www.medi-cal.ca .

The First 10 Days:

- **ICE:** Apply cold packs to the affected area 3-4 times daily for 15-20 minutes to help minimize inflammation. This is especially beneficially for the first few days while swelling is at its greatest.
- **SUPPORT:** support <animal> while walking, especially over slippery surfaces (i.e. Laminate or hardwood floors). Use either a sling or towel under the belly to support him/her.
- **PROM:** (Passive Range of Motion). This activity is designed to increase joint health, prevent muscle contractions and stimulate circulation to the limb. Use extra caution during the early stages as there will be limited **Range Of Motion** post operatively.
- **MASSAGE:** massage the quadriceps and hamstring muscles for 2-3 minutes before and after PROM. Start close to the knee and work your way up towards the hip. Start with light pressure and slowly increase throughout the duration of the massage.
- **EXERCISE:** **Short, Slow, Controlled** leashed walks. 2-3 walks/day, 5-10 minutes each. It is important to keep <animal> slow as this encourages <him> to use <his> leg properly and distribute weight evenly on the affected limb. Correct gait helps decrease swelling, build muscle mass and decrease tension on other joints. If <animal> is allowed to move too quickly, <he> can either potentially damage the affected limb or not use <his> leg at all, which could lead to muscle atrophy.

Weeks 2-4:

- **EXERCISE:** after the first 10 days, *SLOWLY* increase the duration and frequency of the walks to 15-20 minutes, 3 times daily. **REMEMBER, GO SLOW.** Near the end of week 4, swimming sessions of 15-20 minutes can be incorporated into the exercise program. **Always** lead <animal> into the water in a controlled manner until <his> feet are off the ground. **DO NOT** let <animal> run in on <his> own.
- **MASSAGE & PROM:** continue with both, especially before walks. .
- **HEAT/ICE:** apply heat for 15 minutes before walking/swimming, and apply cold packs for 15 minutes after the walk/swim. This can be incorporated during massages.

Weeks 4-8:

- **EXERCISE:** as the surgical site is healing, it is time to incorporate some new exercises that are designed to help build muscle and support the affected area.
 1. **Controlled, leashed walks:** 20-40 minutes, 2-3 times per day.
 2. **Swimming:** 15-25 minutes per swim. Substitute a swim for a walk at any time.
 3. **Figure-8:** walk <animal> in a large figure 8 pattern, 4-5 times, then switch directions and repeat. As <animal>'s strength increases, slowly begin to tighten the figure 8

patterns (avoid any sharp turns as this may hinder healing) and switch directions more frequently.

4. **Sit-to-Stand:** ask <animal> to sit. 5-10 seconds after, ask <animal> to stand. Repeat gradually to 10 -12 repetitions, 2-3 times daily. Remember, this is for **strength**, not speed. This exercise is great to do prior to meals or walks.

- **MASSAGE & PROM:** continue the same as before.
- **HEAT/ICE:** continue the same as before.

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Slocum[®] TPLO Rehabilitation Regime

Once radiographs have confirmed bone healing, usually around eight weeks post-operatively, the **Rehabilitation regime** is initiated.

During this period <animal>'s activities are gradually increased to build muscle, stretch scar tissue from surgery, and strengthen bone healing. The degree of activity should progress with <animal> remaining comfortable. The goal of the rehabilitation regime is to increase the duration of activities, not the intensity; therefore, **explosive activities, such as running, jumping or playing, are not allowed during the rehabilitation period.**

Throughout the rehabilitation process <animal> is allowed to go as far as <he> is able while remaining comfortable. To judge <animal>'s comfort, watch <him> when <he> gets up following exercise and rest. If invigorated and excited about more activity, <animal> is comfortable. If <animal> gets up with stiffness and complaint, then the amount of activity should be reduced.

The remaining twelve weeks should be comprised of progressively longer **controlled** training periods. Weeks 8-14:

- **Walks** can slowly be increased in either duration or frequency. If <animal> is comfortable during the daily walks try doubling the distance of the walk. Monitor <animal>'s comfort and after three to four days, try doubling the distance again. If ever <animal> appears to be uncomfortable with the increased distance, cut the length of the walk back to the last distance at which <he> was comfortable; go for another few days at the lesser distance, then try doubling it again. Walks should still be on a short leash.
- **Stretching** of the limbs can begin after radiographs show the bone has healed. The stretching exercises should be executed slowly. If there are any signs of pain, these movements are not advisable. Repeat the series between 3-7 times.
- **Swimming** length can also be increased at this point. Substitute a swim for a walk at any time, allowing the swim to be the same length as the walk you are replacing. Still do not allow <animal> to launch <him>self into the water, but rather be encouraged to swim once feet are off the ground.

- **Training** using the Figure 8 and Sit-to-Stand techniques can be continued as before. These training tools are not only beneficial for muscle development, but can be great for <animal>'s mental stimulation. These exercises are great when used before walks or meal times. As long as <animal> is comfortable, continue to increase the frequency or duration of these exercises. Remember not to increase the speed or intensity of these exercises. No sharp turns or jumping permitted.

The Remaining Six weeks: Almost There!

Walks are continued with <animal> on a **long lead**, such as a 10-15 foot leash or a flexible lead. You will need to cut back the length of the walks you are currently going, as the longer lead allows <him> the freedom to trot back and forth, increasing <his> usage of the leg. Usually we recommend that you quarter the distance you are currently going on the short lead walks. Once you know where <animal>'s comfort level is, you will be able to double the amount of activity every few days. As distances are more difficult to judge at this point, it is important to monitor <animal>'s comfort level closely during this stage of rehabilitation.

Slowly start allowing <animal> some *mild off leash activities*. You will continue with the long lead walks and you will start letting <animal> have time off lead in the yard, under your supervision. The area should have no other animals or distractions around. The off lead activity should occur after <animal> has had a walk to get some energy out of <his> system. Start with five minutes off lead following a walk. As with the walks, double the time <animal> is spending off lead in the yard every few days as long as <animal>'s comfort level permits. <animal> should remain under your voice control at all times. *No jumping, chasing a ball, frisbee, or playing with other animals is permitted.* Avoid any activities where <animal>'s full concentration is thrown into the activity without regard for <his> body.

A final checkup at the end of the rehabilitation process is needed before full activity may be resumed. Good luck and have fun!