



# **Tibial Plateau Leveling Osteotomy (TPLO) For Treatment of Rupture of the Cranial Cruciate Ligament**

## **Introduction**

Rupture of the cranial cruciate ligament is one of the most common orthopedic conditions in the dog. It is the major cause of arthritis of the stifle or knee joint. The strength of a dog's cranial cruciate ligament deteriorates with age. Other factors which can contribute to rupture include pre-existing inflammation and anatomical abnormalities such as excessive slope of the tibial bone. Up to 40% of dogs may rupture the opposite leg's cruciate ligament within 24 months following rupture of the first.

Often the rupture occurs acutely during normal levels of activity. The dog may have been jumping off the couch or deck, or running in the yard. The dog may vocalize and hold up the injured leg. In other cases the rupture may have a more chronic course without a single traumatic event. In these cases the dog may have a chronic, episodic lameness that worsens with vigorous exercise.

The cranial cruciate ligament prevents forward movement of the tibia (cranial tibial thrust), internal rotation and hyperextension of the knee. Rupture of the ligament results in instability of the knee leading to pain, lameness and later arthritis. There are medial and lateral menisci in the knee joint. These menisci are made of fibrocartilage, are crescent shaped and are situated between the femur and tibia. Damage to the medial meniscus, or less commonly the lateral meniscus, is present in a significant number of dogs with cruciate ligament ruptures. The medial meniscus may be torn acutely at the time of the initial cruciate rupture or more often becomes damaged as a result of the chronic instability. An audible click may be heard during flexion and extension of the knee in dogs with meniscal damage. The surgeon will evaluate the meniscus at the time of the surgery and if damaged, a partial or complete removal of the meniscus will be performed.

## **Clinical Signs and Diagnosis:**

The diagnosis of a cruciate ligament rupture is based on history, physical examination and possibly radiographic evaluation to rule out other problems. The history of a complete rupture typically involves an acute onset of lameness after minor trauma. Generally the dog will initially not bear any weight on the leg and will begin to toe touch after a week or more. A partial tear is associated with a less severe lameness.

On physical examination there may be lameness, increased fluid within the knee and cranial drawer movement. Such motion is the ability to move the tibia forward while holding the femur stable. It may be more difficult to obtain drawer in very large dogs, tense dogs or those with partial tears. Another method to evaluate for a rupture of the cranial cruciate ligament is producing cranial tibial thrust.

Once the cruciate ligament tears, it allows the femur to slide down the slope of the top of the tibia (tibial plateau) and thrust forward. The TPLO procedure levels this slope and eliminates the tibial thrust. At least two radiographs are required prior to the TPLO procedure. These are used to determine the slope of the tibial plateau and degree of rotation required for correction. In chronic cases of cranial cruciate ligament rupture, arthritic changes may be present on the radiographs.

### **Tibial Thrust**

Tibial thrust is a natural force created in the dog's knee with each step taken. The cranial cruciate ligament when intact, normally limits the amount of cranial tibial thrust (in a forward direction). With the cranial cruciate ligament ruptured or stretched, this thrust is unopposed. This movement results in a great deal of instability within the joint, abrasion of joint cartilage, damage to the medial meniscus, stretch of the joint capsule, and discomfort. These changes ultimately lead to the development of arthritic changes and swelling within the knee joint. In addition, instability within the joint makes walking uncomfortable.

### **TPLO Surgery**

Tibial plateau leveling osteotomy surgery entails creating a semi-circular, full thickness cut in the tibia. Once the bone has been cut, it is rotated in a calculated manner to level the tibial plateau, thus eliminating cranial tibial thrust. The cut section of bone is then secured back to the tibia by means of a stainless steel bone plate and screws. Healing of the bone takes approximately two to three months. After surgery, your dog's leg will might be placed in a padded bandage overnight.

### **Post-op Care and Rehabilitation**

For the first 8 weeks following the surgery strict confinement is required as outlined below. During this time, the bone is healing and adhering to restrictions is vital to avoiding complications.

1. Running, jumping, playing and stairs are not allowed. If your pet is walking on a slippery surface or uneven ground, a sling or belly-band should be used. When not under your **direct supervision**, confinement to a crate or airline carrier is required. When taken outside your pet must be **on a leash at all times**. They are allowed to eliminate and then return indoors immediately for the first two weeks.
2. Ice (a cold pack or bag of frozen whole kernel corn works well) should be applied to the incision for 5 to 10 minutes 3 or 4 times daily for the first week after surgery. After application of ice, the leg should be gently flexed and extended to help maintain flexibility and muscle tone.
3. Your pet should be separated from other dogs and not allowed to play.

4. You should reduce your pet's food intake to prevent weight gain during the inactivity. Generally cutting their food intake in half will allow them to maintain their current weight. Water consumption should remain normal.
5. For the first two weeks following surgery you will need to monitor your pet's incisions. Licking or chewing can cause infection or premature removal of the sutures. An E-collar may be needed for licking or chewing. If you notice swelling, redness or discharge at the incision we advise you call for advice. A recheck appointment will be performed 14 days post-operatively to remove the skin sutures and evaluate your pet's progress.
6. Strict adherence to the above post-operative care is critical to your pet's recovery. If at any time you notice a problem, your pet cries out or you notice a set back in healing you should call for advice.
7. During this period of recovery, leash walking is recommended. The dog should walk on a short lead in the heel position. Walk slowly to allow the dog to place weight on the foot with every step. Start with 5 minute leash walks several times daily. You can double the duration of the walks every 5-7 days as long as the pet remains comfortable.

Rehabilitation will begin once radiographs confirm bone healing. **Bone healing** is usually seen 8 to 12 weeks after surgery. The following recovery is advised.

1. The patient's activity is gradually increased to build muscle, increase mobility in the joint and strengthen bone healing. The degree of activity should progress with your pet remaining comfortable. Increasing the duration and not intensity of the activity is desired.
2. For the first few weeks, leash walks are advised. Continue to gradually increase the leash walking as during the initial rehab period.
3. After 4-6 weeks of leash walks, you can allow your pet walks on a longer lead, such as 10-15 foot leash or a flexi lead. Decrease the number of walks at the same time.
4. At 4 months after surgery most restrictions can be removed and your pet can start off leash exercise. Heavy working and hunting can resume 6 months post-op. A final recheck exam is advised 4 months after surgery.

Each patient is an individual. These guidelines are general expectations, but your pet's recovery may take more time or less time. We will adjust the rehab depending upon how your pet responds.

A successful TPLO procedure will allow your dog to return to full activity with no residual lameness. If arthritis was present before surgery, some intermittent stiffness or lameness may be noted, particularly after heavy exercise, cold weather or upon rising.