

# CRANIAL CRUCIATE LIGAMENT (CCL)-TIBIAL TUBEROSITY ADVANCEMENT (TTA)

## **Tibial Tuberosity Advancement (TTA)**

### Background

Cranial cruciate ligament (CCL) disease is the most common orthopedic disease in dogs (see CCL overview section) The CCL is located inside the knee and functions to stabilize the knee during locomotion. Because the articular surface of the canine tibia (shin bone) is sloped backward, normal locomotion leads to forward translation (tibial thrust) of the tibia with relation to the femur (thigh bone). An intact CCL will maintain stability of the knee, but a damaged or torn CCL will lead to abnormal motion such as tibial thrust. This instability can lead to lameness, osteoarthritis, abnormal cartilage wear, and/or meniscal injury.

The TTA is an orthopedic procedure performed at DVSC for dogs with CCL disease. The theory behind the TTA is to advance the tibial tuberosity forward in order to modify the pull of the quadriceps muscle group (through the patellar ligament). This helps reduce tibial thrust and stabilizes the knee (see procedure).

Below is a picture of the knee and associated structures mentioned above.

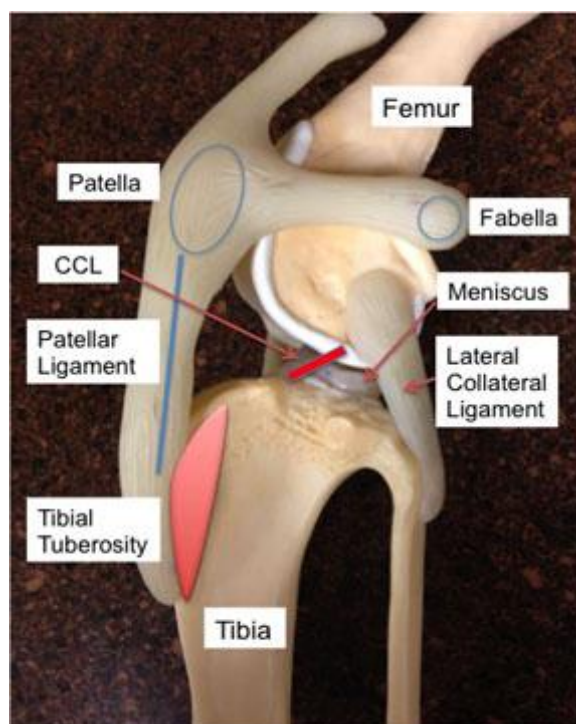


Figure 1 TTA Stifle Anatomy

## When to consider the TTA

The TTA procedure can be considered for almost any dog with CCL disease. Although recent studies have suggested that the TPLO (Tibial Plateau Leveling Osteotomy) may result in better long-term function than the TTA, the TTA may still be chosen for certain dogs. These dogs may include those that are poor TPLO candidates or dogs that have multiple knee problems (concurrent patellar luxation and CCL disease for example). At DVSC, the TTA is most commonly performed in bulldogs with CCL disease because of tibial conformation and difficulty in performing a TPLO on these patients. A surgeon at DVSC may make the recommendation for a TTA after full assessment of the patients' history and condition.

## Procedure

The goal of the TTA procedure is to advance the tibial tuberosity forward in order to dramatically reduce tibial thrust. The surgery involves an incision over the inside aspect of the knee. The joint is explored (arthrotomy) to examine the CCL, assess arthritis, and look for any meniscal injury. If there is a meniscal injury, the meniscus is partially removed. An intact meniscus may also be surgically "released" as a prophylactic measure against future injury (surgeon dependent). Next, a partial cut is made into the tibial tuberosity to approximate and plan the TTA. A TTA specific bone plate is placed on the tibial tuberosity and the bone cut is completed. The tibial tuberosity is advanced forward and a TTA specific "cage" is placed within the cut. The bone plate is then screwed into the tibial shaft to hold the bones together. Lastly, bone graft is placed within the gap to stimulate bone healing during the post-operative period.

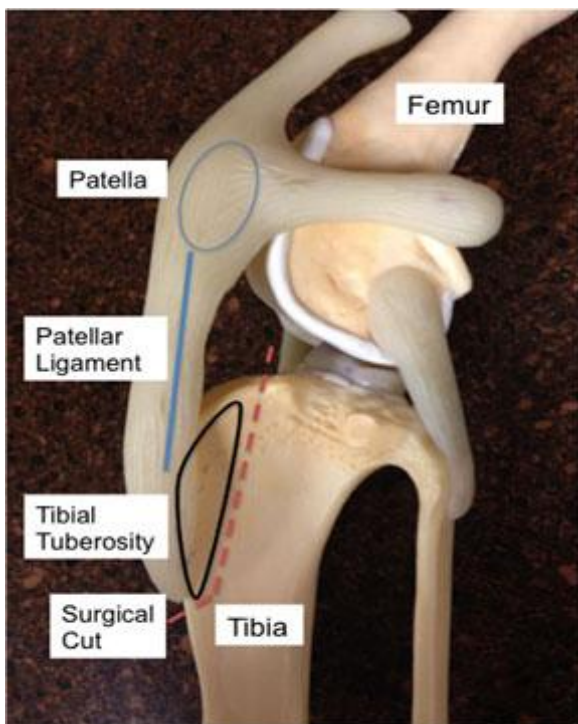


Figure 2 – Pre TTA

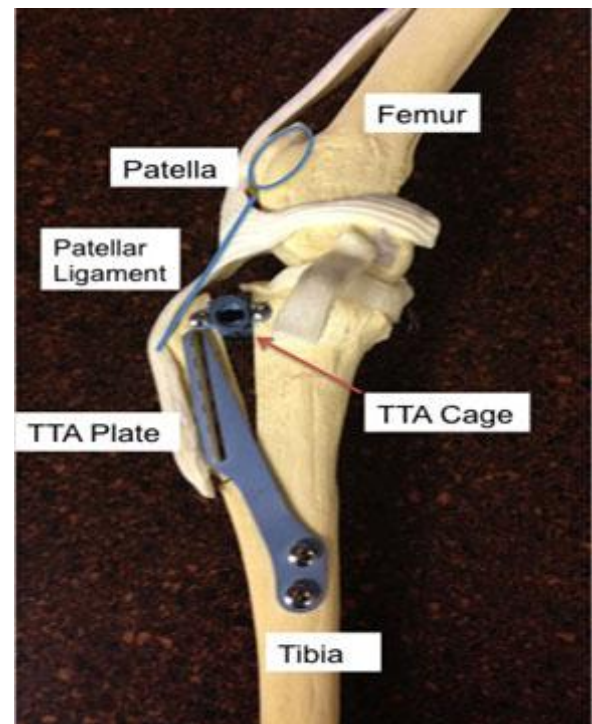


Figure 3 – Post TTA

## Postoperative Care

Post-operative care after a TTA surgery includes activity restriction, incision care, physical therapy, medications, and follow-up X-rays.

**Activity Restriction** – The bone that is cut during a TTA requires at least 8-12 weeks to heal. During this time, the patient needs to have their activity restricted as to not cause complications with the fixation. Too much activity can lead implant failure, meniscal injury, and pain. The DVSC usually recommends confinement (crate, kennel, enclosure, small room), leash walks only, no jumping, no playing, no climbing, and no running for the majority of the recovery period. As the patient recovers, the surgeon will implement gradual return to normal activity.

**Incision Care** – It usually takes about 2-3 weeks for the incision and soft tissues to heal. During this time, it is important to monitor the incision for any excessive swelling, oozing, or incisional dehiscence (opening up). We also recommend an E-collar (cone) placed around the dogs' head in order to keep them from chewing or licking at the incision. Licking or chewing at the incision can lead to dehiscence and/or infection of the site, which can be a serious complication especially if infection reaches the implants.

In addition, cold and/or warm compress may be implemented to decrease incisional swelling.

**Physical Therapy** – All the surgeons at DVSC support some form of post-operative physical therapy. Physical therapy can range from basic “bicycle” exercises to physical therapy with our Animal Rehabilitation group. Your surgeon will advise you on how much physical therapy to implement with your dog. Please visit (North Texas Animal Rehabilitation) for further information.

**Medications** – All our patients are prescribed pain medications after TTA surgery. The necessity for pain medication is patient dependent and can range from just a few days to the entire recovery period. In addition, antibiotics may also be prescribed. The surgeon will determine the necessary duration of pain medications or antibiotics.

Follow-up – All TTA patients are recommended to have post-op X-rays at ~10 weeks to assess bone healing. Recommendations for returning to normal activity will be given after assessment of the X-rays.

### Overall Complications

Complications with the TTA procedure are overall uncommon. The most common post-operative complication reported is a meniscal injury, which can occur in 5%-25% of patients. This complication can be dramatically reduced with a meniscal “release” during surgery. Otherwise, complications such as implant failure, infection, and/or healing problems occur in less than 5-10% of patients as long as the post-operative instructions are followed closely. Most, if not all, complications can be addressed as long as they are discovered early. All clients will be informed on how to identify signs of possible complications.

### Prognosis

The TTA often carries a good to excellent prognosis for dogs with CCL disease. Prognosis is patient dependent and can be assessed by a surgeon at DVSC.

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