

# CUTTING EDGE

[www.DFWVetSurgeons.com](http://www.DFWVetSurgeons.com)

Update on the  
Tibial Plateau  
Leveling  
Osteotomy  
(TPLO) and the  
Tibial Tuberosity  
Advancement  
(TTA)  
Techniques

**C**ranial cruciate ligament (CCI) injury is one of the leading causes of hind limb lameness seen at the Dallas Veterinary Surgical Center (DVSC). Left untreated, a CCI injury will lead to progressive osteoarthritis (OA). DVSC recommends early diagnosis and surgical intervention to minimize the development and progression of OA. A completely torn CCI generally results in a non-weightbearing lameness along with a cranial

DVSC to identify patients with a partial CCI include:

- 1) joint effusion,
- 2) pain elicited upon hyper-extension of the stifle,
- 3) a firm swelling over the medial side of the proximal tibia (medial buttress), and
- 4) subtle OA seen on stifle radiographs.

MRI and arthroscopy are other potential diagnostic tools that can be utilized to confirm a CCI tear; however, they are seldom necessary and incur additional expense to the client.

An extracapsular technique, passing monofilament nylon around the lateral fabella through a bone tunnel in the proximal tibial crest, has a very predictable positive outcome in small and medium (weighing less than 30 lbs.) patients. Most surgeons recognize the inherent shortcomings of the extracapsular repair and discourage its use in large or active dogs. Higher failure rates, poor limb function, significant peri-articular fibrosis with

*continued on page 2*

drawer sign. Typically, drawer sign can often be identified in an awake patient, however, occasionally sedation or anesthesia is required. A partial tear of the CCI is extremely common, especially in large and giant breeds, although drawer motion will be identified in less than 50% of these patients. Therefore, a positive drawer sign cannot be used, as the sole criteria for diagnosis of CCI pathology. Other clinical signs that are often used by surgeons at the

## WELCOME Dr. Fulton Reaugh



After graduating from Texas A&M University veterinary school in 1999, Dr. Fulton Reaugh began his career in Arlington, Texas where he practiced for two years. He then completed a rotating internship at Oklahoma State University followed by a three-year residency in small animal surgery. Fulton enjoys doing all types of surgery, but has a particular interest in orthopedics where his primary research background has been centered on external skeletal fixators.

Fulton and his wife, Stephanie, have a beautiful daughter, Ella, two Golden Retrievers and a cat named Kirby. He enjoys bird hunting, football, and spending time with his family. Fulton and Stephanie returned home to family and friends this summer and Fulton joined the DVSC in August. Please feel free to call or stop by to discuss your surgical cases with Dr. Reaugh.

## CRANIAL CRUCIATE LIGAMENT TEARS

# DVSC

*The highest quality surgical care for the well-being of your pet.*

### What's New

You are invited to refer patients to the DVSC's newest hospital **now open** in Plano. Or stop by to visit the new facility at 10225 Custer Road, Plano, 75025, 214.667.2233. The Plano hospital is in the same building as the Collin County Emergency Animal Clinic, located at Custer and Highway 121.

## Cranial Cruciate Ligament Tears

*continued from page 1*

concurrent reduced range of stifle motion, and rapid progression of OA are common complications associated with extracapsular monofilament reconstructive techniques in large or active dogs.

Procedures that alter mechanical forces acting upon the stifle, such as the tibial plateau leveling osteotomy (TPLO), are preferred by surgeons at DVSC, as well as across the country. The DVSC has performed over 5000 TPLO procedures during the past eight years. A TPLO is generally recommended for the following patients:

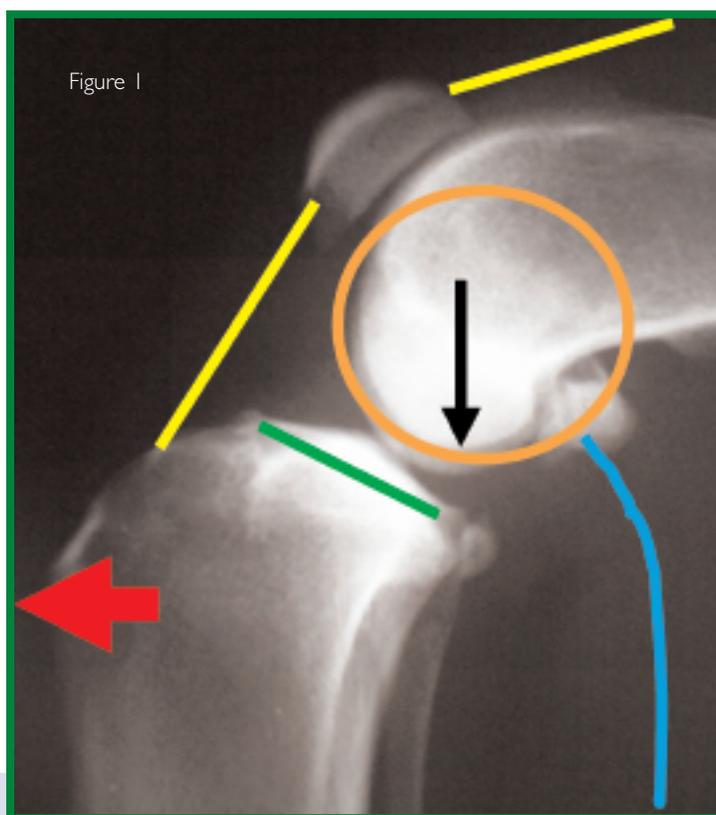
- Dogs with a body weight greater than 40 lbs
- Extremely active or performance animals regardless of body weight
- Medium or large patients that are grossly overweight
- Small patients in which an extracapsular repair failed due to excessive tibial slope
- Any patient with a concurrent medical condition (i.e. Cushings or diabetes) or a contralateral orthopedic condition that would place the patient at an increased risk for a poor outcome with the extracapsular monofilament reconstructive technique

## TIBIAL PLATEAU LEVELING OSTEOTOMY: TPLO

The TPLO technique neutralizes the forces acting upon the stifle that result in cranial drawer. During weight-bearing, contraction of the quadriceps and gastrocnemius muscles partially counteract the ground reaction force, causing the distal femur to be compressed against the proximal tibial plateau. The caudal and distal-sloped tibial plateau converts this femorotibial compression into a cranially directed shear force called cranial tibial thrust. Cranial tibial thrust is normally constrained by an intact CCI and by the pull of the hamstring muscles (biceps, semimembranosis and semitendinosus) on

the proximal tibia. When the magnitude of cranial tibial thrust exceeds the strength of the CCI, the ligament begins to tear (partial tear) until catastrophic failure (complete tear) occurs. The magnitude of cranial tibial thrust is, in part, controlled by the steepness of the tibial plateau slope with a steeper slope potentially resulting in greater cranial tibial thrust.

The basic theory behind the TPLO is to reduce the slope of the tibial plateau, therefore mitigating cranial tibial thrust. Most patients with a CCI tear evaluated at DVSC, have a tibial plateau slope between 24 and 30° (figure 1).



By reducing the tibial plateau slope to approximately 5°, cranial tibial thrust is eliminated by mechanically converting it into caudally directed thrust, which is constrained by the caudal cruciate ligament. The TPLO technique eliminates the need for a CCI and uses the larger caudal cruciate ligament to replace its mechanical function (figure 2).

Precise positioning of the stifle for preoperative determination of the tibial plateau slope is required. In addition, the radiographs and patient are evaluated for evidence of excessive internal tibial torsion as well as tibial and/or femoral varus deformity. Preoperative geometric planning will determine 1) the ideal location and size of the osteotomy, 2) total degrees of tibial plateau slope correction required to eliminate cranial tibial thrust, and 3) tibial torsion or varus correction may be required. Various sizes of blades are available to create the dome osteotomy. After rotation of the tibial plateau, the osteotomy is stabilized with one of several available specially designed TPLO

plates and 6-8 screws. During the postoperative period, strict activity restriction is required for approximately 10 weeks. Physical therapy performed by either the client or a trained physical therapist may be encouraged to promote rapid recovery.

Complications reported with the TPLO can be due to a variety of causes including improper exercise restriction, infection, or implant failure. Therefore, it is highly recommended that the procedure is only performed by surgeons with advanced residency training. Furthermore, clients must understand the importance of the postoperative recovery period and be willing to confine their pet for 10 weeks. The overall complication rate has been reported to be less than 5-8%. In the opinion of the surgeons at the DVSC, as well as the majority of board certified surgeons across the country, the TPLO offers the most reliable and consistent results for management of a partial or completely torn CCI.

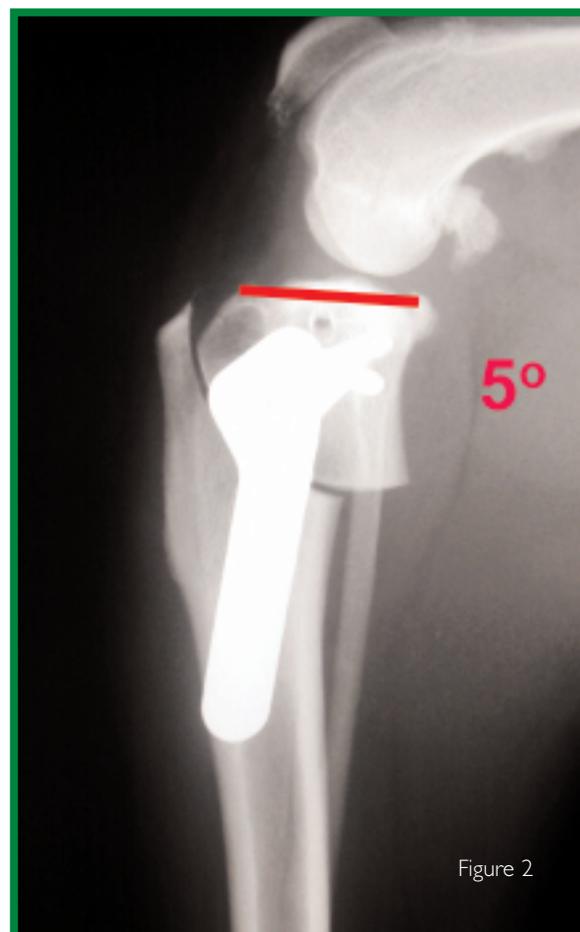


Figure 2

## Our Doctors

**Robert D. Barstad, DVM, MS**  
Small Animal Surgery

**Scott G. Bertrand, DVM**  
Diplomate American College  
of Veterinary Surgeons

**Julie M. Ducoté, DVM**  
Diplomate ACVIM (Neurology)

**Peter J. Early, DVM**  
Diplomate ACVIM (Neurology)

**Joanne N. Franks, DVM**  
Diplomate American College  
of Veterinary Surgeons

**Darryl E. McDonald, DVM, MS**  
Diplomate American College  
of Veterinary Surgeons

**Robert M. Radasch, DVM, MS**  
Diplomate American College  
of Veterinary Surgeons

**H. Fulton Reaugh, DVM, MS**  
Small Animal Surgery

**Brent E. Wilkens, DVM**  
Diplomate American College  
of Veterinary Surgeons

**Katherine L. Wells, DVM**  
Small Animal Surgery

**Nancy Zimmerman-Pope, DVM, MS**  
Diplomate American College  
of Veterinary Surgeons

# TIBIAL TUBEROSITY ADVANCEMENT: TTA



A new technique was developed in Europe in 2001; it is called the tibial tuberosity advancement (TTA). Like the TPLO technique, the TTA neutralizes cranial tibial thrust; however, instead of leveling the tibial plateau, a longitudinal osteotomy of the tibial tuberosity is created. The tibial tuberosity is advanced cranially until the patellar tendon is orientated perpendicular to the tibial plateau (figure 3). The osteotomy is opened proximally using a titanium cage and then stabilized with a titanium plate and prong (figure 4). Similar to the TPLO, precise preoperative planning is required.

Surgeons at DVSC have been trained to perform the TTA procedure. No short or long-term clinical evaluations of the technique are currently available. In addition, only a small number of TTA procedures have been performed, compared to the hundred thousand or more TPLO procedures performed worldwide.

Complications that have been reported with the TTA include: tibial crest fracture, tibial diaphyseal fracture, collapse of the osteotomy gap, and plate failure. No complication rate is currently available due to the small numbers of the procedure that have been performed in this country. The overall cost of the procedure will be slightly higher than the TPLO technique due to the high cost of the titanium implants and additional expense of a cancellous bone allograft.

DVSC surgeons are currently only recommending the TTA technique for very specific cases in which they feel it may offer a superior outcome over TPLO. These cases include patients with significant distal femoral varus deformity. Similar to TPLO, the TTA should only be performed by surgeons with advanced residency surgical training. **The DVSC only recommends the TTA for very specific cases.**

# DVSC

Dallas Veterinary Surgical Center

## Dallas

4444 Trinity Mills Rd., Suite 203  
Dallas, Texas 75287  
T 972.267.8100  
F 972.267.8700

## Southlake

2340 W. Southlake Blvd.  
Southlake, Texas 76092  
T 817.379.5444  
F 817.379.0222

## Mesquite

4651 N. Belt Line Rd.  
Mesquite, Texas 75150  
T 972.226.3399  
F 972.226.0800

## Plano

10225 Custer Rd.  
Plano, Texas 75025  
T 214.667.2233  
T 214.667.2250

