



## Tibial Tuberosity Advancement (TTA)

For the Anterior Cruciate Deficient Knee in Dogs

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There are many techniques for the surgical treatment of anterior cruciate ligament disease in dogs. In the last 10 – 15 years, the Tibial Plateau Leveling Osteotomy (TPLO) has gained great favor among veterinarians for the treatment of anterior cruciate ligament disease in medium to large breed dogs. In TPLO, the tibial plateau is rotated to bring the slope of the plateau into a neutral range thus eliminating anterior tibial thrust (drawer) during active weight bearing. Anterior tibial thrust (drawer) can be eliminated by bringing the tibial plateau perpendicular to the long axis of the patellar tendon.

At the 2004 ACVS meeting, Dr. Pierre Montavon and Dr. Slobodan Tepic presented a technique that they have developed called the Tibial Tuberosity Advancement (TTA). I then attended their first US TTA training course in Denver at the end of February 2005. As of February 2005 there had been over 2500 cases of TTA performed in the US and as of January 2010, I have completed over 160 cases. TTA accomplishes the same thing as a TPLO in that it eliminates the anterior tibial thrust by making the patellar tendon perpendicular to the tibial plateau. There are basically 2 ways to get the tibial plateau perpendicular to the patellar tendon, either rotate the tibial plateau (TPLO) or advance the tibial tuberosity/patellar tendon complex (TTA).

The TTA procedure is new relative to TPLO and has been used in Europe for the last 8 – 10 years. In TPLO the tibial plateau is radially osteotomized and rotated to bring the plateau perpendicular to the long axis of the patellar tendon thus eliminating cranial tibial thrust.

In TTA, the tibial crest including the insertion of the patellar tendon is moved anteriorly to bring the long axis of the patellar tendon perpendicular to the tibial plateau. This is accomplished by making an osteotomy of the tibial crest, advancing it anteriorly and then fixing it in place with a spacer basket, a bone graft, and a TTA Plate, in a new position where the long axis of the patellar ligament is 90 degrees to the tibial plateau. This eliminates cranial tibial thrust resulting in a stable knee during all phases of weight bearing.

What are the reported advantages? It requires less surgery time than TPLO, is a less invasive approach and healing/recovery is reported to be faster. We begin rehab at 1 week post-op versus 6 - 8 weeks post-op with TPLO. Additionally TTA does not change the intra-articular biomechanics of the tibial plateau; it does not create a fracture of the long axis of the tibia; patellar tendinopathy and pivot shift have not been reported with TTA, and it does not increase the pressure on the caudal horns of the menisci in stifle flexion as TPLO does. Range of motion and patellar position remain normal in TTA, and the retropatellar pressure (pressure between the patella and the trochlear groove) is decreased which benefits those cases with patellar cartilage loss seen in approximately 30% of chronic ACL deficient knees.

What are the reported complications? In 57 cases reported out of Tufts University, 5 cases were re-operated for a subsequent meniscal tear (higher than the reported average for all ACL techniques of 2%), 3 wound infections, 2 delayed unions, 1 implant failure and 1 seroma. In another multi-institutional study report of 384 cases, 7 tibial tuberosity fractures (same area as TPLO), 3 tibial fractures, 2 delayed unions, 1 wound infection, and 8 other complications considered minor including seroma, licking at the wound, and bandage irritation. In this study there were 21 complications out of 384 cases (5.5%). With respect to complications, what appeals to me about TTA is that if there is a fracture of the tibial tuberosity or implant failure you do not lose the weight bearing long axis of the tibia. Additionally, if the tibia were to fracture, there is more bone proximal to the fracture for plating than with TPLO. Also reported at the training conference was that with tuberosity fracture, most healed with only bandage/splint immobilization and no further surgery.

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The typical post-op recovery plan for TTA is as follows:

- 1) Strict exercise restriction for 2 weeks post-op but begin rehab at 24 hours post-op.
- 2) Radiograph at 4 weeks post-op to assess if adequate healing occurring, and continue rehab.
- 3) Radiograph at 10 - 12 weeks post-op and if healing complete then release to normal activity but recommend increase activity to normal over 8 more weeks.

Based on the experience of several surgeons that I know and respect who have experience in the hundreds of cases of TTA, and my personal experience (n=180+), I think we are going to see TTA emerge as another ACL technique that is equal and may be preferable to TPLO. On the schedule at this years' ACVS meeting is a half-day devoted purely to TTA. I am now offering TTA to clients as a new alternative to TPLO for cases of ACL deficiency in dogs.



*Day of Surgery TTA*



*4 week post-operative*



*12 week post-operative*

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