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MEDVET CLINICAL REVIEW

Tibial Plateau Leveling Osteotomy for the Treatment of Cranial Cruciate Injury in Dogs: A New Concept and Treatment

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Injury of the cranial cruciate ligament is one of the most common orthopedic injuries in dogs of all sizes and ages. Since 1952, dozens of repair techniques for the ruptured cranial cruciate ligament (RCCL) have been created, modified, and in some cases, discarded. A *JAVMA*, November 1, 1994 survey of veterinary surgeons across the country documented 19 techniques are currently used for treatment of RCCL. Return of stifle instability, persistent subnormal limb function, and progressive arthritis are potential postoperative complications.

The main goal of traditional techniques is to limit the cranial drawer by counteracting it with various implants, connective tissue grafts, or ligaments — a kind of “tug-of-war.” The failure of implants and stretching of autogenous tissues may result in the return of stifle instability and discomfort. The tibial plateau leveling osteotomy (TPLO), as designed by Dr. Barclay Slocum, is unique in that it alters the transmission of force across the stifle rather than attempting to oppose it. In order to understand this concept, an understanding of the forces acting upon the knee is necessary.

The concepts behind the TPLO consider cranial tibial thrust as the main force affecting cruciate ligament injury and persistent instability. Simply put, cranial tibial thrust is caused by transmission of force up the tibia and across the stifle during weight bearing. Because the tibial plateau is sloped, cranial translation of the tibia occurs (**Figure 1**). It essentially is the “active” form of cranial drawer that occurs when a dog walks. The cranial cruciate ligament and the flexor muscles of the stifle normally oppose this force. When it cannot be counteracted sufficiently however, cranial tibial thrust can cause cruciate ligament injury. Cranial tibial thrust can be evaluated clinically by the tibial compression test (**Figure 2**). Like the cranial drawer it is present when the cruciate ligament is damaged.

The TPLO neutralizes tibial thrust by converting it into tibial compression. Prior to surgery, multiple radiographs of the stifle are taken to determine the angle of the tibia plateau. This angle dictates how much the plateau angle must be shifted in order to achieve tibial thrust neutralization. Using special instruments, a tibial osteotomy is performed and the tibial plateau segment rotated. A TPLO plate is applied to the osteotomy to allow healing (**Figure 3**). Postoperative care is similar to that of traditional repair techniques.

The TPLO has a number of advantages over traditional cranial cruciate ligament repair techniques. A complete halt of arthritis progression in stifles treated by TPLO has been described. No other procedure to date can claim this. This is significant since even dogs with surgically treated RCCL may develop debilitating arthritis. The TPLO also claims great success in large dogs (>50 lbs.), allowing complete return to normal function. Many surgeons who have used more traditional techniques for years have begun doing TPLOs and are impressed with the results. Numerous high-profile success stories including patients winning championship field trials and The Iditarod.

Our experience at MedVet has been similarly positive. Results have been excellent in dogs of all sizes including in the giant breeds. Many dogs that have failed previous knee surgery have done extremely well with the TPLO and most dogs do not develop the stifle thickening and reduced muscle mass often

seen with other techniques. Recovery from surgery is quick and all dogs evaluated at 8 weeks have shown near complete union of the osteotomy site. Long term rechecks find dogs to have excellent limb function, increased muscle mass, and superior stifle range-of-motion.

Suggested Readings

Slocum B, Slocum TD. Tibial plateau leveling osteotomy for cranial cruciate ligament rupture. In: Bojrab MJ, ed. *Current Techniques in Small Animal Surgery* 4th ed. Philadelphia: Lea & Febiger 1998:1209.

Slocum B, Slocum TD. Tibial plateau leveling osteotomy for cranial cruciate ligament rupture in the canine. *Vet Clin North Amer* 1993;23:777.

