TPLO in Small Breed Dogs and Cats

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Anterior cruciate ligament (ACL) rupture in small- or toy breed dogs and cats is common. Treatment decisions should be based on similar considerations, as they exist for large breed dogs. The classical repair with a lateral suture and joint capsule imbrication is a quick and simple surgical procedure that results in an acceptable outcome in many small dogs and cats. However, suture failures resulting in unstable stifles do occur more commonly as one may expect. This is becoming particularly evident in dogs that are competing in sporting activities, such as agility. Isometric suture placement using suture anchors seems to eliminate some of the problems seen with the classical suture techniques, but optimal suture placement is not as easy in the very small patient. Similar to large breed dogs, TPLO is a viable alternative to the lateral suture techniques. The following presentation will discuss some of the differences of ACL rupture and TPLO between large breed dogs (LgBD) and small breed dogs (SmBD) and cats:

First, early partial or partial tears are not as commonly diagnosed in SmBD and cats. They usually have a fully torn ligament at the time of clinical presentation. It is unclear however, why partial tears are less commonly seen. There are two possible explanations: 1. Partial tears do exist as well, but clinical signs are not as obvious and as readily recognized in SmBD as in LgBDs - or - 2. ACL rupture in SmBD and cats has a different etiology and/or course of disease. While in dogs ACL ruptures are considered to be usually the result of a degenerative disease, in cats they are mostly traumatic in origin. Due to the synergistic function of the different stifle ligaments concurrent injuries have to be expected in trauma cases. It is therefore not surprising, that almost 40% of the cats with ACL ruptures have additional stifle ligaments injured. Concurrent injuries to the medial collateral and posterior cruciate ligament are most common. These result often in highly unstable knees or even in disruption of the stifle joint. In SmBD there is rarely a history of major trauma and concurrent stifle ligament injuries are seldom seen. It can be assumed, that in SmBD the ACL fails secondary to chronic damage and degeneration as in LgBD and the early signs of the disease simply go unnoticed by the owner. The conformation of the proximal tibia and the degree of the tibial slope is somewhat different in SmBD. They often have a very prominent tibial crest, a caudally curved proximal tibial shaft and/or a varus deformity of the proximal tibia. Deformities resulting in patellar luxations are another typical SmBD feature and ACL rupture associated with chronic medial patellar luxation are commonly seen. If the patellar luxates medially, the proximal tibia rotates inward, which results in an impingement and trauma of the ACL by the medial.

The average tibial slope in SmBD seems to be steeper and often excessive compared to the LgBD. In one publication an average inclination of the tibial slope of 27.4 degrees in SmBD (Petazzoni, 2004) is reported. In 22 dogs we did a TPLO the average TPA was even higher with 32.3° (24 - 40.5°) A steep slope increases the stress on the ACL.

Cats on the other hand have almost no tibial crest and a flat tibial slope. The average tibial slope in cats is less then in dogs and has been reported to be 20.5° ( +/- 4°) (Schnabel et al. Thesis, Univ of Vienna, 2006).
Management

Surgical management is the preferred treatment also in toy breed dogs and cats with ACL rupture. It has been reported, that cats do not need surgical repair and recover as well with conservative treatment. In our experience surgical management is better to return the cat to normal function compared to conservative treatment. Operated cats show faster recovery and seem to have a better overall prognosis. This observation is supported by the fact, that 42% of the cats with ACL have also an injured meniscus, which is a significant source of pain.

The TPLO procedure is technically demanding due to the small size of the patients. Positioning and general approach is similar as in LgBD. If there is a full tear, we perform a menisceal release by a caudal-medial approach - as done in LgBD. Inspection and removal of damaged portions of the medial meniscus however is more difficult due to the small field of view. A craniomedial approach to the joint is a good alternative and allows for full inspection of the stifle joint. However it can be more difficult to reach the meniscus for release or resection.

There is a new designed small jig (Synthes Paoli, USA) for TPLO in the SmBD. There are different small saw blades available to make an appropriate cut. We use most commonly the 12 mm blade. Cutting performance of the blades is variable, depending the company and the purpose it was designed for. Some blades are rather thick and remove a lot of bone while cutting. There are thin cutting blades available, that allow for a fast and very precise cut. The oscillating machines commonly used are rather bulky for a precise cutting through the delicate bones of SmBD and cats.

The amount of rotation required to level the tibial plateau is obviously less with the small radius blades. To level a 35° slope to 5° only 6 mm rotation is necessary if the cut was performed with a 12mm blade. As the tibial crest is usually very prominent and strong the risk for a fractures is minimal even if a very steep plateau is leveled with a single cut only. We have leveled excessive tibial slopes over 35° with a simple osteotomy without any obvious untoward effects.

In contrast, cats have a rather flat tibial crest with a compact proximal tibia. This puts cats at risk to sustain an avulsion fracture of the crest if the TPLO cut is performed to cranially. Using a pin for rotation and temporary fixation of the proximal segment can be somewhat clumsy. A pointed reduction forceps can be used instead of the rotation pin and facilitates insertion of the temporary fixation pin.

For stabilization, Mini-instruments and -plates are needed. There are now pre-contoured 2.0 and 2.4 Mini TPLO locking plates available that make plate application very easy and quick, as no plate contouring is required. These two plates fit the majority of SmBD and cats very well. Even so TPLO in SmBD and cats is technically more demanding, it can be achieved without major difficulties or intra-operative complications and has shown to be a successful technique for the treatment of anterior cruciate ligament rupture.