

Tibial Plateau Leveling Osteotomy (TPLO)

What is the Function of the Cranial Cruciate Ligament?

Many tendons and four ligaments (medial and lateral collateral and cranial and caudal cruciate) are involved in providing stability to the stifle (knee joint). The cranial cruciate ligament (CCL) provides the same stabilizing effect to the canine stifle as the anterior cruciate ligament does to the human knee. The CCL prevents forward motion of the tibia (shin bone) relative to the femur (thigh bone). If the CCL tears the femur will shift back on the top of the tibia (tibial plateau) during weight bearing and abnormal forces will be transferred to the soft tissue structures (joint capsule) surrounding the knee resulting in pain and inflammation. Tearing of the medial meniscus is also common with complete CCL tears especially if left untreated. Chronic instability yields chronic inflammation that drives the development and advancement of osteoarthritis (OA) finally resulting in a progressive decline in rear limb function and comfort.

CCL Tear Diagnosis

Rupture of the cranial cruciate ligament is diagnosed by taking a thorough history and performing a comprehensive physical examination. X-rays of the knee can help in making a diagnosis by eliminating other causes of knee pain and revealing some typical degenerative changes associated with CCL tears. The classic history of a patient with a CCL tear is one of an acute onset of three-legged rear limb lameness after rigorous activity followed by a gradual return to light weight bear on the affected limb within 1-5 days. There are a few specific manipulations that are utilized during physical exam to reveal stifle laxity, which is also known as cranial drawer or cranial tibial thrust. Stifle laxity or looseness between the tibia and femur cannot exist if the cranial cruciate ligament is intact. The presence of cranial drawer is diagnostic for CCL rupture. In cases where a partial CCL tear is suspected, a definitive diagnosis is made prior to surgical repair by direct or arthroscopic visualization of the tear.

Treatment

The TPLO technique allows leveling of the tibia plateau (top surface of the tibia) to prevent or neutralize the abnormal forward motion of the tibia relative to the femur that occurs after CCL tear. The resultant repair is more durable than other techniques with fewer failures and a more rapid return to full function. Prior to surgery, the tibial plateau angle (angle of the joint surface) is measured on a digital x-ray. After performing the tibial osteotomy (cutting the bone), the tibial plateau is rotated a specific amount thereby neutralizing the abnormal cranial tibial thrust. The tibial plateau is then secured in place with a specially designed bone plate and screws. After the cut in the tibia heals, the bone plate essentially becomes a passenger for life meaning there is nothing to wear out or break down over time. The end result of the repair is a knee that is dynamically stable affording good limb function and a significant slowing of the progression of osteoarthritis.

