



Michigan Veterinary Specialistssm

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Tibial Plateau Leveling Osteotomy for Cranial Cruciate Ligament Rupture

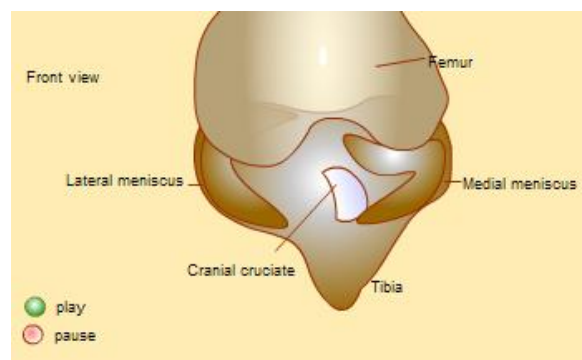
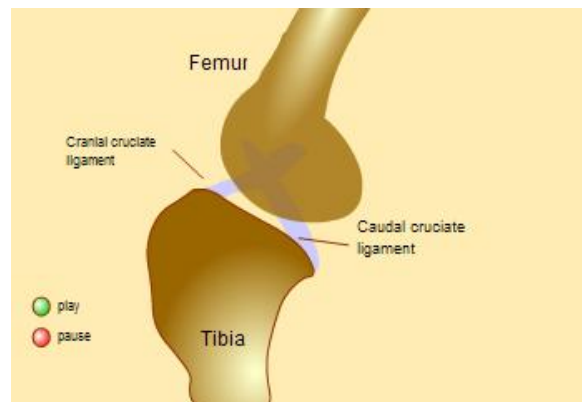
Key Points

Cruciate ligament rupture is the most common cause of hindlimb lameness in dogs. Many procedures have been developed to treat cranial cruciate rupture, however the TPLO is the only procedure that has been shown to reduce the progression of arthritis. Surgeons at Michigan Veterinary Specialists have an excellent track record of returning dogs to athletic or working activities following TPLO surgery.

What is it?

The canine knee (also called the stifle) is similar to a human's knee in many regards. The joint is made of the femur (thigh bone), tibia (shin bone), patella and supporting tendons and ligaments. Of great importance are the cruciate ligaments.

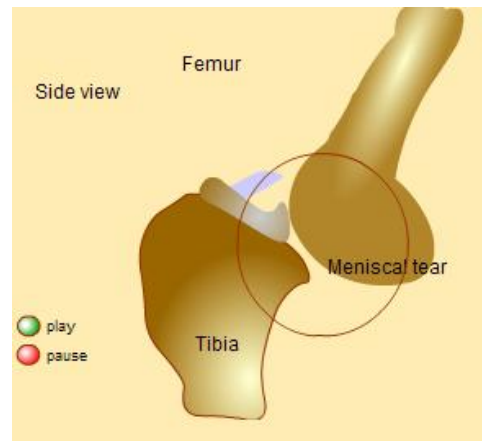
The cranial cruciate ligament (also known as the anterior cruciate ligament or ACL in humans) which is most commonly torn ligament in dogs results in lameness due to pain and instability of the joint. When the ligament is torn, the femur slides down the sloped top portion of the tibia called the tibial plateau. The cause of cruciate ligament tear is unknown, but conformation of the limbs and genetics may play a role. In about one third of the patients that have a torn cruciate ligament



also have a tear of the meniscal cartilage on the inner side of the joint (medial meniscus) - the two illustrations (right and below) demonstrate the dynamic displacement of a torn medial meniscus - this is very painful.

Anatomy

The knee is correctly termed the stifle joint in animals. Ligaments hold the stifle joint together. Ligament tears are common in dogs and cats. The cranial cruciate ligament is one of the main stabilizing structures of the stifle joint. The cranial cruciate ligament serves to prevent forward movement of the tibia bone (shin bone) relative to the femur bone (thigh bone), to prevent internal rotation of the tibia bone, and to limit hyperextension of the stifle. Two meniscal cartilages (medial and lateral meniscus) located inside of the joint are crescent-shaped pads that serve as cushions and provide some stability to the joint.



Tibial Thrust

When the cruciate ligament is torn, the forces exerted on stifle joint by the calf muscles cause the tibia bone to slide forward and the femur bone to slide backward with each weight-bearing stride. This results in excessive wear of the cartilage of the joint. As the tibia thrusts forward it stretches the tissues which surround the joint, which causes pain. When the femur bone becomes displaced down the slope of the tibial plateau, it will hop on top of the back portion of the meniscus and result in a painful tear of this cartilage pad. The tibial thrust is neutralized following the TPLO surgery, thus the instability of the joint is eliminated and the dog develops pain free movement of the joint once healing has taken place.

Clinical signs

Most dogs are middle-aged or older when the rupture occurs, however, young dogs can also have a similar injury. Breeds commonly affected include Labrador Retrievers, Rottweilers, Akitas, Border collies, Huskies, German Shepherds, and Mastiffs. Many small breeds also develop cruciate ligament tears. Common signs include: stiffness on the limb after resting for a period of time; varying degrees of lameness; not bearing weight on the limb; if the meniscus is torn sometimes a clicking noise is heard from the stifle when the pet walks on the limb or when the stifle is flexed (see animations above and right)

Diagnosis

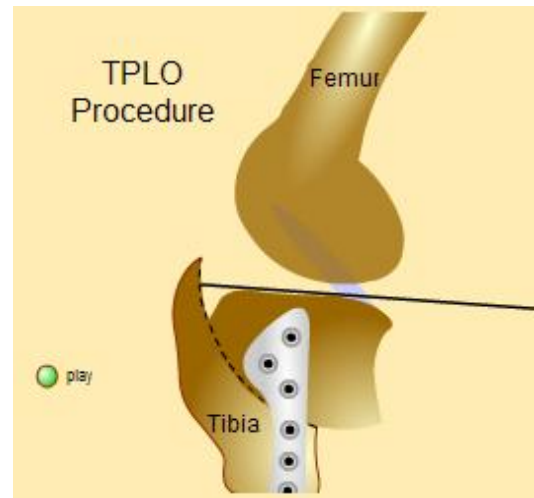
Physical examination will frequently reveal the following: lameness on the limb; instability of the knee (called drawer movement); and swelling of the knee joint. X-rays will show signs of swelling in the stifle joint, arthritis, and in some cases displacement of the femur bone down the slope of the tibia. About one third of the dogs will tear the cruciate ligament in the opposite limb within 1 to 2 years; some already have a cruciate

ligament tear already in the opposite stifle joint at the time of initial diagnosis. The opposite stifle therefore is also carefully assessed. These dogs frequently have arthritis in the knee joint even before the tear in the cruciate is obvious on physical examination, but early changes such as mild joint swelling may be detected with x-rays. An x-ray may show subtle changes of cruciate ligament disease that may not be obvious on physical examination.

Treatment

The first part of the surgery involves removing the torn ends of the cruciate ligament and examining the medial and lateral meniscus cartilages. If a tear of either meniscus is found, the damaged part of the meniscus is removed. If a partial tear of the cruciate ligament is noted, the ligament is left intact as it has a good chance to heal following the TPLO surgery. The illustration to the right demonstrates the TPLO surgery.

A curved cut is made in the top of the tibia and the bone is rotated in order to level the slope of the tibial plateau. A plate and six screws are used to hold the bones in place. If your pet is a very large dog, a larger plate is typically used and eight screws are inserted into the bone. The cut in the bone will heal in about 6 to 8 weeks.



Aftercare (Care at Home)

Give prescribed medications that control pain (analgesics) and reduce swelling in the stifle joint (nonsteroidal anti-inflammatories). Check the incision for signs of infection daily which include swelling, pain, discharge and redness. A cold compress should be applied to the stifle three times daily, for 20 minutes to reduce swelling. Starting on the third day after surgery, a warm compress should be applied to the stifle before range of motion exercises. At the conclusion of each exercise session, a cold compress should be applied to the stifle for about 5 minutes. This "at home" rehabilitation therapy should be continued until your pet is using the limb well. Return to us for an evaluation of the incision and stifle joint at two weeks after surgery. Radiographs (x-rays) of the stifle joint are made at 2 months after surgery to check the healing of the bone. Ten to 15 minute leash walks three times daily can be started once the bone is healed (about 2 months); the length of the walks is gradually increased on a leash over the next two months. After four months the exercise restriction is lifted. Working dogs should not return to their normal activities until six months have elapsed.

Potential Complications

Infection: unusual complication as strict sterile technique is used during the surgery. Poor bone healing: this can occur if your dog is overactive or if your dog is receiving medications such as chemotherapy or steroids. Patellar ligament strain: following TPLO surgery the patellar ligament will have a significantly increased pressure

exerted on it and may become strained if your pet is overactive during the healing phase. Rest and anti-inflammatory medication are used to resolve this problem. Tibial crest fracture: as mentioned above the patellar ligament will have significant increased force exerted on it and the bone that it is attached to will also have more force applied to it. The result can be a fracture of the tibial crest. This will typically heal without doing additional surgery. Implant failure: the screws may loosen if your pet's activity is not restricted or if he/she takes a fall. This may also result in a catastrophic fracture of the top part of the tibia. Arthritis: this is typically present in most dogs that have a cranial cruciate ligament rupture. The arthritis could progress with time and result in stiffness on the limb. Medications are used to help relieve these clinical signs. Anesthetic reactions are uncommon and rarely result in mortality under the care of our trained specialists. Meniscal tear: this is a complication that occurs in about 2% of dogs following TPLO surgery. This would necessitate another operation.

Prognosis

About 90% of the dogs having the TPLO regain normal or near normal function of the limb (full weight-bearing). We have operated many dogs that have resumed normal working activities (police dogs, hunting, agility). Dogs that have sustained a blowout fracture of the tibial plateau as a result of falling after surgery may not regain as good of function on the limb. Dogs that have been previously operated using another technique frequently are improved with the TPLO surgery, but the outcome may not be as good, versus a virgin knee that has received the TPLO surgery. The TPLO procedure will help to minimize the progression of degenerative joint disease. One study demonstrated a four fold reduction in the progression of arthritis following TPLO surgery, versus dogs that received the lateral imbrication technique.

Please visit http://www.michvet.com/library/surgery_tplo.asp to see this article on the web. It has animations which will help you understand the TPLO procedure.