Cranial cruciate ligament rupture (CCLR) is the most common orthopedic injury in dogs. The cranial cruciate ligament is one of several ligaments in the knee that maintain the stability of the joint. In people, the same ligament is called the anterior cruciate ligament. In both species the ligament may stretch or tear, leading to pain and osteoarthritis. CCLR can also lead to damage to the menisci in the knee. The menisci are two small cushions of fibrocartilage that sit between the bones of the knee. CCLR can make the menisci vulnerable to tearing, which is quite painful.

The cause of CCLR is unknown. In people this common injury is usually associated with trauma from athletic activities such as skiing; however, its occurrence in dogs suggests an underlying abnormality such as dysplasia or inflammatory or vascular disease.

The signs of CCLR vary, but they include an acute onset of lameness followed by mild improvement but continued lameness. Other dogs experience a moderately progressive lameness particularly associated with exercise or when the dog gets up after resting.

**Diagnosis of Cranial Cruciate Ligament Rupture**

CCLR is first diagnosed by palpation (examination and manipulation by hand). In a dog with a complete rupture, the veterinarian will be able to feel the instability that results. In dogs with stretching or partial tearing, there may be no instability at all, but your veterinarian may suspect CCLR after finding a firm swelling of the knee and seeing that the dog has pain when the joint is moved.

X-rays are routinely taken in dogs with CCLR, but this disease cannot be diagnosed on x-rays because the ligament does not appear on radiographs. Changes on radiographs with CCLR are identical to those of most diseases that affect the knee joint, although the x-rays may be helpful in judging the severity of osteoarthritis and ruling out other diseases.

CCLR may be diagnosed by arthroscopy before surgical treatment of the ligament rupture. Arthroscopy may also be used to clean out the joint and treat meniscal injuries with a smaller incision than what traditional surgery would involve. Purely arthroscopic treatments of CCLR are available but are not in widespread use, mainly because of concerns about effectiveness. In this way, the treatment of CCLR in dogs differs dramatically from that in people. In some cases we recommend arthroscopy in large dogs in combination with TPLO. Arthroscopy permits a greater examination of the joint than open surgery and does not require large incisions into the joint capsule which is very sensitive to pain.
Treatment of Cranial Cruciate Ligament Rupture

Many treatments for CCLR are available and there is widespread debate and disagreement about the usefulness of these treatments. Surgery is recommended for most dogs. In very small dogs it is possible for the knee to improve in stability without surgery as the body lays down scar tissue. In most cases this is best achieved with several weeks of strict rest, which helps the body to lay down scar tissue around the joint without the forces of vigorous activity. Treatment by rest alone may be attempted in any size dog, but in most dogs adequate stabilization of the knee will usually not be achieved, and the pain and lameness will continue.

Damage to the meniscus

The meniscus (menisci plural) are two small cushions made of fibrocartilage that sit between the bones of the knee. In approximately 35% of dogs they may be torn. This causes significant pain that can only be resolved by removing the torn portion. Damage to the meniscus can also happen after surgery although the incidence is much lower. There are certain techniques designed to prevent future damage although the value of these techniques is still debated. We carefully examine the meniscus either through open surgery or arthroscopy in every case. We always removed torn portions and in some cases perform techniques to protect the meniscus.

Extracapsular suture or Imbrication suture

More traditional surgical treatments of CCLR involve replacing of the ligament with either a natural or synthetic material. In these procedures, natural fibrous tissue, nylon suture, or wire is used to stabilize the knee. These procedures have been used for more than half a century, and the results are good in many cases. The outcome of these procedures are improved with physical therapy. The main concern with these procedures is that the stabilizing material can stretch or break, after which the knee is stabilized by scar tissue. This may lead to a decrease in the range of motion of the joint. We recommend extracapsular suture surgery for smaller dogs (less than 35 pounds) or when medical or financial limitations prohibit performance of a TPLO. Extracapsular suture may also be sufficient for less active large dogs.
Tibial Plateau Leveling Osteotomy

The most widely used technique in treatment of CCLR by board certified surgeons is the Tibial Plateau Leveling Osteotomy (TPLO). In this technique, the lower bone of the joint (tibia) is cut and rotated to eliminate the abnormal motion of the knee during normal activity. The advantage of this procedure is that it does not rely on materials that can stretch or break to stabilize the knee. TPLO may be specifically better in larger dogs that put more force through the knee and are more likely to stretch traditional repair methods. This technique has gained widespread acceptance because of reports of improved results, especially in larger dogs. We recommend TPLO in most of our medium and large patients and particularly in more active dogs.

How the TPLO Works

Researchers have suggested that one reason so many dogs rupture their cruciate ligaments is that there may be a deformity to the knee joint. This dysplasia causes the lower bone of the knee (the Tibia) to be sloped (tibial plateau angle) so that the upper bone of the knee (the femur) is always sliding down the tibia. This constant sliding places strain on the cruciate ligament, causing it to fail. This may also explain why the suture or other material used in other techniques also fails prematurely. The TPLO procedure corrects the tibial plateau angle to eliminate the sliding and the instability of the knee and the accompanying pain and slowing the progression of osteoarthritis.

Cruciate disease and osteoarthritis

Pain associated with CCLR may be caused by joint instability, damage to the meniscus, or osteoarthritis. There are no complete conclusions about how well each of the above surgical methods slows or stops the osteoarthritis, but it is accepted that eliminating the joint instability is important in protecting the menisci and slowing the osteoarthritis.

In mild or early cases of CCLR, medical management of the osteoarthritis after surgery is usually unnecessary, but in more severe cases medical management may be combined with surgical treatment to eliminate lameness.

Cruciate Surgery at New Engalnd Veterinary Surgery

Cruciate surgery at New England Veterinary Surgery is performed by a highly experienced and caring team who prioritize your pets welfare. Dr Schulz has been performing cruciate surgery including TPLO for over 15 years. He served as chief of surgery at the University of California and has published over 60 manuscripts in canine orthopedics. He is the author of several books including Small Animal Surgery, Small Animal Arthroscopy, and the Pet Lovers Guide to Joint Problems and Osteoarthritis.

At New England Veterinary Surgery we feel it is important to educate owners and help them make the best decision for their pet and their family. In many cases surgery may be performed the same day as your initial appointment.
Advantages and Disadvantages of Surgeries

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<th>Extracapsular suture</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td></td>
<td>• relatively simple procedure</td>
<td>• suture eventually stretches or breaks</td>
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<td>• does not require bone cutting and healing</td>
<td>• joint is eventually stabilized by scar tissue</td>
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<td></td>
<td>• lower cost</td>
<td>• scar tissue decreases range of motion</td>
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<td>• works well for smaller dogs</td>
<td>• does not eliminate the forces that cause ligament rupture</td>
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<tr>
<th>TPLO</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tr>
<td></td>
<td>• better outcome in medium and large dogs</td>
<td>• more expensive</td>
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<tr>
<td></td>
<td>• recommended for athletic dogs</td>
<td>• requires bone cutting and healing</td>
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<td></td>
<td>• no suture to break or stretch</td>
<td>• requires more surgical expertise</td>
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<td>• eliminates the forces that cause ligament rupture</td>
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Typical Discharge Instructions

1. Please keep Spot quiet for the next two weeks. After 2 weeks of rest we will begin leash walking. There should be no running, jumping or playing for the next 8 weeks at which time we will perform radiographs to evaluate his healing.
2. Spot should be in a crate any time he is unsupervised.
3. Spot should wear his Elizabethan collar any time he is unsupervised until suture removal to avoid his chewing or licking his incision.
4. Sutures should be removed in 10 to 14 days. We will do this here free of charge if that is convenient.
5. Please monitor Spot's incision. If you see any significantly increased redness, swelling or any drainage from the incision please let us know.
6. Spot has been discharged with Rimadyl for pain. Please give as instructed on the label. If Spot has any vomiting or inappetence please discontinue the Rimadyl immediately and contact us.
7. We have prescribed Cephalexin as a preventative antibiotic for Spot. Please give twice a day as directed on the label until gone.
8. You may apply a cold compress on Spot's leg during the first 6 days after surgery. This may be done for approximately 10 minutes three times a day being sure that the compress is at a comfortable temperature.
9. Spot should have a recheck appointment in approximately 8 weeks for a progress check.
10. If Spot seems painful please call us and we can prescribe additional medication. (Tramadol)
11. We have sent home a prescription of Acepromazine with Spot. If he is overactive please give as directed on the label.

Medications:

a. Cephalexin -Antibiotic
   Give one capsule twice a day until gone
b. Rimadyl -Anti-inflammatory
   Give one tablet twice a day.
c. Acepromazine -Sedative
   Give one to two tablets twice a day as needed for sedation.