

# Lameness in Dogs: Can You Prevent It?

This type of injury is one of the most common orthopedic conditions in dogs causing lameness - and the condition most often requiring surgery. Which breeds are most susceptible, what causes it and is there anything you can do to help your high-risk pet avoid it?

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## STORY AT-A-GLANCE

- Damage to cranial cruciate ligaments (CCLs) is one of the most common orthopedic conditions in dogs and the condition most often requiring surgery
- A recent study revealed the breeds most and least likely to acquire a CCL injury in the U.K., and which dogs are most likely to undergo surgery to repair the damage
- Signs of a potential CCL injury include lameness, abnormal body position, swelling of the knee and a clicking sound in the knee
- There are several contributors to CCL damage, most being lifestyle related and preventable, if addressed prior to ligament degeneration
- Treating CCL damage non-surgically requires a healing and maintenance protocol that includes a nutritionally optimal fresh food diet, pain management and joint support, rehabilitation therapy and a restricted strength-building exercise protocol

Injury to the cranial cruciate ligament (CCL) is one of the most common causes of lameness in dogs, according to the American Veterinary Medical Association (AVMA).<sup>1</sup>

The cruciate ligaments are bands of fibrous tissue, two per knee joint (called the "stifle") in the back legs of dogs. The ligaments connect the femur, which is the bone above the knee joint, and the tibia, the bone below it.

The cruciate ligaments are main stabilizers of the knee joint. They cross over each other, with one band running from the inside to the outside of the knee joint, and the other from the outside to the inside. In humans, the CCL is called the anterior cruciate ligament (ACL).

Inside the knee joint between the femur and tibia is cartilaginous material called the meniscus. The job of the meniscus is to absorb shock and assist with load bearing, and it can be damaged when there is injury to the cruciate ligaments.

## Breeds in the UK at Highest, Lowest Risk of CCL Rupture

Researchers at the University of London Royal Veterinary College (RVC), looked at risk factors for CCL rupture in dogs in the U.K., as well as factors that influence treatment options.<sup>2</sup>

The study used data collected by the RVC's VetCompass program, which includes electronic patient records at primary care veterinary practices throughout the U.K. The study authors evaluated 1,000 CCL rupture cases and a random selection of 500,000 other dogs without CCL injury, and found the breeds most at risk for CCL rupture (compared with mixed breeds):

- Rottweiler, at 3.66 times the risk
- Bichon Frise, at 2.09 times the risk
- West Highland White Terrier, at 1.80 times the risk
- Golden Retriever, at 1.69 times the risk

The breeds at lowest risk:

- Cockapoo, at 0.26 times the risk
- Chihuahua, at 0.31 times the risk
- Shih-tzu, at 0.41 times the risk
- German Shepherd, at 0.43 times the risk

## **Factors Influencing CCL Rupture Treatment Approaches**

Cranial cruciate ligament ruptures are treated both surgically and non-surgically, and the RVC researchers looked at which dogs underwent surgical repair, and which received some other form of therapy.

The study authors found that insured dogs and those weighing over 44 pounds were more likely to have surgery, while dogs 9 years and older and those with another major comorbidity at the time of CCL rupture diagnosis were less likely to receive surgical treatment. Additional findings from the study include:

- The median age at first diagnosis of CCL rupture was 7.4 years
- Dogs aged 6 to 8 years had the greatest risk (3.24 times the risk) of a diagnosis of CCL rupture compared with dogs less than 3 years old
- Spayed females, at 1.46 times the risk, and neutered males, at 1.42 times the risk, were more likely to be diagnosed with CCL rupture than intact dogs
- Dogs weighing 66 pounds or more had 2.19 times the odds of surgery compared with dogs weighing less than 22 pounds
- Insured dogs had 2.79 times the odds of surgery compared with uninsured dogs
- Dogs 12 years and older had 0.26 times the odds of surgery compared with dogs less than 3 years old.
- Dogs with a non-orthopedic comorbidity had 0.38 times the odds of surgery compared with dogs with no comorbidity.

According to Camilla Pegram, a VetCompass doctoral student at the RVC and lead author of the study:

*"This study has used the power of 'big data' to robustly address the risk factors for cruciate ligament rupture diagnosis and management in dogs. The factors affecting the decision to surgically or non-surgically treat dogs with cruciate rupture are now clearer, with future work underway to address the clinical outcomes of this decision."*

## Signs of a CCL Injury

- **Lameness** — Lameness can be acute, appearing without warning when a weakened CCL gives out while a dog is **running or playing**. This sudden tear or rupture can be so uncomfortable that the dog can't even put his foot down. Lameness can also occur over time, intermittently over weeks or months as the ligament gradually worsens. Active dogs may carry the leg when running, and toe-touch when standing. Often, the dog moves better after resting, but the lameness returns during activity.
- **Abnormal body position when sitting or lying down** — Dogs with an injured CCL may sit or lie with the affected leg stuck out to the side because bending the knee is painful.
- **Lameness and stiffness in both back legs** — CCL damage typically occurs first in one knee, but an estimated 40% to 60% of dogs develop the problem in the other knee within two years. However, if both knees are affected simultaneously, the dog may move stiffly or be reluctant to go for walks or get up from a sitting or lying position.
- **Knee swelling/thickening** — CCL injuries involve inflammation and swelling in the knee. Over time, scar tissue develops, and the injured knee appears larger than the healthy knee.
- **Clicking in the knee** — When a dog walks or runs on a knee that is no longer stable due to CCL damage, it puts stress on other structures inside the joint. The meniscus (the knee's "shock absorber") can be damaged from the knee moving in an abnormal way. This situation sometimes creates an audible "click" in the knee that can be heard when the dog moves around. Since meniscus injuries are painful, there is typically significant lameness present along with the clicking noise.

Rupture of the CCL can be partial or complete. According to the American College of Veterinary Surgeons (ACVS), and in my own experience, in the vast majority of affected dogs, ruptured ligaments have been gradually deteriorating over a period of months or years.<sup>3</sup>

With complete tears, only surgical correction or replacement will make the joint fully functional again. The type of surgical technique selected, and the competence of the surgeon dictate outcome success, along with rehabilitation therapy and long-term joint support.

However, the majority of dogs suffer from recurring sprains rather than complete ruptures. In these situations, I recommend avoiding surgery for as long as possible by instituting an intensive management protocol, which I'll discuss shortly.

## What Causes CCL Damage?

It is thought that disorders/diseases of the CCL are caused by a combination of factors, including degeneration of the ligament, obesity, poor physical condition, and genetics (including breed). The CCL injuries I treat are influenced by one or more of these five factors:

1. Trauma (e.g., being hit by a car)

2. Size, weight, and breed, along with sex hormone and vaccine status; the larger and heavier the dog, the more likely he is to stress his ligaments
3. Inconsistent exercise: dogs who don't get daily exercise that strengthens tendons and ligaments are at greater risk
4. **Poor quality, ultraprocessed diets**, especially if the volume of food fed is less than the recommended amount on the bag (which results in nutritional deficiencies that affect tendons and ligaments over time)
5. Homemade prey model diets fed by misguided pet parents who believe offering any type of fresh food is all that matters, recipes are unnecessary, and "balance will occur over time" without intentional additions to meet specific nutrient deficiencies

The vast majority of patients I see with CCL damage haven't acquired it as the result of trauma. Instead, the ligaments have been gradually breaking down over months or years. Large and giant breeds have more CCL injuries than smaller dogs, but they comprise only a small percentage of my patients. Genetics may play a minor role,<sup>4</sup> but about 75% of the dogs I see don't fit into either of these categories.

Dogs who've been **spayed/neutered** have more CCL damage than intact animals, which makes sense since sex hormones appear to have a protective effect on the musculoskeletal system.<sup>5</sup> Overweight and poorly conditioned dogs tax their ligaments more than lean dogs, so while "weekend warriors" are more at risk of ligament damage, most of my patients aren't fat or out of shape.

If you're guilty of only exercising your dog on the weekends, make a commitment right now to take her for daily rigorous walks. Walking uphill is great for strengthening the knees. Backyards don't count when it comes to aerobic exercise. Without daily ligament conditioning it's impossible for the body's tissues to remain resilient.

The CCL-injured dogs in my experience are active and healthy, not over-vaccinated, and many still have their ovaries/testes and therefore, their sex hormones. As an integrative vet, I eventually concluded that nutrition was a probable cause for the majority of CCL injuries I was seeing.

Both my Rottweilers ruptured their CCL's when I was feeding a homemade "prey model diet," which focuses on "balance over time" (versus knowing you're meeting minimum nutrient requirements) and are almost always short or completely devoid of adequate amounts of fresh vegetables, seeds, and nuts (which meet the need for hard-to-come-by nutrients important for tendon and ligament health, including micronutrients).

Nutritional deficiencies are an amplified risk when owners feed less than the recommended amounts of commercial dog food, because companies are not required to formulate on a metabolic basis, relating activity levels and calorie expenditure. For example, a 60-pound sedentary Rottweiler requires the same amount of vitamins and minerals as a 60-pound highly active Rottweiler, just fewer calories.

Currently, pet food companies don't account for this, so when you cut back on calories (the number of cups you feed), you are also inadvertently cutting back on nutrients. Since many pet parents are trying to keep their dogs at an ideal body weight by feeding less food, many of these pets aren't getting the minimum nutrient requirements to maintain wellbeing.

My animal chiropractor (who started as a human chiropractor) was the first to suggest my own dogs and my "prey model" or "80/10/10" (80% meat + 10% bone + 10% organ) fed canine patients were probably nutritionally deficient, specifically lacking in vitamins B1, E and D, as well as zinc, choline and manganese. Nutritional inadequacies and lack of ligament conditioning (resiliency) can be a root cause of many human ACL injuries, and the same is true for dogs.

As it turns out, the whole "overfed and under-nourished" phenomenon occurring in human populations is also true for most well-loved dogs; too many calories and too few vitamins, minerals, essential fats, and key amino acids leads to degeneration over time, for all species. When blended with conformational predispositions (in this case, knee ligament stress), the outcome is damaged soft tissue.

Several vitamins and minerals serve as cofactors for enzymatic reactions in the body, as well as the raw materials for tissue repair and maintenance. Food sources vary on the amount of specific nutrients present, and the flaw with the "balance over time" philosophy is that it does not account for rotation between a wide variety of foods still lacking in these key nutrients required to prevent degeneration, so it still occurs.

If you feed a homemade diet, it's imperative the recipe is accompanied by a complete nutritional analysis (as compared to minimum nutrient requirements). Most vets, nutritionists and wellness professionals agree: if you don't have a complete nutritional analysis, don't feed that recipe for more than a few days before rotating in recipes that you know meet minimum vitamin and mineral requirements.

## **Nutrition as a Likely Cause of Many CCL Injuries**

My dietary recommendation is to feed a homemade, fresh food diet you are absolutely sure is **balanced for optimal nutrient intake**, including 3.1 mg of manganese per 1,000 kcal (calories). This is the average amount of manganese provided by the canine ancestral diet.

The diet should also provide natural sources of collagen and glucosamine. Dogs who are fed a ligament-supportive diet and undergo strength conditioning should not have environmentally related degenerative cruciate damage over time. My recommendations for feeding a manganese rich diet:

- Follow a homemade recipe that provides nutritional information (including amounts of manganese per serving or 1000 kcal)
- Call the pet food company and ask what guidelines they follow, or how much manganese (per 1000 kcal) is in their food, so you know you're meeting optimal intake for your dog (AAFCO minimum is 1.25mg/1000 calories)
- Supplement, as necessary (with whole foods or a product such as Standard Process E-Manganese) to meet Mn requirements in homemade diets

In addition, it's very important to keep your dog lean and well-conditioned, preferably still hormonally active (opt for an **ovary-sparing spay or vasectomy**, when possible), and titered vs. over-vaccinated.

## **Pain Management and Joint Support**

The recovery and maintenance protocols I customize for my patients are based on each dog's specific circumstances, age, activity level and job (for example, agility athletes and working dogs have different ligament stress than other dogs).

Treating CCL disease non-surgically involves three essential strategies that should occur simultaneously: controlling pain, restoring function and strength, and supporting and improving joint health (to slow degenerative joint disease).

Medications should be given for as long as necessary to control both the pain of the CCL injury, as well as any maladaptive pain that has developed as a result, such as low back pain, however, creating a hybrid protocol of safer, natural non-steroidal anti-inflammatory nutraceuticals should be a goal within the first month.

I incorporate many natural anti-inflammatories for long term, safe pain management, including boswellia, devil's claw, feverfew, proteolytic enzymes, SAME, scutellaria, serrapeptase, superoxide dismutase (SOD), turmeric (curcumin) and ginger, and willow bark (dogs only — not for cats).

Instituting chondroprotective agents (CPAs) as soon as possible helps reduce further damage to joints. For genetically predisposed breeds, athletes, and working dogs this means beginning CPAs proactively, at 6 to 12 months. The most commonly used CPAs are Perna mussel (green lipped mussel), eggshell membrane, glucosamine sulfate, and MSM.

Dogs who have had substantial CCL injury should be on progressive joint supportive protocols for the rest of their lives to slow degenerative joint disease in the injured knee and improve ligament resiliency in the other knee.

I also use injections of Adequan and platelet-rich plasma therapy<sup>6</sup> to slow joint degeneration and promote joint fluid production in cases of chronic knee problems. Prolotherapy, which involves injecting small amounts of various natural substances into the soft tissues of a damaged joint, can be beneficial for these patients as well.

There are some excellent homeopathic remedies, Ayurvedic, western and Chinese herbs that can be beneficial as well, but these natural treatments should be given in addition to CPAs, not in place of them.

## **Rehabilitation Therapy and Exercise**

There are several orthopedic braces that can be beneficial for limiting range of motion and supporting the rest of the body (including the over-stressed, opposite knee joint). Matching the type of brace to the breed and body of the dog is important, so work with an animal rehab therapist to determine which brace will be most beneficial for your dog.

It is imperative movement is controlled and specific strengthening exercises are instituted while undergoing knee rehabilitation or further damage (including meniscal injury) can occur. Bracing and resting is not sufficient for knee recovery.

Once a dog's pain and lameness are addressed, a physical rehabilitation program should be instituted to improve function and rebuild strength. I have found water therapy to be very beneficial in helping dogs recover from CCL injuries, because it helps build strength and muscle mass while minimizing discomfort. On an underwater treadmill, your dog can exercise in a normal posture without putting excess weight on damaged joints. Water also provides resistance during movement, which helps strengthen muscles.

During this time, I also typically recommend laser therapy, the **Assisi loop** and acupuncture and electro-acupuncture to help alleviate joint pain. Chiropractic care and joint mobilization can improve your dog's postural imbalances and may help reduce compensatory stress on the other knee. In addition, massage is excellent for tight, overworked muscles.

It's important to note that even with intense therapy, there are cases where complete rupture eventually occurs. That's why many dogs ultimately require CCL surgery to maintain their quality of life. Every patient's situation is different, so the challenge is finding the methods of treatment that are most suitable and helpful for the individual pet and his family. If your dog requires surgery, find a seasoned veterinarian who is competent with orthopedic procedures and start rehabilitation therapy as soon as sutures are removed.

## Sources and References

<sup>1</sup> [AVMA.org, March 16, 2023](#)

<sup>2</sup> [Pegram, C. et al. The Veterinary Journal, Volume 292, February 2023, 105952](#)

<sup>3</sup> [American College of Veterinary Surgeons](#)

<sup>4</sup> [Baird, Arabella E G. Investigating the genetic basis of cranial cruciate ligament rupture in the Newfoundland dog. \(2013\) Doctoral thesis, University of Liverpool](#)

<sup>5</sup> [VCOT Archive, Issue 3, 2003](#)

<sup>6</sup> [dvm360, April 1, 2014](#)

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