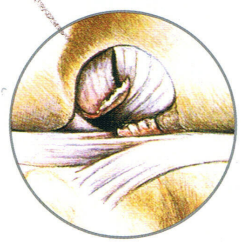
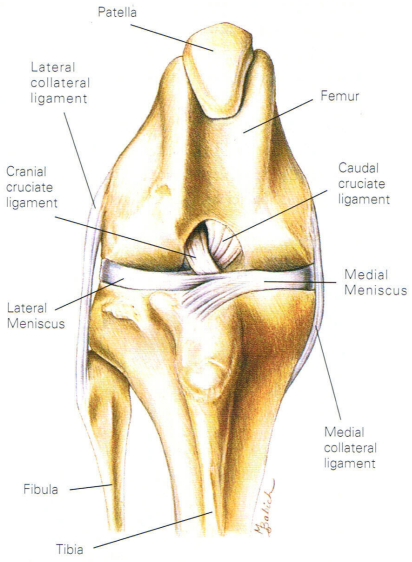
When Knees Go Bad

Options and outcomes for the number-one canine orthopedic injury

By Roxanne Hawn



Detail, ruptured cranial cruciate ligament



Anterior view of a normal canine "knee" (stifle) joint and cranial cruciate ligament. Weight-bearing use exerts constant tension on the ligament. A CCL rupture creates joint instability.

EVEN AS A PUP, MY DOG GINKO LOVED THE BALL. A Lab/Greyhound mix, he played fetch with hilarious speed, stopping only to wriggle in the snow or splash in the creek, depending upon the season. He also hiked the Rocky Mountains near our home, often wearing his own backpack. Then, in the summer of his third year, he started acting stiff and sore at night, but always seemed fine the next morning. Despite significant cutbacks in activity, the pain cycle continued.

After a visit to the vet, we had a diagnosis: Ginko had ruptured cranial cruciate ligaments (CCL) and torn medial meniscus in both knees. My otherwise healthy, active boy had a big, bad, bilateral boo-boo, similar to anterior cruciate ligament (ACL) and cartilage injuries suffered by humans.

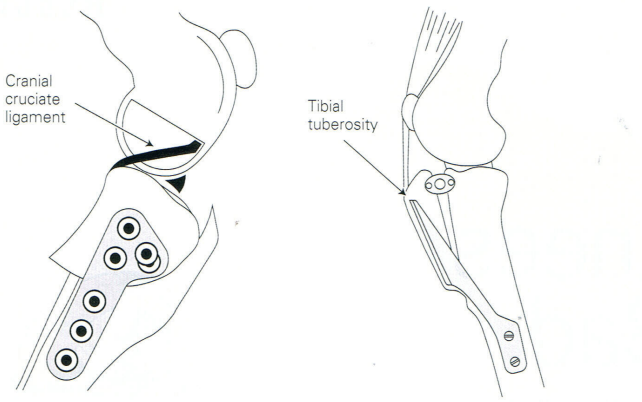
Ginko is not alone. "The ruptured CCL in the dog is the most common orthopedic problem we deal with," says Paul Gambardella, VMD, MS, ACVS, hospital director at Oradell Animal Hospital in Paramus, New Jersey. Across the country, surgeons report seeing as many as a half-dozen cases per week. "The most knee surgeries I've done in one week is 17," says James Cook, DVM, PhD, ACVS, director of the Comparative Orthopaedic Laboratory at the University of Missouri.

Improved Diagnostics

The CCL is the most important ligament in the canine knee, or stifle, providing stability during weight-bearing use. When the CCL ruptures, either partially or completely, the unstable joint begins its decline, and arthritis or other inflammatory conditions result.

While ACL problems in people come from acute injury (stop, twist, pow!), CCL ruptures in dogs are more insidious. "I would say less than 5 percent are truly athletic injuries," says Cook. "The confusing thing is that there is often an event when the owners notice it. So, they think that's when it happened, but this is really a slow, degenerative process. We don't know if it's pure biodynamics, but I can say for sure that when we see these dogs, who, say, jumped for a Frisbee or fell in a hole, if we take x-rays that day, we can see radiographic changes that are pretty severe, so we know there was some micro-instability brewing at the time."

Michele Steffey, DVM, ACVS, a small-animal surgeon and lecturer at Cornell University, explains, "Cruciate disease in dogs does not really match cruciate disease in people, so it's been harder to get at the underlying causes." In the past, veterinary



Both the TPLO (left) and the TTA (right) change the geometry of the knee joint. In the TPLO, the top of the tibia is cut off and repositioned, and a plate holds the joint in place until the bone heals. The TTA works by repositioning the knobby top of the tibia, the tibial tuberosity.

students learned the three Fs of cruciate tears, she adds. "The textbook CCL case was 'five, fat and female.' That's changing in that we're seeing more younger dogs that don't necessarily fit that scenario."

This injury is more common in larger breeds, including many types of pure- or mixed-breed Retrievers (Labs and Goldens, especially), Rottweilers, the Arctic breeds, Mastiffs, Newfoundlands, standard Poodles and German Shepherds, among others. Small dogs in the Spaniel family, and even Beagles, Bichons and Dachshunds tear CCLs too. "We talk about epidemiology, and ... the poster children for certain diseases," says Cook, "but this can happen to any dog. I tell my students, 'Never rule it out in any breed.'"

"We're definitely seeing an increased number of cases, and we're also diagnosing with more precision than we were before," says W. Preston Stubbs, DVM, ACVS, who works at Alameda East Veterinary Hospital in Colorado (made famous on Animal Planet's *Emergency Vets*). "I shudder to think about the dogs we missed 15 years ago. I can't tell you how many cases are referred to me for hip problems, and it's actually knees. Lo and behold, what's really bothering them ... is a partial CCL tear."

A Range of Remedies

Treatment for CCL ruptures falls into three categories: conservative, non-surgical; intracapsular (inside the joint) surgery; and extracapsular (outside the joint) surgery.

Conservative treatment involves strict rest combined with nonsteroidal anti-inflammatory medication for six to eight weeks. Following re-evaluation, controlled activity can be reintroduced, and ongoing pain management is provided as needed. This option works best in dogs weighing less than 35 pounds. Basically, the knee develops enough scar tissue to provide some joint stability, even if range of motion is limited and osteoarthritis is likely to progress more quickly.

Conservative treatment rarely suffices for larger dogs; a retrospective study notes a 70 percent failure rate in dogs over 50 pounds. Daryl Parrish of Austin, Tex., tried conservative treatment for his 6-year-old Lab, Hannah, for several months. After keeping the 90-pound charmer off her feet, he slowly reintroduced activity, including playtime with his other Lab. "It did get a little better," Parrish explains. "She started putting weight on [her leg], and she started running a little

bit, then maybe a month after that, we took them to the park. She ran a lot and started limping again, so at that point, we knew we were going to have to do something."

Parrish, in consultation with his general practice veterinarian, chose an intracapsular technique in which a synthetic material mimics the CCL function. Hannah had surgery in January 2005. "She's probably back to 80 percent," Parrish notes. "You can tell her muscles need to get [stronger], and she doesn't have any endurance, but she's having fun with our other dog again."

Among the many extracapsular surgeries available, the TPLO (tibial plateau-leveling osteotomy) is often the procedure of choice. Rather than mimic CCL function, the TPLO changes the geometry of the knee to decrease thrust during weight bearing. Essentially, surgeons flatten the tibial slope by cutting off the top of the tibia and repositioning it with a plate and screws. Tibial slope in itself is not a cause of CCL injury, but works as a solution.

When it was first introduced by the late Barclay Slocum, DVM, in the early 1990s, some in the veterinary community were appalled at the idea of cutting healthy bone to solve a soft-tissue injury. The idea still seems invasive to some, but many surgeons, including the one who did Ginko's knees, say they see such great results with the TPLO that they won't go back.

Amanda Clase of Hamilton, Mont., has seen both sides of the issue. Her American Pit Bull Terrier, Sydney, tore her first knee at the age of two and had intracapsular surgery, which was performed by her family veterinarian. When the second knee went a year later, Clase chose a board-certified surgeon and TPLO. "The TPLO, in my opinion, is a better surgery," says Clase, who has been through nine surgeries with Sydney for bad hips, knees and elbows.

Recovery from TPLO is no simple task. Surgeons recommend strict rest—no running, no jumping, no stairs—for at least eight to 12 weeks. Dogs are allowed out on leash only for potty breaks, and for very controlled leash walks, which increase in duration as healing progresses. It takes three months for the cut bone to fully heal, and most dogs return to normal function five or six months post-op.

Wendy Chase of Monument, Colo., faced a decision when her Great Dane-mix, Echo, ruptured the CCL in both knees. For the first knee, done in December 2004, Chase went with the TPLO. For the second, however, there's a new option. Called a TTA (tibial tuberosity advancement), the new extracapsular surgery slices the knobby part of the tibia lengthwise, and then a spacer and bone graft are inserted, and everything is screwed into place. This procedure, like the TPLO, changes the geometry of the knee joint. It was invented by Slobodan Tepic, a biomechanical engineer in Zurich, Switzerland, best known for his cementless total hip replacement, used in both people and pets.

Stubbs at Alameda East was one of the first American veterinarians to learn the TTA procedure from Tepic. The hospital's surgeons began doing TTAs in July 2003 and since then, have performed 100 to 150 of them. Stubbs says, "I would say it's moved from investigational to early significant clinical use."

One Size Doesn't Fit All

Overall, these surgeries have a 90 percent success rate in stabilizing the joint and resolving lameness and pain, despite future arthritis. "It's a matter of degree," says Oradell's Gambardella. "Even with surgery, ... arthritic changes ... occur."

It would be nice to say that one surgical procedure far outshines the others, but that is not the case. Gait- and force-plate analysis have not proven one technique to be superior to the others, according to researchers.

For that reason, Steffey at Cornell tailors the surgical choice to the dog and the client, depending on the dog's lifestyle (agility course vs. couch), the financial limitations of the client (older procedures are generally half the cost of newer ones) and

the anatomy of the dog (size, weight, build). Vicki Wilke, DVM, ACVS, and PhD candidate at Iowa State University, who is looking for cruciate disease genetic markers in Newfoundlands, agrees. "I do the TPLOs," she says, "and I think dogs do well. Lately, I'm just very annoyed that people feel that the TPLO is the only way to go. Even most surgeons feel that if you are not doing TPLO, you are doing malpractice, and that is just not the case."

"In my opinion," she adds, "not all dogs require surgery, but right now that's not the standard of care."

Currently, most surgeons do believe that surgery is the best option for healthy dogs of any age. However, circumstances like severe obesity, liver or kidney disease, cancer, Cushing's disease, or diabetes can predispose the dog to anesthetic risks. In such cases, surgery is often delayed, or avoided altogether. Examination and blood work can uncover these potential risks.

Concerns are also being raised about an association between the original Slocum TPLO plates and osteosarcoma. But, as surgeons point out, a bevy of combined factors can increase the risk of bone cancer; any cut or broken bone fixed with a plate and subject to complications is at higher risk.

Randy Boudrieau, DVM, ACVS, and professor of surgery at Tufts University, presented some data on the topic of TPLO and cancer at the Veterinary Orthopedic Society (VOS) meeting in March 2005. "There have been a few cases seen in the proximal tibia, which *seem*, key word," he emphasizes, "higher than what we would expect to see. That has to do with the fact that the proximal tibia is a site where osteosarcoma naturally occurs. Differentiating this natural occurrence rate from an increased rate is a big issue, and it's a question not easy to answer without a well-designed epidemiological study that accounts for all cases."

Home Care Is Critical

Ultimately, all the surgeons interviewed agreed that owner participation and management of post-op care is critical. That means massage, stretching and controlled leash walks. This is where obedience training pays off, especially with big dogs. It also means containment—previous crate training helps. It might even mean finding access to doggie physical therapy, including underwater treadmills and therapy pools. As Cook says, "I tell clients, 'Your part is as important, if not more, than mine.'"

If a knee injury occurs, dog owners must consider the implications of treatment options, including financial and recovery hardships. Yet, it often boils down to quality of life—for many, a dog who cannot run or play without pain or lameness is just not an option.

FACTS AND FIGURES

>The most common symptom of CCL injury is hind-limb lameness, ranging in severity from limping to carrying the limb entirely.

>Because CCL injury is common in breeds with a predisposition for hip dysplasia, x-rays of both hips and both knees helps in diagnosis.

>As a general rule, 40 to 60 percent of dogs with one CCL injury tear the second knee one to two years later.

>Younger, large-breed dogs are more likely to tear both CCLs at the same time.

>Dogs under 35 pounds do better with conservative, non-surgical treatment than bigger dogs.

>Up to 20 percent of dogs with partial CCL tears and 53 percent with total CCL ruptures also damage the medial meniscus (cartilage) in the knee.

>All told, surgical treatment has a 90 percent success rate in stabilizing the joint and resolving lameness and pain. Following successful surgery, that knee cannot experience a repeat CCL injury.

>Even with surgical treatment, however, osteoarthritis will develop in the joint.

>While high-quality, lifelong nutrition and weight management are always good ideas, there is nothing pet owners can do to prevent a CCL injury in their dogs.