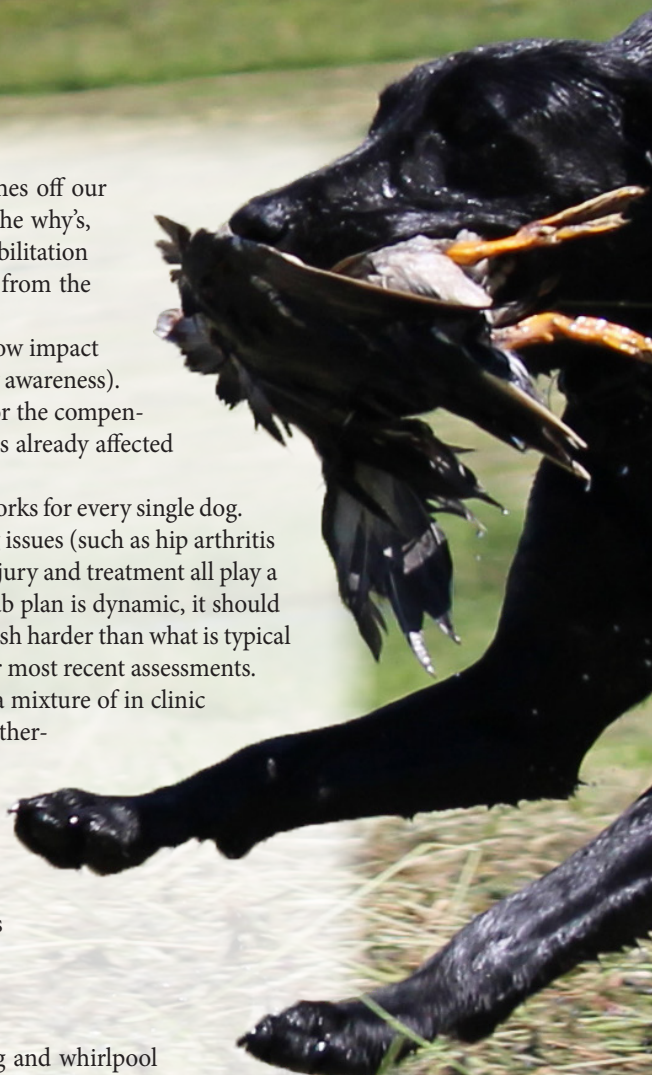
Crucial Facts about
CRUCIATE DISEASE

By Sarah Shull, DVM, CCRT, ACVSMR (Canine) Resident

Part IV



CONGRATULATIONS, you have made it to the fourth series! This article finishes off our discussion of cranial cruciate ligament disease. We have talked about the how's, the why's, and even delved a little into treatment and prevention. Here we will focus on rehabilitation therapy after cruciate injury and surgery and give updates on our 6-year-old FC from the second issue who had his TPLO in June.

The goals of rehabilitation therapy in cruciate disease are tissue strengthening, low impact weight bearing, joint range of motion, muscle maintenance and proprioception (leg awareness). As a patient is undergoing therapy, the entire body is worked with to help adjust for the compensation of the back muscles and front legs, as well as the other hind leg that often is already affected with cruciate disease.

There is no rehabilitation program recipe book that accurately gives a plan that works for every single dog. Factors such as the level of conditioning before the injury or surgery, other existing issues (such as hip arthritis or elbow disease), the type of surgery performed and the length of time between injury and treatment all play a role in what treatments work best and when to perform them. Additionally, a rehab plan is dynamic, it should change regularly in response to the patient as they progress. Some weeks we may push harder than what is typical and other weeks in the same patient we may rein it in for a week or so based on our most recent assessments.

Rehabilitation is a combination of exercise modifications and restrictions with a mixture of in clinic rehab and at home programs for the best outcome. A properly done TPLO in an otherwise healthy patient without complications will typically heal and function better at about 8 weeks post-op when compared to before the surgery even without rehab. However, rehab maximizes return to sport and minimizes time off by keeping the joints and muscles as healthy as possible in the time post-op.

Although we will mainly focus the discussion on post-op TPLO recovery, much of this approach can be used for pre and post-op for other surgical options and with conservatively managed stifle injuries.

Common Rehabilitation Modalities

Hydrotherapy – Hydrotherapy comes in many forms, in clinic pool swimming and whirlpool treatment tubs, at home swimming or wading and the underwater treadmill (UWTM). While each have advantages and disadvantages, the UWTM gives us the best control of variables during weight bearing on the hind limbs. We can change water height, speed, incline and resistance with jets while avoiding natural water hazards such as difficult to access shorelines, also it is not weather dependent. Hydrotherapy plans for our field dogs often include many of these options together.

Swimming is a form of hydrotherapy that can be used in cruciate rehab, but how early in the program is very dog and clinician dependent. Although everyone agrees, they shouldn't be in the water before the incision is healed, some prefer them to wait until the 6-8 week time frame before beginning swimming and others begin

at the 3-4 week mark. The concern is the exaggerated motion of the hind legs kicking in the water may actually cause too much motion at the stifle. Swimming is different than underwater treadmill work. In addition to swimming and UWTM exercise, I will often recommend wading in the water chest deep paralleling the shore so that the hindlegs get a controlled low impact work out like the front. This may require you in waders. And please avoid mucky, slippery shorelines during this time and this is not the time for long land entries. They should not be off leash until they are elbow deep in the water.

Laser therapy – Known as photobiomodulation, laser therapy is using light energy to affect underlying tissues. The goals of therapeutic lasers are to promote healing, decrease inflammation and increase circulation to an area. The effects of a laser can be variable as it can be affected by the skin and coat pigment, tissue type and abilities of the specific device used. Although many effects of laser therapy can be quantified in a laboratory on cells in a dish, veterinary research on effects on using or not using laser in a specific type of condition is still lacking. Clinically, my personal experience supports using laser post-op TPLO and for stifle osteoarthritis, but keep in mind this is within a complete rehabilitation plan.

Cryotherapy – Cryotherapy is a cheap easy way to minimize inflammation and pain in the cruciate patient. This is typically done with a commercially available gel pack. Frozen bags of vegetables although better than not icing, do not provide the consistent cooling the gel pack does. Alternatively, homemade alcohol and water mixes may actually be too cold. Typical icing protocols include 10-15 minutes of icing two to three times a day in the week post-op but change to after exercise or whenever inflammation is detected in weeks two to eight. Circulating compression icing can be used immediately post-op. The key to icing is to do it early, in order to anticipate the

Rimfire's I'm Your Huckleberry, "Huck," owned and handled by Fred Lehnertz; photo by Sarah Shull, DVM.

swelling and prevent it. Icing can also be used for stifles that still suffer from osteoarthritis long-term, specifically after exercise and before rest.

Passive range of motion – Passive range of motion (pROM) is taking the joint through its range of motion in flexion and extension without a muscle contraction. This is best done in a relaxed patient. pROM is easy and well tolerated, but has a steep learning curve, don't be afraid to have the rehab therapist show you multiple times and then have you demonstrate for them, so the treatment is done properly. pROM helps to maintain tissue flexibility around the joint while keeping the blood, joint fluid and lymphatics circulating in and around the joint. Typical post-op TPLO protocols include 10-15 repetitions two to three times a day starting early in the post-op time and continuing until the patient is consistently weight bearing. Though pROM is very helpful with tissue maintenance, muscle building is not achieved by pROM, therapeutic exercises are needed for that.

Therapeutic exercises –Targeted exercises in a controlled setting are useful to mimic functional mobility activities. These include but are not limited to transitions from a sit, a down, and a stand in all combinations, front end elevated on step, weight shifting side to side and front to back, stepping over and around objects, side steps and back steps. These exercises are meant to be slow and controlled with active patient participation often with a treat lure. Although these exercises done wrong can rarely harm a patient, doing them without proper form and technique may not provide any therapeutic benefit. These are often done daily with the simple ones beginning in the first week to two of surgery and advancing in difficulty each week if patient progress is appropriate.

Miscellaneous – Many other modalities are used based on therapists' preferences, experience and patient needs. Neuromuscular electrical stimulation (NMES) or transcutaneous electrical nerve stimulation (TENS) can be used for pain and targeted muscle building. Therapeutic ultrasound can be used to increase tissue elasticity and health during healing. Pulsed electromagnetic field (pEMF) therapy can be used in various loops, beds, and other treatment devices to decrease pain and increased tissue healing.

When to start rehabilitation therapy?

Parts of rehab such as icing, pROM, and therapeutic laser can begin as early as the day of surgery whereas underwater treadmill exercises or hydrotherapy may be instituted after the incision is healed at 2-3 weeks post-op. It is beneficial to get in touch with whoever will be managing your dog's rehab as early in the process as possible when the cruciate diagnosis is made so scheduling and planning can begin.

Rehabilitation Timeline post TPLO

General guidelines from the Veterinary Rehabilitation and Physical Therapy 2nd Edition textbook by Drs. Millis and Levine organize post TPLO rehabilitation into phases based on time frame and outcome measures and give examples of in clinic rehab, the at home program and criteria to move to next phase. Those phases include Preoperative (diagnosis to time of surgery), Non Weight bearing to toe-touching (immediate to 48-72 hours post-op), Early Weight bearing (72 hours to 3 weeks), Consistent weight bearing (3-6 weeks), Improved weight bearing at a trot (6-8 weeks), and Consistent weight bearing at trot (9+ weeks). More detail about these phases from their guidelines are summarized below.

In the preoperative phase, we would be focusing on pain relief and managing inflammation through icing, laser, medication and supplements, and restrictions. In addition, we spend time acclimating them to therapies such as the underwater treadmill for an easier transition post-op. Many of our patients during this pandemic were in this phase much longer than typical due to lack of access to care. This is the time we are taking baseline measurements of goniometry (angle of stifle movement in flexion and extension), thigh girth muscle measurement and beginning our weight loss plan if indicated.

As the early post-op pain and inflammation subsides 48-72 hours postop, weight bearing improves typically to toe touching. During this time, we continue our pain management plans and our restrictions and typically our patients will begin to tolerate more pROM exercises. At this stage, we expect the range of motion (goniometry) of the stifle to be at least 60-80 degrees in flexion and 120-135 degrees in extension before we go on to the next stage. Normal goniometric angle measurement is approximately 40 degrees of flexion to 160 degrees of extension.

Measuring thigh muscle girth

Weight bearing of the surgical limb increases quickly in the first couple of weeks and should be noticeable week to week. Pain medications typically are weaning down after the first 10-14 days and used more as needed to address discomfort or increased limping. Leash walking, pROM, and icing continues. Therapeutic exercises begin to be part of the daily routine, encouraging weight bearing in a low impact way while protecting from injury and decreasing compensation. Aquatic therapy is often begun during this time as long as the incision is sealed. Therapeutic laser is typically done once to twice weekly with rehab treatment sessions. Weight and BCS is reassessed and nutrition plan

are changed as needed, being mindful to not deprive the muscles while decreasing fat. The range of motion of the stifle continues to improve, which typical measurements at this stage of 50-60 degrees of flexion and >150 degrees of extension.

At 3-6 weeks post-op, this is where things get more and more fun for you and the dog. But also, this is a time to remain hypervigilant. Your dog (and you!) may need to be convinced that the restrictions are still necessary. Many of these dogs begin feel better at this stage than they have in a long time, the pain is relieved, the instability during weight bearing is gone and they have dog to the line in their heads. However, the bone is still healing, and we are not ready yet to return to normal activities. Hang in there! The exercises get more fun, we oftentimes are working on having them step over short objects, working on correcting their sit and posture and increasing the difficulty and length of our walks. The underwater treadmill exercise is increasing in time and speed, and often inclines are added to shift the weight more to the rear legs during exercise. Our stifle flexion is increasing during this time. Modalities such as therapeutic ultrasound, thermal/heat therapy, and laser may be used regularly to increase flexibility if the tissues are stiff. Normal progression over this timeframe is better and better use of leg with less obvious if any lameness at a walk and decreasing lifting the leg to carry it at faster speeds.

Six to eight weeks postop, the walks become longer and more varied, and the exercises are more fun and challenging. This step is to prepare for the activities that the dog will get to transition to once bone healing is confirmed. The weight bearing should be almost normal at this point to the average observer at both a walk and a trot with minimal pain. Occasional intermittent lameness might be seen with an increase in activity, but it should resolve quickly.

After the 8 week recheck when the bone is assessed for healing on a radiograph (X-ray) then more directed return to sport activities commence. This is an active and terrifying time. The surgery has been a success, the all clear is given, now to decide what gradual return to activity looks like. With favorable palpation of the stifle and the radiographs showing proper healing, I am less worried about the surgical leg, I am watching the other side close worried that the atrophy of all tissues during the time off has even increased the chances of it being injured if we return to full activities too soon.

For every day that the leg is not used correctly, including the time of lameness before surgery, it can take up to 3 days for full return of strength to all tissues.

Additional timeline explanation and prevention strategies from Dr. Jennell Appel

Rehabilitation: Key to Success

Stifle rehabilitation is divided into four phases: Acute, Intermediate, Advanced Strengthening and Return to Sport. Even though there are no cookie-cutter protocols that apply to every dog with a cruciate injury, our goals for every phase of recovery remain the same across the board.

In the acute phase of rehabilitation (1-2 weeks post-op), our goals include controlling pain and inflammation, maintaining joint range of motion, and averting progressive muscle atrophy. Passive range of motion exercises, icing, laser therapy and neuromuscular electrical stimulation (e-stim) are all used to achieve these goals. Superb pain control is critical at this stage of recovery, as discomfort will inhibit manual therapies and ultimately lead to decreased range of motion and restriction.

The intermediate phase (3-8 weeks post-op) is initiated when the dog is approaching full range of motion and is exhibiting no pain or tenderness on joint palpation. Within this phase of recovery, we focus on improving weight bearing and muscular strength and endurance. Laser therapy, massage and e-stim are all continued, with static weight bearing and concentric/eccentric exercises added in. Hydrotherapy is also beneficial at this stage, in the form of either an underwater treadmill or whirlpool.

Advanced Strengthening begins in my book at around 8 weeks post-op, or when the osteotomy site has healed, and usually continues into week 12. Goals of this phase include increasing endurance, neuromuscular control and core strength. Proprioceptive and Stabilization exercises are introduced, which usually entails the use of obstacle courses, balance boards and balls, and cavalettis. Land or underwater treadmill conditioning is an excellent form of exercise at this stage.

In most cases, the Return to Sport phase of rehabilitation begins around 12 weeks post-op. My personal requirements for this stage are: 1. No observable lameness at a walk, trot or run. 2. No pain or tenderness on joint or muscle palpation. 3. Muscle mass of surgical limb at least 80% of contralateral limb. At this point, sport specific training begins and is carried out three times weekly with one day of rest in between. I prefer to start my retriever athletes off with either water marks or water blinds for the first two weeks of training, before returning to land work. Full activity should be performed without any observable signs of lameness, joint swelling, or discomfort on range of motion of the surgical limb. Warming up prior to training, as well as cooling down with a 5-10 minute constant pace walk, should be a part of every session. Placing your retriever athlete in the care or under the supervision of a certified canine rehabilitation therapist is ideal for facilitating return to sport and preventing secondary injuries while recovering.

Prevention

We now know that there are many predilections to cruciate disease that we cannot control. However, there are several things we can do to minimize the chances of injury based upon the things we can prevent.

Consider the following:

1. **Constant Pace Warm-Up and Cool Down walk prior to and following training/competition**
2. **Endurance training – Swimming or Roading two to three times weekly**
3. **Early intervention upon lameness**
4. **Glucosamine/Chondroitin joint supplementation (Dasuquin) daily**
5. **Yearly physical examinations and blood work**
6. **Tick prevention**

Jennell Appel, DVM, CCRT, SportVet Mobile Canine Rehabilitation and Sports Medicine

Crucial Facts about Cruciate Disease

Follow-up after surgery

Typically, a check on incisional healing and any staple or suture removal is done at approximately 14 days. If the dog is progressively doing well with no increase in pain, lameness or systemic illness, the next surgical recheck is 8 weeks post-operative for evaluation and radiographs of the stifle to check on bone healing and health of soft tissues.

The purpose of radiographs at the 8 weeks post-op time are to assess bone healing at the cut site, inspect for inflammation of soft tissues around the knee (specifically thickening of the patellar ligament) and look for early signs of infection around the screws and plate.

Although it may seem like your dog is doing great at this time and possibly doesn't need a recheck, this is not the time to let your guard down. There are subtleties on the radiographs and by palpation that can be key to heading off setbacks that would delay the return to activities you both enjoy.

Purposes of restrictions

Restrictions are to help mitigate risk. All tissues change in the post injury time and adjust anytime full weight is not being put on the leg. The muscle atrophy is obvious to the eye and hands, but inside the joint, the cartilage is thinning, and the joint fluid is losing viscosity as the leg isn't used properly. The tendons and ligaments stiffen and temporarily may lose their tight organized structure. Those tissues will heal with return to proper use but lifting restrictions too early can cause even more problems in other tissues. Each of these tissues return to strength at different rates therefore, a properly designed rehab program that addresses all the different tissue responses to disuse and return to activity is important to ensure a safe return to normal activity.

Our early pre- and post-op restrictions include crate and leash restrictions. This is to minimize inflammation and other injuries. The initial exercise may be as little as just walking them around on a leash for airing and then progressing week by week, adding 5 minutes to each walk weekly, with multiple walks occurring daily. These are to be done on a well-controlled short leash and often with towel or sling support to prevent slips and falls. One fall can be catastrophic especially in the early post-op period as implants and bone can break and loosen causing immense pain and revision surgeries being necessary. Medications such as Trazadone can be used to help decrease anxiety from being restricted.

During this time, is it imperative that you limit your dog's access to the incision. Licking causes micro-trauma to the skin, promoting inflammation and infection. An infected incision is a common cause of bacteria traveling to implants (plate and screws) causing infection that may require additional surgeries and weeks to months of additional healing.

Rehabilitation can be overdone. Although the exercises seem minimal at times, if prescribed and done correctly, they can be very targeted. If too many repetitions or sessions are performed or they are progressed too quickly, setbacks can occur. One of the most common consequences of too much activity or exercises is patellar ligament desmitis (similar to tendonitis but with a ligament). Performing a TPLO disrupts the patellar ligament temporarily in about 85% of patients. This ligament needs time to reorganize and heal before it is strained more. Not following exercise restrictions and modified plans can cause further harm, again adding anything from a week to months to the return to activity process.

Other surgical considerations

Other stifle surgeries that you may encounter are the Dynamic Tibial Plateau Leveling Procedure (Proximal Tibial Epiphysiodesis) for use in young dogs, the Modified Maquet Procedure (MMB, similar to a Tibial Tuberosity Advancement/TTA) or a Cora-based Leveling Osteotomy (CBLO, osteotomy type of procedure like the TPLO but addressing biomechanics differently). Personally, I have very limited experience with these procedures and continue to default to the TPLO currently for athletic dogs. My exploration of other surgical options would involve a board-certified veterinary surgeon with experience and expertise with canine athletes.

Another conversation that is needed is to address whether to leave the rest of the ligament in cases of a partial tear. Some surgeons advocate that unless obviously diseased visually, the stability provided by it is worth leaving it in. On the other hand, there is concern that the remaining ligament can cause a further inflammatory response. The thorough visualization of the anatomy and surgical expertise is crucial is this decision.

If both stifles are unstable with cruciate disease and require surgical repair, the option to repair both sides simultaneously must be discussed. Although this seems like a valid option allowing for only one time under anesthesia and a shorter time of recovery, this is not an option I recommend routinely. The potential for complications and the difficulty with mobility as both legs go through the healing process concerns me and I would prefer these surgeries to be staggered by eight weeks.

Although once a diagnosis is made, surgery should be done as soon as possible, delays in this timeline can still be managed. Delaying the surgery in order to choose the best surgeon you prefer to work with and to plan the post-op care the best within your schedule is better than rushing into it. During the pre-operative time, rehabilitation therapies and exercise modifications can be made to prepare them physically and mentally for surgery and the post-op recovery.

Who to do the therapy?

Although veterinary technicians/nurses and physical therapists may be the ones doing the rehabilitation treatments on your dog (often better than the veterinarian in fact), a veterinarian with training and interest in rehabilitation should be supervising the plan and decision making. Rehabilitation is best when a team approach is utilized with the rehabilitation therapist, the veterinarian, the surgeon and you all working together. Veterinarians, technicians and physical therapists can pursue additional classes and experience to become rehabilitation certified. Rehabilitation certification programs include the Canine Rehabilitation Institute, the University of Tennessee and Healing Oasis, all of which have directories of graduates organized by state. Board certification or true specializing in rehabilitation and sports medicine has been a possibility since about 2012 and individuals that have this designation have a portfolio including a long list of criteria and experience as well as passing a difficult exam at the end of the multiple year program. Those credentialed individuals can be found on the American College of Veterinary Sports Medicine and Rehabilitation website. Residents are typically in this program 3-6 years before they take their exam. When working with sporting dogs, those that have experience, interest or an understanding of what the sport entails are preferred but this is not always a requirement for the first 8 weeks of a post-op TPLO. Practitioners involved in return to sport specific activities may not be available geographically but can be accessed through various telemedicine opportunities.

What about conservative management?

There is evidence that therapy under the care of a rehabilitation veterinarian can hasten and even improve the recovery from surgery. However, there is scant evidence to suggest that this is a consistent and predictable alternative to surgical management of CCLD in dogs. When a non-surgical alternative is pursued, many of the same rehabilitation modalities, restrictions, medications and supplements are used, yet the timeline may be different. Patients not managed surgically may take longer to get to the same weight bearing point they would be at if they had surgery, but they still may have good quality of life as long as their care is well managed.

Adjunct treatments: Regenerative Medicine

Regenerative medicine includes substances such as stem cells from various sources or platelet rich plasma (PRP). These injections have been used in stifles with or without surgery. More information about these treatments are provided by Dr. Sarah Love; *please see the sidebar on the right.*

Adjunct treatments Bracing

Bracing (orthotics) are often explored when trying to avoid surgery in the case of stifle disease. Although very successful as a treatment in human patients, the variability of our canine patients and the difference in function of the CrCL in the dog can cause challenges. There is a population of dogs in which bracing allows for functional mobility and the brace is tolerated by the dog. Bracing can be considered for dogs where surgery is not an option or to support one side while the other side is healing post-op in cases of both sides being unstable. No brace is perfect, and they will not counteract all of the forces provided by an intact CrCL. Therefore, the goal of bracing should be to minimize pain and inflammation while promoting weight bearing. Proper rehabilitation therapy is still crucial if bracing is pursued.

Medications and supplements

As previously mentioned, we can address the inflammation and pain with anti-inflammatories such as Non-Steroidal Anti-inflammatory Drugs (NSAIDs), analgesics (pain medications) and a variety of nutraceuticals.

Information about Adjunct treatments from Dr. Sarah Love

Mesenchymal stem cell (MSC) therapy is being used more and more in veterinary medicine to treat musculoskeletal diseases as well as diseases of other body systems. MSC's and multipotent progenitor cells are two types of stem cells used for tissue repair and regeneration. Think of them as 'seeds' that can grow into many different tissues and different types of cells lines, such as cartilage, bone and connective tissues. Stem cell therapy falls under the umbrella of the increasingly popular term, 'regenerative medicine'. Along with stem cells, other cell-based products fall into this type of therapy including platelet-rich plasma (PRP) and autologous conditioned serum. These types of therapies are tightly regulated by the Federal Drug Administration in both veterinary and human medicine, more so on the human side.

Regenerative medicine aims to use the body's natural ability to heal itself after injury or damage delivering specific native and bioengineered cells or cell products to diseased tissue to restore structure and function. Animals studies have shown that MSC's can result in the incorporation of these cells into a partially ruptured cranial cruciate ligament (CCL) and damaged cartilage, as well as speeding up the healing process. This has been shown to occur when the MSC's are injected directly into the joint.

Surgery is the preferred treatment in dogs that have a ruptured CCL and an unstable stifle in order to return to the field and slow the progression of osteoarthritis. What is unknown is, what other treatment options are available to dogs with a partial CCL rupture and still have a stable stifle? Should we as veterinarians focus on the body's own inflammation in the stifle or address the integrity of the ligament itself?

A study of a group of dogs with a less than a 50% tear of the CCL were treated with MSC's and PRP. These dogs underwent gait analysis, radiographs and diagnostic arthroscopy of the stifle (surgical scoping procedure) and were treated with MSC's and PRP. The tissues used to harvest and then process into stem cells were either bone marrow or adipose (fat) tissue from the abdominal cavity. The MSC's and PRP were then injected into the affected stifle and all dogs underwent typical rehabilitation therapy for CCL disease. Thirteen dogs had a repeat arthroscopy 90 days later to actually see the CCL again. Of these, nine dogs had an intact appearing CCL at that time and dogs showed better weight bearing at 90 days. This study has several limitations, however it does show improvement in a partially ruptured CCL with regenerative medicine treatments.

Another study looked at a group of dogs with a completely ruptured CCL in one stifle and a partially ruptured CCL in the other stifle. The complete rupture stifle had a TPLO surgery performed and the partial rupture stifle had bone marrow-derived stem cells injected into the joint and intravenously. The injected, CCL partial rupture stifle showed lower inflammation several weeks out and 25% went on to have a second TPLO surgery on stifle that was previously identified as a partial rupture. This shows that MSCs had an anti-inflammatory effect several weeks after treatment and possibly led to stabilization of some of those stifles.

A great deal of more work is needed to determine if regenerative medicine can be truly effective in decreasing the cascade of events in CCL disease. A less invasive technique for early CCL disease would be great to have for our working dogs, though proper diagnostics still would need to be performed by veterinarians and time off for rehabilitation therapy would not be dramatically different. If one is considering these therapies, there should be a discussion between an owner and veterinarian performing the treatment regarding appropriate patient selection, current state of CCL disease, pre and post-injection diagnostics, appropriate physical rehabilitation and what the dog's job or sport is and do they wish to continue their work.

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Most prescribed NSAIDs include Rimadyl/Carprofen, Deramaxx, Metacam, or Galliprant and with Gabapentin, Amantadine and Tramadol being our most used analgesics. Many of these drugs are used initially post injury or post-op but can also be used for chronic osteoarthritis either daily or as needed during flares.

Chondoprotectants and joint supplements such as Dasuquin or omega fatty acids are commonly used. Supplements and nutraceuticals are not FDA regulated and often rely heavily on marketing. When exploring omega fatty acids for joint disease, there are very specific target concentration of DHA and EPA specifically. Injectable Adequan is an approved product and is used often with osteoarthritis and joint disease. Following veterinary recommendations regarding supplements and joint health medications by someone that knows you and your dog best is the best use of resources.

Goals of recovery

In recovery, your dog should steadily improve. Reasons to seek veterinary attention would be increased pain or lameness or general illness overall. Complications include infection, trouble with implants, meniscal injury or patellar ligament desmitis as previously discussed. Signs of these complications can begin to appear in a dog that is slow to recover or sometimes they occur when the dog is doing well at first and then starts to decline. These complications often occur in the first 8 weeks post-op. A veterinary exam and potentially radiographs will easily diagnose these complications and direct care.

Very few studies compare rehab versus no rehab in post-op TPLO patients, but based on clinical experience, the recommendations for athletes certainly are to apply rehab at some level even just with a directed at home plan for best outcomes. Points to remember are that rehabilitation plans from dog to dog are not the same and return to sport is determined by condition before injury as well as by the response to treatments and surgery.

Summary

Joint replacement options for the canine stifle are slowly becoming a reality, but still are a way off for use commonly in veterinary patients. Surgical options such as the TPLO and non-surgical conservative management are our main choices at this point. More focus and research should be put into prevention both from an activity and genetic standpoint while continuing to ensure proper body condition and athletic conditioning.

Thank you for reading, I hope this series of articles has stimulated thoughts and discussion surrounding this topic. Please consider participating in all future research endeavors on cranial cruciate disease, this information is stronger when a broader population provides input. Good luck to all of you with your dogs recovering from TPLOs as we speak, the wait will be worth it. ■

Thank you to Jessica Hynes for excellent article editing, as always.

Information compiled for this article from Veterinary Rehabilitation and Physical Therapy, 2nd Edition, Drs. Millis and Levine.

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Perspective from real-life experience …

In my experience with seven post-operative TPLO and one tightrope rehabilitation, a ruptured CCL does not have to be career ending. National Champions have run on repaired CCL.

A successful return to field trials requires significant rehabilitation which is realistic relative to the other leg suffering the same injury. In one case we had a rupture at a National on one leg and a scope done on what appeared to be a healthy leg – we were advised it was suspect already. So we did both knees that December ten days apart and rehabilitated through May and went on to finish three Nationals and earn 95 points before succumbing to torsion a few years later.

TPLO surgeries rarely fail in my observation. But rehabilitation can fail quite easily. Successful rehabilitation requires professional physical therapy guidance providing experienced hands on work.

Success most often includes taking proper time to redevelop full range of motion, stabilizing and rebuilding core strength and only then proceeding to rebuilding field roading including eventual side hill foot falls which builds off the core strengthening. This is importantly preceded with slow long distance roading build up with proper periodization. Periodization is important as it plans incorporating adequate rest and recovery through hard work weeks and lighter weeks to build strength optimally. Patience and professional supervision are important. Hill repeats can eventually be incorporated (speed work in disguise) before the speed work of actual field marks, including slow accents and descents, when the dog is ready for them. By taking this staged rehab approach injury-risk may be reduced and setbacks minimized.

Rehab defers swimming for a lot longer than most people think and avoiding rough pond entries can avoid ligament injury. Swimming just isn't the right motion for early rehabilitation per the experts that guided my experiences. When swimming is eventually advised it should come after primary workout sessions.

The timeframe from surgery to field marks is a four month deal if it goes well. Experienced and professional rehab or at least periodic evaluation is really important the first month or two of physical therapy. Finally, when the athlete returns to the field they have been more fit than when the rupture presented itself.

Update on the Michigan State University Cruciate Survey

We have 1000+ responses as of press time!
The survey is still open and we want to hear from you, no matter if you have had any experience with cruciate disease.

Please consider giving your input through our short survey, this information will be shared once the data is compiled. Thank you for your participation.

https://msu.co1.qualtrics.com/jfe/form/SV_6L2tJPtGV6n9V5P

If you have any questions about the study, you can contact Dr. Sarah Shull at shulldvm@msu.edu or 616-894-5887.

Thank You!

Update on our patient

He is doing very well thanks to his dedicated owners. His plan has consisted of mainly at home rehabilitation with coaching. Initially pROM of the stifle and hips with icing was done multiple times a day with the therapeutic laser used daily. Leash walks were done multiple times a day with time and difficulty increasing each week.

He began daily therapeutic exercises approximately 2 weeks post-op consisting of sits and sits to stands, front end elevated and cavaletti boards. Progression of his exercises included single leg lifts, side steps and back steps. Swimming began approximately 3 weeks post-op. Struggles have included skunks on the walks, frogs jumping in the water on the shoreline and waders stuck in mud, but fortunately his handler didn't end up in the pond and no skunk odor was exchanged.

He has gained approximately 3 cm of muscle on his surgical side and lost 5 pounds to date. His post-op radiographs were taken at 9 weeks and show good healing overall, with the bone cut not yet fully filled in with no signs of infection. His leg use has improved every week, with only a slight limp when walking or trotting and offloading the leg some when he stands. Over the next 4-8 weeks his exercise restrictions will be gradually lifted.

Field training will resume when he has been off leash for a few weeks and is handling the terrain and activity well without limping or leg disuse. He has been continued on Meloxicam for osteoarthritis of his hips and stifle and has begun a regular course of Adequan injectable that he will be on lifelong.