

## Physical Rehabilitation Following CCL Repair

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Physical rehabilitation in people is well understood and the benefits have been extensively studied and proven. The start of rehabilitation for humans began in World War I and was noticeably heightened during World War II when more men survived the war (due to penicillin) and needed to return to normal lives. The Vietnam War brought more advanced orthopedic techniques that required early physical therapy for recovery.

By the 1970's and 80's Physical Therapy was part of the established standard of care for orthopedic and neurologic problems.

In contrast, the use of physical rehabilitation for canines in the United States is new and has only been introduced within about the past 5-10 years. Fortunately, it has rapidly gained acceptance. Currently, there are many veterinary research studies that demonstrate the multiple merits of canine physical therapy. Rehabilitation and hydrotherapy are truly new and exciting adjuncts to traditional veterinary care.

Stifle (knee) injuries are the most common orthopedic condition in the Great Pyrenees dog. When assessing the most common stifle injury, rupture of the cranial cruciate ligament (CCL) ranks first followed by luxating patella. Luxating patella is commonly seen in toy and small breeds and is *not* common in larger breeds. Interestingly, the Great Pyrenees has a much higher incidence of luxating patella than any other large breed dog.

**Prevention** is paramount when discussing rehabilitation. Therefore, in order to discuss the various approaches to physical rehabilitation following CCL tear it is important to understand the etiology or cause.

Common causes of CCL rupture include: direct (acute) trauma to the stifle, luxating patella, previous CCL tear on the opposite leg, poor conditioning, chronic degeneration of the CCL, congenital / developmental conditions.

**Direct trauma** is often associated with jumping up or sudden hyperextension of the hind leg especially when coupled with inward (medial) rotation of the stifle and hind leg. Examples include jumping *into* a vehicle, missing 'footing' when vigorously jumping out of a vehicle or slipping (ice or slippery floors).

Sudden acute rupture can be caused by rigorous play, especially body slamming or 'hamstringing' play for which Pyrs are famous!

**Prevention:** Risk for CCL injury can be minimized by: using a ramp for getting in and out of vehicles and teaching cue words like "wait" before exiting vehicles or moving onto slippery surfaces.

Chronic Degeneration is the most common cause of CCL tears and occurs in most large breeds. The highest incidence is with spayed females age 4-7 years. There is some speculation that early spaying (before 12-14 months) reduces hormones required for healthy ligaments.

The classic symptom of chronic CCL degeneration can be identified on history as a Pyr that is generally healthy orthopedically but after long rest periods rises and takes a few lame hind leg steps, then “walks out of it” and is fine.

Prevention: Recognize that your Pyr may have a low grade partial CCL tear. Use controlled exercise and massage to allow healthy tissue to form. Minimize rigorous play until symptoms have subsided. Whenever possible, try to avoid sudden transitions from lying to running.

Congenital causes of CCL tear include: poor hind angulation (straight in stifles and hocks), luxating patella and lineage trends demonstrating early CCL tears in offspring. Most Pyrs with straight hind angulation or luxating patella will experience a CCL tear sometime during their lifetime. It is interesting to note that most dogs (Pyrs included) with luxating patellas are also poorly angulated in the hind.

Prevention: Always purchase your Pyr from a reputable breeder. Keep in mind that even the most conscientious breeder can occasionally have a pup with poor angulation. So, when selecting a Pyr puppy or adult look for well angulated and strong hind legs. Ask breeders about the incidence of stifle problems in the parents and grandparents of the Pyr you are interested in purchasing.

The congenitally related CCL tears occur early in a Pyr's life usually from age 6 months to 2 years. Breeders should be notified of the CCL problem and monitor lineage.

A Previous CCL Tear in Opposite Leg increases the risk of a CCL tear by 30% to 60% within 24 months. Part of this is related to slow return of thigh muscle size and decreased range of motion thereby stressing the other limb.

Prevention: As early as possible, seek a professional trained in rehab if your dog has a CCL problem. Studies indicate a reduction in contralateral (opposite leg) CCL tears in dogs that have had rehab. Minimize risk factors such as jumping and high contact play.

Poor conditioning is another cause of CCL tears in Great Pyrenees. Like other dogs, Pyrs that are over weight and those that do *not* have a regular *daily* exercise regime are at higher risk of CCL tear. In addition, “the weekend warrior”, or the Pyr that has no daily routine but occasionally is asked to perform in events (carting, agility etc) or go on long hikes (mountaineering, hiking, skiing, snow shoeing, skijoring) is at very high risk of CCL tear.

Prevention: Don't be a weekend warrior! Maintain your dog *for their lifetime* in an exercise program of sustained walking at least 35 minutes 5-6 days per week. Do not allow them to ever be over weight.

## Treatment Options

The formulated physical rehabilitation program is based on: the cause of the tear, the degree of the tear, the length of time between tear and treatment and the type(s) of medical or surgical intervention applied by the veterinarian.

### Conservative Management

As previously mentioned, not all CCL's suddenly rupture; some Pyrs experience slow degeneration of the CCL. In early/slow degeneration 30% to 50% (or less) of the ligament may be torn or frayed. This is referred to as a partial CCL tear.

In this case, conservative management with physical rehabilitation may preserve and restore the ligament. Passive range of motion to maintain flexibility, strengthening exercises to reduce muscle atrophy, alterations in lifestyle such as weight loss and development of a regular exercise routine are imperative for maximum recovery with return to full function and performance.

In the past, veterinarians believed that only in small dogs (less than 50 pounds) could conservative therapy suffice. However, this is no longer true and large dogs such as: Great Pyrenees, Newfoundland's and Bernese Mountain dogs have done well with early conservative rehabilitation interventions for early partial CCL tears.

### Surgical Management

To date, there are more than 50 different surgical techniques to treat a ruptured CCL! The details for each of these procedures are beyond the scope of this article.

The three most common surgical CCL repairs include:

- Extracapsular stabilization (imbrication) and there are several approaches. In all cases, heavy nylon is utilized around the outside of the joint to assure stability..
- Tibial Plateau Leveling Osteotomy (TPLO) which fractures the tibia and inserts a plate with screws to increase the angulation of the hind limb
- Intracapsular stabilization using a strip of muscle for a graft to create a new ligament.

While arthroscopy is the human norm, the canine stifle differs noticeably and arthroscopy has not yet become widely available. However, in a handful of veterinary facilities, arthroscopy is offered to debride ligament fragments and a prosthetic ligament is inserted to replace the ruptured CCL.

Interestingly, despite cost and complexity....there are NO studies that indicate superiority of one surgery to another. Research studies performed in unbiased settings demonstrate that functional outcomes are equal with all procedures. However, Veterinary University research has demonstrated improved outcomes with physical rehabilitation added to any of these procedures.

**Note:** The rehabilitation treatment plan varies remarkably for each of these procedures and is based primarily upon the performed surgery. An educated canine rehabilitation therapist *must* adjust the treatment plan accordingly in order to minimize complications and assure/speed maximal functional outcomes.

### **Rehabilitation: General Management**

#### **Think Preoperatively...Prepare & Get Ready!**

Ideally, rehabilitation begins BEFORE surgery!

Whenever possible, aquatic therapy, cryotherapy (heat and cold), massage, sling and/or ramp walking and passive range of motion exercises should be started *before* surgery. These modalities help to maintain muscle size and strength. Weight loss is also sometimes a desired goal and some pounds can be lost while waiting for the surgical date!

Also, a pre-operative plan allows the dog and owner to 'practice' using products and techniques *before* the stress of surgery. The therapist may also have added helpful post-op suggestions that prepare you, your dog and home environment. Examples are: securing rugs, adding rubber backed throw rugs for ease of walking on slippery surfaces, adding ramps to outside stairs and utilizing products for the paws to reduce falls. All of this helps you and your Pyr to be better prepared for surgery.

#### **The Benefits of Rehabilitation are Well Documented**

Several university studies have now demonstrated the positive benefits to physical rehabilitation following CCL repair. Rehabilitation has been documented to improve muscle mass and attenuate muscle atrophy that occurs following surgery. Without physical rehabilitation, dogs commonly lose 30% (or more) of their muscle mass within 3 weeks post-operatively. This loss of muscle increases the concussive forces through the joint and adds significantly to joint stress.

Studies also demonstrate that rehabilitation speeds the return of both passive and active range of motion thereby increasing joint flexibility and adding to the overall speed of recovery and earlier weight bearing. Rehabilitation increases blood and lymph flow through the affected area, promotes early resolution of inflammation, prevents joint contractures, and reduces compensatory injury of other limbs.

All of these factors: reduce the incidence and progression of arthritis, decrease pain, lower complication rates, speed recovery and improve canine/ owner satisfaction!

## Post Operative Rehabilitation

Once the veterinarian and you have determined that your Pyr needs surgery, the course of rehabilitation varies based upon the type of surgical procedure, the dogs overall physical condition and the caregivers limitations. Hence, post-op care is *always* individualized. *The following serves only as a guide that should be supervised by a professional educated and certified in canine rehabilitation.*

### Phase 1 > Immediately After Surgery until Toe Touch Weight Bearing.

- Plan to be home with your dog for at least the first 2-4 days after surgery.
- Ice, Ice Ice! Ice packs can be made by mixing: 2 cups of water, ½ cup rubbing alcohol, and 2 tablespoons of salt into a good quality zip lock bag; then freeze. Double bagging is a good idea to prevent leaks. The texture, when frozen, should be a very dense slush.  
Prior to icing, wrap a thick bath towel around the stifle to protect the skin. White dogs are more prone to skin damage from ice so the layered protection of a towel and frequent skin checks is essential. Assure the ice placement so coverage surrounds most the entire stifle joint. Ice should be applied for 15-30 minutes 3-5 times per day until all swelling is gone (several days)
- Passive Range of Motion (PROM) should be demonstrated by a trained professional and can be slowly performed to the stifle and hock starting the first postoperative day. Be certain you have a clear understanding of these exercises before attempting and perform PROM 2-5 times per day. Never move the joint or limb quickly and stop immediately at the point of resistance. Each day, the range of motion will slowly improve.
- Use a Bite-Me™ or Elizabethan collar any time your dog is unsupervised to prevent chewing of the suture area.
- Be certain to bring home from the veterinary clinic an ample supply of pain medication for the first several days to week(s) following surgery
- Do **not** allow *any* running or jumping after surgery for *least* 8-12 weeks. Do allow the dog some normal walking in the house and encourage weight bearing following surgery.
- Use a sling, as an assistive device, for the first 3-5 days when going outside or while walking on slippery surfaces. The sling or folded towel goes around the lower abdomen and is used to catch or secure the dog in case of a slip. The sling can also assist in position transitions from lying to standing.
- Massage the lower back and entire leg to reduce soreness
- Check with your veterinarian and therapist regarding the amount of suggested walking. The amount of walking varies depending on type of procedure. The intracapsular and extracapsular repairs allow for 5 minutes of walking, especially for “potty breaks” 4-5 times per day and this is slowly increased by about 5-7 minutes per week. The TPLO does not initially permit this much walking due to the healing fracture site.
- Added modalities: some therapist also use electrical stimulation for muscle contraction (NMES) and transcutaneous nerve stimulation for pain (TENS)

### Phase 2> Increased Weight bearing

In this phase the Pyr should be using the limb 100% of the walking steps even though there will be a limp. *If your Pyr is not partially weight bearing by 2 weeks after surgery definitely seek professional rehabilitation help.*

Swimming in a *therapeutic pool* often begins 8-14 days postoperatively or when sutures are removed. Swimming following a TPLO is usually not started until 4 weeks (or more) after surgery or when the first X-rays are performed. The warm water environment allows for muscle relaxation, improved passive and active range of motion and re-builds muscle quickly.

Leash walking should be sustained (no stops) and is increased as weight bearing improves. Short frequent walks are better tolerated, with less joint stress, than long walks. Walking 2-4 times per day on a flat surface is ideal. Inclines can be added slowly. Usually, walking starts at 5-7 minutes per session and the walks are increased by about 5 minutes per week before trotting is added. Slow walking is the best gait for encouraging early and maximal weight bearing. If the dog experiences any worsening of lameness or soreness the walking schedule must be decreased.

Ankle weights can be added for supervised walking in the house and outside. Never leave weights on unattended. Talk to your therapist about the proper amount of weight.

Continue massage, PROM and ice if there is any swelling.

Weight loss should be a desired goal if the dog is over weight.

Sit to stand exercises, walking up hills, walking safe gradual stairs help to increase thigh muscle. Walking over ground poles (PVC, 2x4's etc) spaced about 1 body length a part help to restore strength and natural rhythmic gait.

During summer months remember to protect any shaved areas from the sun!

### Phase 3> Consistant Weight Bearing and Adding Trot Steps.

At this phase the dog will have no limp at the walk and use the leg consistently at the walk and an occasional trot step.

Begin weaving at the walk for 1-2 minutes. The frequent change of direction at the walk should not cause soreness. If there is no lameness with weaves, then begin 5-minute sets of straight line trotting on a flat surface during each walk session. Pyrs do not normally trot for prolonged periods so 5-10minutes of trotting 1-2 times per day is adequate exercise.

continued

Add trotting *up* hills and some weaving at the trot. Continue the other previously described exercises. Crawling thru a tunnel or under objects helps build hind strength. "Dancing" is permitted by allowing the dog to stand on the hind legs while you gently support the front legs. When dancing, do not allow the dog to stand totally upright because this can be stressful to the low back. In the 'dance' position, ask the dog to walk backwards 3-5 steps to maximize extension of the hip and stifle. Slowly increase the number of dance steps to 10-15 if possible.

### Final Phase> Sustained Trotting and Improving Endurance/Strength.

At this phase, the Pyr should not have any limping during the short sustained trot on flats, hills or while weaving. Now the goals are to further increase muscle size and strength by adding a canter and return to normal activity.

If not aggressive or dominant, add tug of war games to engage the hind legs with deep squat pulling. To engage the hind legs, hold the tug in a high position to engage the drive with the hind legs. [Holding the tug down or close to the ground causes more work with the forelimbs than the hind.]

Begin allowing a supervised canter or 'free' time while in fenced area for 10 minutes. Do not chase the dog to force a canter but allow the dog to canter freely if they wish. I suggest walking the yard first to assure there are no animals to chase when the dog is released. Do not encourage sudden running but allow the dog to select their gait going from a warm up walk/trot to canter. Slowly increase the time outside.

Continue the walks with trots as described before.

Continue the weight loss program until goals are met.

Continue swimming in therapeutic pool or if desired outside ponds if your Pyr likes to swim. Using a life vest helps build confidence.

Maintain your Pyr on a walking program for their lifetime> at least 35 minutes 5 days per week. **Don't** be a weekend ( or seasonal) warrior!

Always perform ample warm-up time before *any* performance event...including conformation showing.

Following injury and surgery there will some arthritis to the stifle joint. Consider glucosamine/chondroitin joint supplements for life.

### Conclusion

Keep in mind that your Pyr may never be totally 100% 'normal' after surgery. Most veterinarians feel that peak recovery does not occur until about 6-12 months after surgery. However, with a skilled surgeon, post operative rehabilitation, proper life long care and weight management your Pyr will be at their absolute functional best.

### About The Author

Jody Chiquoine is the owner of Fitter Critters, a canine physical rehabilitation and hydrotherapy (indoor swimming pool) center in Lee, MA. Jody has practiced and studied canine rehabilitation since 1999. She is a Certified Canine Rehabilitation Therapist, Certified Canine Massage Therapist and a member of the American Canine Sports Medicine Association. In addition to providing rehabilitation for dogs after surgery and those with chronic conditions, she works with performance dogs, offering gait analysis and gait retraining.

Jody has presented canine rehabilitation lectures to the veterinarian students at Tufts Veterinary School and teaches canine massage courses to dog owners. She is a published author on the subjects of canine rehabilitation, hydrotherapy and canine massage.

Jody holds a Masters degree in nursing as a Family Nurse Practitioner and has 13 years of human rehabilitation experience as well as having worked in the clinical areas of: surgery, cancer care and geriatrics. She draws on this experience in caring for her clients.

Active in Great Pyrenees rescue for the past 9 years, Jody helped to establish Northeast Great Pyr Rescue (NEPR) in 2003 and serves as NEPR President.