

Physiotherapy for post-op CCL repair

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Aims of Physiotherapy and therapy treatment for a CCL repair.

(Note: I have clustered references under topic headings -see reference list at end)

The overarching goal of Veterinary Physiotherapy rehabilitation is to

- promote quality healing,
- return the dog to pain free function,
- promote quality movement and to
- reduce secondary complications and compensations lifelong ⁽¹⁾.

The aims and treatment options are derived from a combination of research and experience on human orthopaedic rehabilitation and tissue healing, and relevant animal research. We know that bed-rest is detrimental for quality healing and return to function because muscle mass is lost, tissue heals to be stiff and in shortened positions, proprioception and neuromuscular control is compromised. So having had the surgery to stabilise the joint, the tissue needs controlled weight-bearing and mobility in order to heal in a functional manner. In people early controlled mobility and rehabilitation work promotes tissue healing, bone healing and return to function with far less compensatory issues and complications ^(1, 3,4).

So dogs require the same but whereas when providing rehabilitation to people, physiotherapists work to encourage movement; in dogs we need to prevent uncontrolled movement as they are far too keen to move, hence the cage rest and strict limited exercise. With physio involvement we are able to do more controlled weight-bearing and controlled exercise to promote functional healing. Post-op the physio focus is on proprioception, neuromuscular control, co-contraction of joint stabilising muscles, strength preservation and gain ^(4,5). Although the actually surgery is different for canine cruciate ligament issues compared to human ACL repair, the principles of rehabilitation are similar.

Physiotherapy is not prescriptive and each dog is assessed each time and relevant treatment options selected using knowledge of surgical procedures, tissue healing times, biomechanics, current presentation, owner lifestyle and the eventual role of the dog.

This quote epitomises physio rehab: *“Knowledge of the stages of tissue healing and of the strength of tissues is critical to avoid placing too much stress on the surgical site, yet some challenge to tissues must be provided to optimize the return to function.”* ^(Davidson et al 2005).

Below are the aims and treatment options considered during the stages of healing.

PRE-SURGERY

Physiotherapy pre-surgery would be benefit the dog (and owner) - particularly as muscle atrophy is present in dogs with CCL injury ⁽⁵⁾.

- Aims : prepare owner and dog and the home for post op management; maintain muscle mass ⁽⁵⁾; treat compensatory muscle soreness⁽³⁾ (usually spinal and contralateral leg)
- Treatment options: Home assessment, restricted exercise, cage introduction, treating muscle soreness with soft tissue work; Hydrotherapy to preserve muscle mass.

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POST SURGERY 1- 3 days

Depending on when the dog is sent home, some of these options can be done at the vet practice. Some of these techniques vet nurses have been trained to perform prior to discharge.

- Aims : controlled and well set up home environment; adjuncts to control pain and swelling⁽²⁾; maintain range of movement, controlled weight bearing. Analgesics are not always able to completely control pain⁽²⁾ so physiotherapy has options to adjunct this.
- Treatment options: home assessment and set up to promote controlled rehabilitation; Passive gentle range of movement exercises to affected limb and massage to local muscles^(1, 2), Soft tissue treatment for muscle soreness elsewhere in body (usually spinal)⁽¹⁾; Assistance for weight-bearing; cold compression therapy if available⁽²⁾

POST SURGERY 4 - 14 days

Focus is on increasing proprioception, neuromuscular control, promotion of quality weight-bearing .

Physio likely to see dog 2 to 3 times a week

- Aims: promote owner compliance to restrictions (cage and toileting); adjuncts to reduce pain⁽²⁾; promote healing; preserve muscle mass⁽⁵⁾; improve proprioception and neuromuscular control⁽⁴⁾; early controlled weight bearing on the limb⁽³⁾; prevent mechanically dysfunctional compensatory postures and movement strategies^(1,3); early identification of complications^(1,3).
- Treatment options: home assessment and reiteration to owners of management plans; pulsed magnetic therapy for pain , muscle soreness and to promote tissue healing^(1,2); proprioception enhancement⁽⁴⁾ including gentle range of movement exercises for stimulation of mechanoreceptors, in standing perturbations and weight transfer⁽⁴⁾, sit to stand exercises for preserving muscle mass and neuromuscular control^(4,5); neuromuscular electrical stimulations (NMES)^(1,5) if muscle atrophy has been significant prior to surgery; controlled exercise of VERY VERY slow walking of 5 minutes⁽¹⁾.

POST SURGERY 2 - 6 weeks

Focus is on increasing proprioception, neuromuscular control, promotion of quality weight-bearing and controlled function. Progressing treatment when appropriate to the dog.

Of most importance is supporting the owner to continue to comply with restricted mobility – this is the most likely time for an owner to think the dog looks ok and allow more freedoms. Regular physiotherapy involvement will reduce this risk. Physio likely to see dog 2 to 3 times a week.

- Aims: promote owner compliance to restrictions; improve proprioception and neuromuscular control⁽⁴⁾; controlled functional use of the limb⁽³⁾; prevent mechanically dysfunctional compensatory postures and movement strategies^(1,3); promote healing; preserve muscle mass⁽⁵⁾; promote joint stability⁽⁴⁾; early identification of complications^(1,3).
- Treatment options: supporting owners with management plans; proprioception enhancement⁽⁴⁾ including perturbations, weight transfer⁽¹⁾, later on: forelimbs on wobble cushions and proprioceptive tracts of flat surfaces with changing sensory input⁽¹⁾; sit to stand and lie exercises with quality of movement^(1,4,5); neuromuscular electrical stimulations (NMES)⁽⁵⁾ if muscle atrophy has been significant prior to surgery; soft tissue treatment of muscle soreness⁽¹⁾; gradual increase of lead walk (depending on discussions with vets) usually approx. 5 mins per walk per week⁽¹⁾; walking 2 or 3

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times a day depending on assessment - at VERY VERY slow pace to prevent mobility adaptations and ensure correct use of limb⁽¹⁾.

- Hydrotherapy⁽⁶⁾ (once stitches removed) is most beneficial especially the water treadmill to promote supported functional use of the limb, reduce compensatory spinal and contralateral muscle soreness; increases range of movement of operated limb and promotes muscle mass increase.

POST SURGERY 6-14+ weeks

With a good grounding of rehabilitation in the previous 6 weeks, the dog should be well on his way to a quality functional outcome. Focus is now on continuing to build up muscle strength towards returning to function within his lifestyle. Fine proprioception and neuromuscular control are still an important part of this stage of rehabilitation.

- Aims: promote owner compliance to continuing exercise restrictions; improve muscle mass & strength⁽⁵⁾; fine tune proprioception and neuromuscular control⁽⁴⁾; prevent mechanically dysfunctional compensatory postures and movement strategies^(1,3); identification of complications^(1,3).
- Treatment options: continuing to support owners with management plans; lead walk, increasing times, distance, surfaces, controlled turns, later on: speed and controlled off lead rehab⁽¹⁾; proprioception enhancement and neuromuscular control^(1,4) with transitions; wobble cushions and boards, proprioceptive tracks; later on: forelimbs on a step with trunk weight transfer (following a treat with head); 3 legged and two legged stance; ground level pole work^(1,4); later on - controlled introduction to other functions such as stairs, in and car⁽¹⁾; quality of movement always paramount.
- Hydrotherapy⁽⁶⁾ continues to be beneficial especially the water treadmill to promote functional use of the limb, reduce compensatory spinal and contralateral muscle soreness; increases range of movement of operated limb and promotes muscle mass increase.

Overall throughout Physiotherapy rehab, controlled return to function is at the top of the list. Although there are expected healing and return to function times, every dog is different as is every injury and surgery but if at any time there is an indication of a problem then the dog is referred back to the vet ASAP.

Owners enjoy having physiotherapist involved in their dog's rehab as it helps them to maintain and journey through the full recovery of their dog.

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References

1. Overall post-op rehab articles – all these contain detail that includes 2-6 (pain, early rehab, proprioception, strength and hydro)
 - 1.1. Marsolais G, et al (2002) Effects of postoperative rehabilitation on limb function after cranial cruciate ligament repair in dogs. JAVMA May 1, 2002, Vol. 220, No. 9, Pages 1325-1330
 - 1.2. Monk M, et al. (2006) Effects of early intensive postoperative physiotherapy on limb function after tibial plateau leveling osteotomy in dogs with deficiency of the cranial cruciate ligament. American Journal of Veterinary Research 67:3, 529-536
 - 1.3. McGowan C, Goff L, Stubbs N, (2007) Animal Physiotherapy – Assessment, Treatment and Rehabilitation of Animals. Blackwell Publishing Ltd .
 - 1.4. Owen M (2006) Rehabilitation Therapies for musculoskeletal and spinal disease in Small Animal Practice. European Journal of Companion Animal Practice Vol. 16 - Issue 2
 - 1.5. **Davidson** J , et al (2005). Rehabilitation for the orthopaedic patient. Vet Clin North Am Small Anim Pract. 2005 Nov;35(6):1357-88
 - 1.6. **Kvist** J (2004) Rehabilitation following anterior cruciate ligament injury: Current recommendations for sports participation, Sports Med 2004;34:269
 - 1.7. Taylor and Admason (2002) Stifle surgery and Rehabilitation. Proceedings of 2nd International symposium on Rehabilitation and Physical Therapy in Veterinary Medicine. Knoxville TN, pp 143-146. cited in McGowan C, Goff L, Stubbs N, (2007)
 - 1.8. Jerram & Walker (2003) Cranial cruciate ligament injury in the dog: pathophysiology, diagnosis and treatment. New Zealand Veterinary Journal. Volume 51, Issue 4
 - 1.9. Rivière (2007) Physiotherapy for cats and dogs applied to locomotor disorders of arthritic origin. Veterinary Focus Vol 17 No 3
2. Pain and complications – adjuncts to control
 - 2.1. Wiese A, et al (2005). Characteristics of pain and response to analgesic treatment in dogs and cats examined at a veterinary teaching hospital emergency service. Journal of the American Veterinary Medical Association. June 15, 2005, Vol. 226, No. 12, Pages 2004-2009
 - 2.2. Drygas K et al (2011), Effect of cold compression therapy on postoperative pain, swelling, range of motion, and lameness after tibial plateau levelling osteotomy in dogs; Journal of the American Veterinary Medical Association. May 15, 2011, Vol. 238, No. 10, Pages 1284-1291
 - 2.3. Gordon-Evans W et al (2011) Effect of the use of carprofen in dogs undergoing intense rehabilitation after lateral fabellar suture stabilization. Journal of the American Veterinary Medical Association. July 1, 2011, Vol. 239, No. 1, Pages 75-80
 - 2.4. **Cheng** et al, (2005) Ice and electromagnetic field therapy to reduce pain and swelling after radial fracture repair. J. Rehab medicine 37, 372-377.
 - 2.5. Fitzgerald & Angel (2010) Predictive Variables for Complications after TPLO with Stifle Inspection by Arthrotomy in 1000 Consecutive Dogs. Veterinary Surgery 39 (2010) 460–474
3. Early rehab and mobility
 - 3.1. **Nash** et al (2004) Resting injured limbs delays recovery: a systematic review. J Fam Pract. 2004 Sep;53(9):706-12
 - 3.2. **Ernst** et al (2000) Lower-Extremity Compensations Following Anterior Cruciate Ligament Reconstruction. Physical Therapy vol. 80 no. 3 251-260
 - 3.3. Ragetly C, et al (2008). Non-invasive determination of body segment parameters of the hind limb in Labrador Retrievers with and without cranial cruciate ligament disease. American Journal of Veterinary Research. September 2008, Vol. 69, No. 9, Pages 1188-1196
 - 3.4. Francis et al (2002) Bone and muscle loss from disuse following ccl transection and stifle stabilisation surgery. Proceedings of 2nd International symposium on Rehabilitation and Physical Therapy in Veterinary Medicine. Knoxville TN, pp 203-204. cited in McGowan C, Goff L, Stubbs N, (2007)
4. Proprioception and neuromuscular control
 - 4.1. **Hewett** et al (2002). Strategies for enhancing the proprioceptive and neuromuscular control of the knee. Clinical Orthopaedics and Related Research, 403 76-94. cited in McGowan C, Goff L, Stubbs N, (2007)

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- 4.2. **Lephart** et al (1997) The Role of Proprioception in the Management and Rehabilitation of Athletic Injuries. Am J Sports Med January 1997 vol. 25 no. 1 130-137
- 4.3. **Swanik** et al (1997) Re-establishing proprioception and neuromuscular control in the ACL-injured athlete. Journal of sport rehabilitation 1997 6 182-206
- 4.4. **Risberg**, et al (2001) Design and implementation of a neuromuscular training program following anterior cruciate ligament reconstruction. J Orthop Sports Phys 2001:31:620
- 4.5. **Wilk** KE, et al (2003) Recent advances in the rehabilitation of isolated and combined anterior cruciate ligament injuries. Orthop Clin NAm 2003:34:107
- 4.6. **Chmielewski** TL. (2005) Perturbation training improves knee kinematics and reduces muscle co-contraction after complete unilateral anterior cruciate ligament rupture Physical Therapy 85(8): 740-54
5. Prevent muscle atrophy and improve strength
 - 5.1. Holler, et al (2010). Kinematic motion analysis of the joints of the forelimbs and hind limbs of dogs during walking exercise regimens. American Journal of Veterinary Research. July 2010, Vol. 71, No. 7, Pages 734-740
 - 5.2. **Fitzgerald** et al, (2003). A modified NMES protocol for quads rehab following ACL repair. J Orthopaedic Sports Physical Therapy. 30(4).
 - 5.3. **Salem** GJ (2003) Bilateral kinematic and kinetic analysis of the squat exercise after anterior cruciate ligament reconstruction. Arch Phys Med Rehabil. 2003 Aug;84(8):1211-6.
6. Hydrotherapy
 - 6.1. Levine D et al (2010) Effects of partial immersion in water on vertical ground reaction forces and weight distribution in dogs. American Journal of Veterinary Research December 2010, Vol. 71, No. 12, Pages 1413-1416.
 - 6.2. Marsolais G, et al (2003) Kinematic analysis of the hind limb during swimming and walking in healthy dogs and dogs with surgically corrected cranial cruciate ligament rupture. Journal of the American Veterinary Medical Association 222:6, 739-743.