

Four Leg News

# KNEE / STIFLE

Sept – Oct 2013 / Issue 2, Volume 5

## Stifle Surgeries

Part 1... Lateral suture technique...  
Hamstring activation...  
Bilateral tears...  
Human ACL rehab research  
and more!!

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## So much information!

Hi Gang!

Firstly, let me tell you that this issue is packed with all sorts of interesting articles to dig through, think about, and share! And I do want you to share this newsletter with your colleagues or referrals sources if you think it might benefit your practice! This issue is all about the stifle... I found a couple of lateral suture repair articles specifically, and will hunt down articles pertaining to the TPLO and other techniques in future issues... but for now, this edition is stuffed to the gills with information... and some info you won't even be expecting (I wonder if you will be able to find THAT article review without it being pointed out! I've got you curious now, don't I???)

Why snow on the borders of this edition? No reason... I just liked the layout... but perhaps secretly I am overjoyed that the kids go back to school after this long weekend! Oops! I think 'good' mothers don't admit to having those thoughts! Anyways, when I was a kid, back to school meant winter was coming. So perhaps subconsciously, I am thinking "YEAH September!"

We can't stop it from coming anyways... and with kids back in school, it's good news for you too... because it usually means I have more time to be creative! Let's see what happens with that!

Enjoy the issue! Cheers ~ Laurie



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CANINE REHAB EDUCATIONAL RESOURCES

Lateral suture repair technique **02**

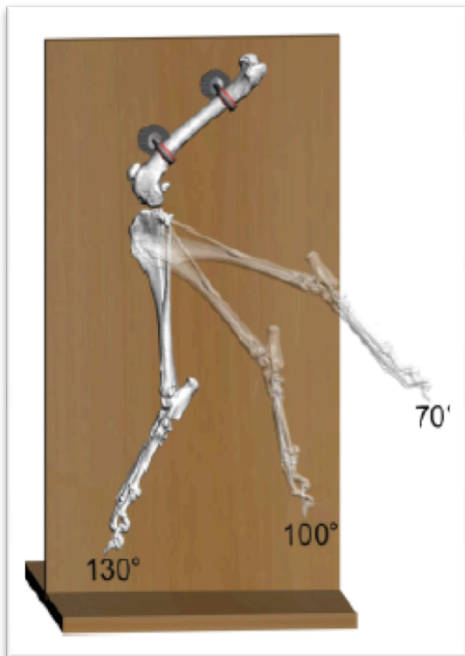
Lateral suture repair complications **03**

Radiographs for ruptured ACL **04**

Lateral suture repair versus TPLO **05**

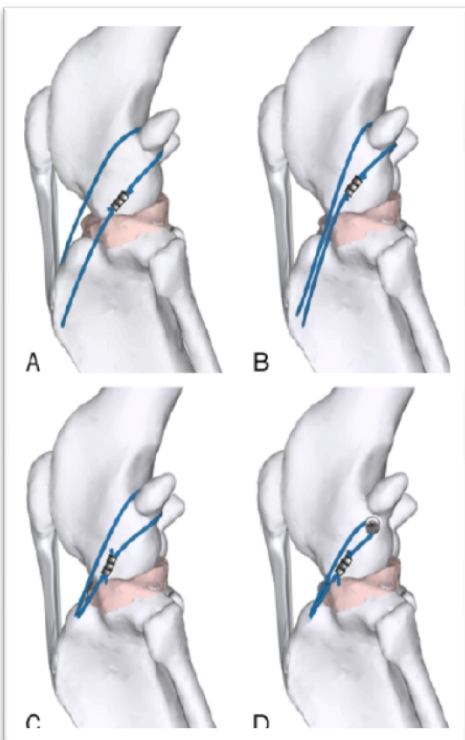
Time to tear for bilateral CCL **06**

Humans! **07 & 08**



ABOVE: Angles at which the lateral suture fixations were tied.

BELOW: Four different securing methods utilized



## Can joint angle at which the lateral suture was tied impact function?

**Fischer C, Cherres M, Grevel V et al. Effects of attachment sites and joint angle at the time of lateral suture fixation on tension in the suture for stabilization of the cranial cruciate ligament deficient stifle in dogs. Vet Surg 2010; 39: 334 – 342.**

**Objective:** This study evaluated the stability of cruciate joints fixated via lateral suture technique with the stifle joint in various degrees of stifle flexion. 9 cadaveric stifles were utilized and one investigator performed each of the surgeries.

**Method:** Four different methods of securing the lateral suture were utilized. The four techniques are shown in the photo below. Each technique was conducted in 3 different joint angles: 130 degrees, 100 degrees, & 70 degrees (see photos).

**Results:** All four lateral stabilization techniques had an increase in suture tension in flexion. Lateral suture stabilization with the suture looped around the lateral fabella and secured to the proximal aspect of the tibia via 2 parallel drill holes at the tibial crest had the least change in suture tension during ROM. Tightening the suture at a 70 degree joint angle resulted in a significant loss of suture tension on extension.

**Conclusion:** None of the lateral stabilization techniques resulted in constant suture tension. Tightening the suture with the stifle held in flexion may result in joint instability in extension. Lateral suture stabilization as commonly performed is associated with a significant increase in suture tension on flexion of the stifle, potentially over-constraining the joint. Tightening should be performed with the stifle in slight extension rather than in flexion.

**Relevance to Rehab:** This study is good to be aware of in regards to potential functioning of the post-operative canine patient.

- 1) The rehab practitioner may note an increase in give of the surgical materials with the stifle in extension (when testing for integrity of the repair). Fortunately the ability to detect a definable endfeel will help to detect whether the repair is intact or just loose.
- 2) The rehab practitioner may find that some dogs with extracapsular repairs have greater joint discomfort than others. Barring any other findings, the rationale for this could be that the lateral suture technique was performed with the stifle in a greater amount of flexion than comparable animals with the same surgical technique.
- 3) Rehab may progress slower in the case of a lateral suture stabilization performed at or near 70 degrees from the perspective of over joint constraint in flexion and/or laxity in extension.

## Complications with lateral suture techniques for CCL repair



**Casale SA, McCarthy RJ. Complications associated with lateral fabellotibial suture surgery for cranial cruciate ligament injury in dogs: 363 cases 1997 – 2005. J Am Vet Med Assoc 2009; 234: 229 – 235.**

**Objective:** This retrospective case series attempted to detect the complication rate in 305 dogs, with 363 incidents of CCL injury, treated with the lateral fabellotibial suture surgical technique.

**Method:** Medical records were reviewed for dogs that were evaluated at the foster Hospital for Small Animals at the Cummings School of Veterinary Medicine. Data obtained from the medical records included signalment, body weight, affected limb, and nature (unilateral vs bilateral) of the CCL rupture. Surgery time, anesthesia time, primary surgeon (staff surgeon vs resident), extend of CCL damage (complete vs partial), meniscal damage and treatment (excision vs release), implant type, postoperative bandage application, and duration of follow-up were recorded, as were type and number of complications.

A complication was defined as any undesirable outcome associated with the surgical procedure or occurring after surgery that was confirmed via physical examination of the dog at the hospital. Complications were categorized as intraoperative, neurologic, infection (confirmed via positive result of bacteriologic culture of a sample obtained from the surgical site), incisional (without positive result of bacteriologic culture), meniscal, and implant related.

**Results:** Complications (n = 65) were recorded for 63 of the 363 (17.4%) surgical procedures. Multiple complications developed in 2 dogs. In 26 (7.2%) dogs, a second surgery was required to manage the complications.

**Conclusion:** Results of the present study indicated that the overall complication rate after LFS surgery was 17.4%, with additional surgery required in 7.2% of affected dogs. The overall complication rate was lower than that reported for other methods for surgical treatment of CCL rupture. High body weight and young age are associated with a higher complication rate, and owners should be warned of this when options for management of CCL ruptures are discussed.

**Relevance to Rehab:** As rehab practitioners, we may find ourselves in the role of advising clients about which surgical options are available locally and which one we think might serve the patient the best. As non-surgeons, we may in fact be the only unbiased opinion that the client will encounter and potentially have seen more post operative cases than any one general veterinary practice. So it is important that we be up to date on relevant research in this area, and provide well thought out advice. Additionally, it is important to know what types of complications one might encounter post-operatively and be prepared to act accordingly should the animal deteriorate or fail to improve post-operatively. Personally, I think that the lateral fabellotibial suture technique can still be a very useful technique for the right patient.

*Something  
you didn't  
expect to  
learn...*

**Guerra AG, Hendrick S, Barth AD. Increase in average testis size of Canadian beef bulls. Can Vet J 2013; 54: 485 – 490.**

Did you know that the average scrotal circumferences for most common beef breeds in Canada have increased significantly over the last 25 years? Differences between breeds have remained unchanged and Simmental bulls still have the largest scrotal circumference at 1-year of age.

Hmmm! Who'd of thunk it!??

I've told readers before that I'm a farm girl... so this study was one that simple made me go 'hmmm!'

Are today's bulls more fertile than 25 years ago? Should we care about circumference? Is there a correlation with temperament, birth weight, weaning weight, marbling of meat, or other market- or producer- relevant factors?



## Radiograph to detect a ruptured CCL?

**Plesman R, Sharma A, Gilbert P et al. Radiographic landmarks for measurement of cranial tibial subluxation in the canine cruciate ligament deficient stifle. Vet Comp Orthop Traumatol 2012; 25: 478 – 487.**

**Objective:** The study set out to determine a repeatable radiographic technique for assessment of cranial tibial subluxation (CTS) and test the intra-observer and inter-observer repeatability of the chosen landmarks. A secondary objective was to determine the effects of digital radiographic magnification on CTS measurement repeatability.

**Method:** Mediolateral-view radiographs of 23 normal cadaveric pelvic limbs were studied to determine the magnitude of CTS pre and post – transection of the cranial cruciate ligament (CCL). They were compared with clinical cases with CCL ligament ruptures and varying degrees of osteoarthritis to determine visible landmarks for CTS measurement. A custom-made apparatus was utilized to create CTS during radiography. Using the landmarks selected from the clinical cases with osteoarthritis, three investigators

measured the distance between the femoral and tibial landmarks before and after transection of the cranial cruciate ligament.

**Results:** Measurement of the CTS from the caudal margin of the intercondylar fossa on the femur to the intercondylar eminence was the most repeatable. The authors found no effect of magnification or presence or absence of bone markers on measurement of CTS.

**Conclusion:** Cranial tibial subluxation can be detected with the most repeatability by measuring between the caudal margin of the intercondylar fossa and the intercondylar eminence. This technique can be used for in vivo analysis of the canine cruciate ligament deficient stifle joint.

**Relevance to Rehab:** This study and technique might be of use to the one-handed or armless veterinarian. Beyond that, I think it's ridiculous to rely on radiography to detect a full tear of the cruciate ligament! A good manual exam in combination with clinical reasoning will not only be able to detect a full tear, but partial tears as well.

## Lateral suture technique vs TPLO for CCL repair in dogs

Gordon-Evans WJ, Griffon DJ, Bubb C, Knap KM, Sullivan M, Evans RB. Comparison of lateral fabellar suture and tibial plateau leveling osteotomy techniques for treatment of dogs with cranial cruciate ligament disease. *J Am Vet Med Assoc* 2013; 243: 675 – 690.



Kanno N, Amimoto H, Hara Y et al. In vitro evaluation of the relationship between the semitendinosus muscle and the cranial cruciate ligament in canine cadavers. *Am J Vet Res* 2012; 73 (5): 672 – 680.

**Conclusion:** the semitendinosus muscle is an agonist of the CrCL in the stifle joint of dogs. Moreover, the quadriceps and gastrocnemius muscles may be antagonists of the CrCL. These findings suggested that the risk of CrCL rupture may be increased by diseases (such as cauda equina syndrome) associated with a decrease in activity of the semitendinosus muscle.

Hayes GM, Granger N, Langley-Hobbs SJ et al. Abnormal reflex activation of hamstring muscle in dogs with cranial cruciate ligament rupture. *Vet J* 2013; 196(3): 345 – 350.

**Conclusion:** Medium latency reflexes are abnormally prolonged in both pelvic limbs of dogs that have cranial cruciate ligament rupture, suggesting the possibility that abnormal neuromuscular control could play a causal role in progressive cruciate ligament damage. (In other words: the hamstrings are not contracting at the right time or for the right amount of time after a cranial translation stimulus in standing.)

**Relevance to Rehab:** We need to strengthen the hamstrings (in both legs) with our full or partial CCL – dogs

**Objective:** To compare the one year outcomes after LFS and TPLO.

**Method:** 80 dogs with naturally occurring unilateral CCL disease were randomized to have either the LFS technique or TPLO. Outcome measures were collected at 6 and 12 weeks and 6 and 12 months post-operatively, and included values of pressure platform gait analysis variables, Canine Brief Pain Inventory, owner satisfaction ratings, thigh circumference and stifle joint goniometry values.

**Results:** Canine Brief Pain Inventory, goniometry, and thigh circumference results indicated dogs in both groups improved after surgery, but significant differences between groups were not detected. Peak vertical force of affected hind limbs at a walk and trot was 5% to 11% higher for dogs in the TPLO group versus those in the LFS group during the 12 months after surgery. Owner satisfaction ratings at 12 months after surgery were significantly different between groups; 93% and 75% of owners of dogs in the TPLO and LFS groups indicated a satisfaction score  $\geq 9$  (scale, 1 to 10), respectively.

**Noted in the discussion:** Results of the present study differed from those of 2 observational studies (Conzemius et al 2005; Au et al 2010), in which no significant differences were detected between dogs that underwent TPLO and those that underwent an LFS procedure. Observational studies are not randomized; therefore, an unidentified confounding variable may have improved outcomes for dogs that underwent an LFS procedure or decreased outcomes for dogs that underwent TPLO in those studies. Additionally, in both of those other studies, dogs that underwent LFS procedures also underwent targeted physical rehabilitation at the hospital in which surgeries had been performed.

**Relevance to Rehab:** This study is also good to note. What should also be noted is that the owners were blinded to the surgical technique their dog received and all were charged \$1200 for the surgery. If cost were not a factor, then perhaps this study would suggest that all dogs should receive a TPLO... however cost does play a factor, and from personal observations in the field, not all owners are given all choices. The TPLO appears to be a good choice if affordable!

## How long can the other cruciate hang on???

**Muir P, Schwartz Z, Malek S, et al. Contralateral cruciate survival in dogs with unilateral non-contact cranial cruciate ligament rupture. PLoS One 2011; 6(10): e25331.**

**Background:** There is a high incidence of bilateral rupture at presentation or subsequent contralateral rupture in affected dogs. Although stifle synovitis increases risk of contralateral CrCLR, relatively little is known about risk factors for subsequent contralateral rupture

**Findings:** Subsequent contralateral CrCLR is common in client-owned dogs, with a median ligament survival time of 947 days. In this naturally occurring model of non-contact cruciate ligament rupture, cranial tibial translation is preceded by development of synovial inflammation.

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**Grierson J, Asher L, Grainger K An investigation into risk factors for bilateral canine cruciate ligament rupture. Vet Comp Orthop Traumatol 2011; 24(3): 192 – 196.**

**OBJECTIVES:** To investigate the incidence of bilateral cranial cruciate ligament (CrCL) rupture and determine any associated risk factors.

**METHODS:** The patient information system and surgical database at the Queen Mother Hospital for Animals, Royal Veterinary College, were searched from March 1998 to March 2007. Patient files were reviewed and data recorded. The risk factors considered included: gender, neuter status, breed, body mass, age and concurrent orthopaedic disease.

**RESULTS:** In total, 511 dogs were identified as having cruciate rupture and included for analysis. Bilateral rupture of the CrCL was present in 38.7% (198/511) of the dogs. The mean ( $\pm$  SD) time that passed until the contralateral CrCL ruptured was 57.9 weeks ( $\pm$  54.1; range 3 to 260 weeks). Dogs with bilateral cruciate rupture were younger (mean  $\pm$  SD;  $4.3 \pm 2.7$  years) than dogs with unilateral cruciate rupture (mean  $\pm$  SD;  $5.3 \pm 2.8$  years). In dogs with CrCL rupture, male dogs were more likely to have bilateral rupture than female dogs, overweight dogs were more likely to have bilateral rupture, Golden Retrievers were less likely to have bilateral rupture, and Rottweilers had the highest odds of bilateral rupture.

**CLINICAL SIGNIFICANCE:** In dogs with CrCL rupture, this study suggests possible relationships towards the incidence of a bilateral rupture also occurring as more likely in male dogs, young dogs with a mean age of four years ( $4.3 \pm 2.7$  years), Rottweiler dogs, and with an average elapsed time between ruptures of 57.9 weeks.



**Useful to note:** The first study looked at all dogs, while the second study looked at just dogs that had bilateral cruciate ruptures.

**Relevance to Rehab:** Can we prevent the second stifle from suffering a cruciate tear? From clinical experience, I would have to say, "Not always!" We have had some cases discharged from rehab, only to get a call from the owner a week later! I would however love to see a study that compared incidence of 2<sup>nd</sup> rupture on dogs that did and did not have post-operative rehab to completion!

It's great to be unique!!



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## Why keep a dog and bark yourself?

*Prov.* You should not do something you have hired someone else to do.

## Go to see a man about a dog (humorous)

if you tell someone you are going to see a man about a dog, it is a way of saying that you do not want to tell them where you are really going, especially when you are going to the toilet.

## Tail wagging the dog

a situation where a small part is controlling the whole of something.



## HUMANS!!!

**Christensen JC, Goldfine LR, West HS. The effects of early aggressive rehabilitation on outcomes after anterior cruciate ligament reconstruction using autologous hamstring tendon: a randomized clinical trial. J Sport Rehabil 2013; 22(3)191-201.**

**Objective:** Does early aggressive rehab affect outcomes at 1, 12, and 24 weeks post-operatively?

**Methods:** 36 patients were randomly allocated into two groups (aggressive, or nonaggressive rehab). Surgeries were conducted by the same orthopaedic surgeon.

All patients underwent the same post-operative rehab protocols, with the exception to the aggressive-group being the following:

“Patients were not required to wear a postoperative knee brace and began exercises to restore full passive motion without restrictions on hyperextension immediately after surgery. In addition, patients in this group were issued a continuous-passive-motion machine (Otto Bock Healthcare US, Inc, Minneapolis, MN, USA) set at 0° to 50° and instructed to remain in the device for at least 18 hours of the day with the Polar Care cold cuff on beginning immediately after surgery. Patients in this group were informed to begin weight bearing as tolerated immediately after surgery and to

only use the bilateral axillary crutches for comfort.”

“The non-aggressive group received the following early post-op care:

The nonaggressive group were required to wear a DonJoy Rehab TROM brace (Orthopedics Inc, Vista, CA, USA) locked at 20° of extension for the first week and unlocked 10° to 120° for an additional 3 weeks after surgery. Patients were instructed to only remove the brace to perform the phase I exercises, to shower, and during physical therapy visits. They were required to wear the brace at night to sleep for the first week. After 4 weeks of postoperative bracing, the brace was discontinued and the treating physical therapists instructed patients to begin full passive knee-flexion motion, but they were restricted to no hyperextension stretching for an additional 2 weeks postoperatively.”

The rest of the rehabilitation followed a phasing of exercises as described below:

Phase I (0–4 wk) of the rehabilitation protocol included passive, active-assist, and active ROM exercises; stationary bicycling; muscle-activation exercises; and inflammation reduction. Phase II (4–8 wk) of the protocol emphasized progressive ROM exercises, muscle strengthening, neuromuscular-control training, and functional activities. Phase III (8–12 wk) of the protocol consisted of restoring full symmetrical passive ROM, increased muscle strengthening, higher level neuromuscular-control tasks, and running. Phase IV (12–24 wk) of the protocol involved progressive muscle strengthening, sport-specific neuromuscular-control training, plyometrics, sprinting, and cutting drills.

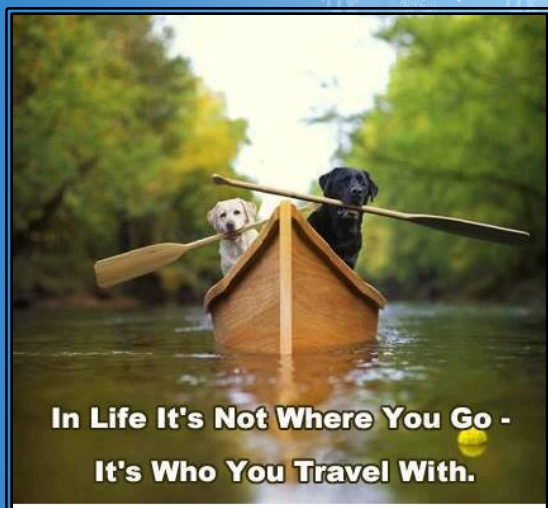
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**Outcomes:** There were no differences found between the two groups in regards to knee laxity, range of motion, peak isometric force, and subjective response to a standardized knee function questionnaire.

**Relevance to Rehab:** At first glance, one might think – “oh dear, this isn’t promising...” But in fact it is!! Being more aggressive earlier on in the rehab did not hinder progress or damage surgical integrity. All patients in this study received the same rehab after the initial stage... so it is not a matter of doing therapy or not, but rather a matter of will aggressive early therapy be detrimental or beneficial? The answer is, “Neither!” But if it were my knee, I’d want to get going sooner than later. I’d rather not wear a bandage or brace. I’d rather have my knee exposed so that I could ice it. I’d also rather use my leg to weight bear as I saw fit.

And why we care about this study in regards to canine rehab... is that ‘human studies’ can show that early aggressive rehab does no harm. (And in my humble opinion, also helps mitigate owner fears, and catch any adverse reactions should they occur.)



**Shaarani SR, O’Hare C, Quinn A, et al. Effect of prehabilitation on outcome of anterior cruciate ligament reconstruction. Am J Sports Med 2013; July 11 [Epub ahead of print].**

**What the heck is prehabilitation?** Prehabilitation is defined as preparing an individual to withstand a stressful event through enhancement of functional capacity.

**Objective:** To find out if prehabilitation affects functional outcomes after ACL reconstruction.

**Methods:** 20 volunteers awaiting ACL reconstruction were randomly assigned to a control group or an exercise group.

The exercise group completed a 6-week gym and home-exercise program. Exercising consisted of supervised resistance training and balancing exercises. The program concentrates mainly on lower limb strengthening with particular attention to the quadriceps, as well as proprioception training. Proprioception training was done on a wobble cushion. Home exercise consisted of the same program as the gym but with the use of a Thera-Band instead of weights.

Postoperatively, all patients had standardized physiotherapy sessions including increasing range of motion (ROM) and weight-bearing while improving symmetry and gait pattern.

**Outcomes:** The 6-week progressive prehabilitation program for subjects undergoing ACL reconstruction led to improved knee function based on the single-legged hop test and self-reported assessment using the modified Cincinnati score (function-questionnaire). These effects were sustained at 12 weeks postoperatively.

**Relevance to Rehab:** There may be circumstances where we, as canine rehab therapists, could advocate for a phase of prehabilitation in events where 1) a surgical wait time was going to be unavoidable or 2) a patient needed fitness / weight loss before being considered a surgical candidate, or 3) To trial conservative management for a period of time – should the owner be interested in pursuing that option as a test (and subsequently, having no deleterious effect should the owner change his/her mind and opt for surgery later).



## Are you a purple cow?



Perhaps you have no idea what I'm talking about!! And if so, you can learn more by grabbing a copy of my e-book, *The Marketing Manifesto for Canine Rehab Practice Workbook*

Marketing is a necessity if you want your canine physiotherapy / rehabilitation business to thrive and grow. However as professionals in healthcare (human or veterinary) we have little to no formal training in business and marketing, and subsequently make poor (if any) marketing choices to help sustain our businesses. Worse yet, many

of us were taught or given the impression that marketing is bad, slimy, or unprofessional. This mind set hampers the canine rehab professional's ability to succeed in business. This book will highlight marketing mindsets, marketing strategies, marketing tactics, and fundamentals in marketing messaging.

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