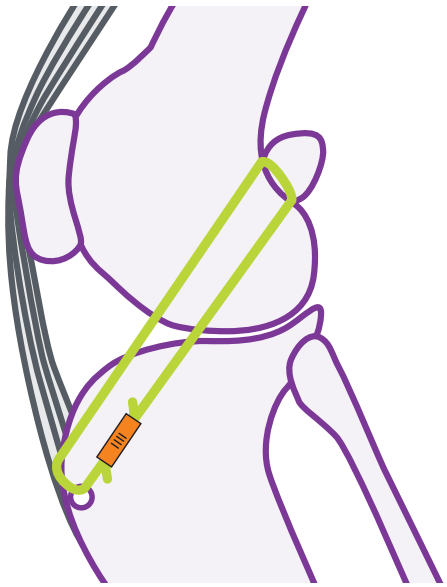
Vi Academy Step by Step

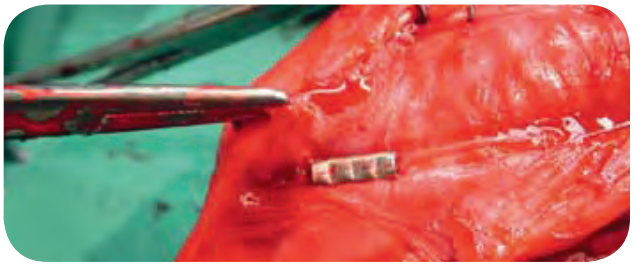
Lateral Suture System - A Step By Step Guide



Management of the ruptured Cranial Cruciate Ligament (CrCL) by placing a non-absorbable suture between the lateral fabella and the proximal, cranial tibia has been routine since DeAngelis first reported the technique in 1970.

Today it remains the extracapsular technique of choice. Conzemius in 2005 in the Journal of American Veterinary Medical Association, using force plate analysis, compared the outcomes of TPLO and lateral suture performed by the same surgeon. He reported no significant difference in outcomes.

The ideal lateral suture would join points of isometry in the femur and tibia. This would mean that as the stifle is flexed and extended the distance between the location points and therefore the length of the suture would remain constant. The points chosen for the lateral suture, the lateral fabella and the proximal cranial tibia, are not fully isometric but are chosen because of the ease of placing a suture. Using bone tunnels or suture anchors it is possible to place a suture isometrically but this is more technically demanding.



Guidelines For Size Of Leader Line

There are no hard and fast rules, particularly in very large dogs, but these guidelines may be helpful.

Strength of Line	Weight of Dog
50lb	10-15kg
80lb	15-20kg
100lb	20-40kg
100lb x 2	40kg+

As many as four lines may be used. Where multiple lines are used it is recommended that double lines are used to minimise trauma in the femorofabella region which is caused by multiple passage of needles.

Some large individuals occasionally have very unstable stifles. In these individuals it is suggested that a medial suture is placed to prevent outward rotation of the tibia as tension is applied to the lateral sutures.

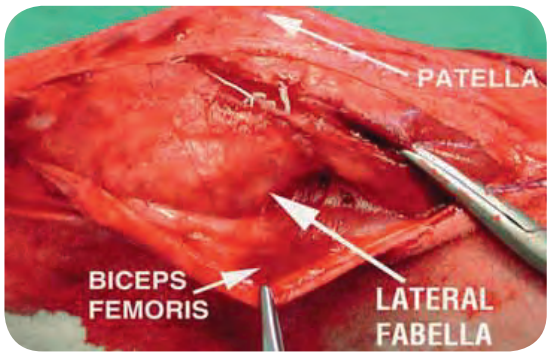
Surgical Technique

1

The dog is placed in dorsal recumbency which gives good access to both cranial and lateral aspects of the stifle. The leg can be flipped one way then the other. Use of the multiarm positioning device allows the limb to be positioned and locked for examination of the meniscus but also easy to be re-positioned and locked for placement of the lateral suture.
The upper limb and foot is fully draped. Use of adhesive anti-bacterial drapes further reduces the risk of infection.

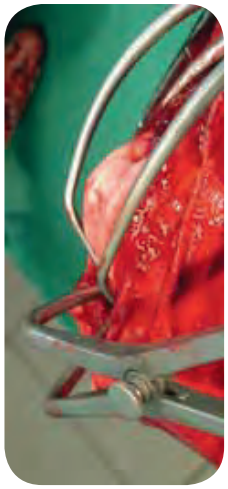
2

Approach the stifle joint via a lateral parapatellar incision. Incise through the aponeurosis of the biceps femoris and tensor fascia lata. Leave sufficient fibrous tissue on the patella to facilitate the re-suture. Do not go through into joint capsule at this stage if possible.



3

Dissect between biceps femoris and joint capsule to identify and expose the lateral fabella. The fabella is palpable on the caudal border of the femur. It is a relatively mobile structure which, if probed with a fabella needle will move, confirming its position.
If the opportunity arises it is helpful to perform a full dissection on a cadaver to identify the fibrous structures which attach the fabella to the femur. It is this fibrous tissue upon which the lateral suture will depend. Failure to pass the suture through enough fibrous tissue is the most common cause of failure.
Open the joint capsule, again leaving enough capsule on the patella for closure.



Make a thorough examination of the stifle joint checking both the lateral and medial meniscus. The lateral meniscus has a secure attachment to the femur and therefore moves with it which minimises trauma.

4

The medial meniscus is not securely attached to the femur. In the unstable joint the femur moves backwards and forwards over the medial meniscus and can cause serious injury. Injuries to the medial meniscus are most common in the large dog with a long

standing stifle instability. Conversely smaller dogs appear to be less prone to meniscal injury. Unfortunately the medial meniscus is very difficult to see even with appropriate instrumentation.

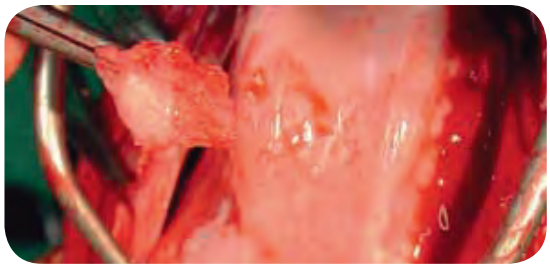
A Senn retractor will retract the fat pad. A stifle distractor is positioned with one prong sitting in the intercondylar notch and the other in non articular tibial plateau between lateral and medial meniscus. The spin lock is not engaged at this stage. Squeezing the handles will confirm if the tips are correctly positioned. If positioning is correct the femur will separate from the tibia revealing the medial meniscus. If the lower tip is too far cranial the stifle will flex.

If the tips are in the correct positions the spin lock should be engaged and the stifle distracted. Once the tips are engaged the distractor becomes self retaining. A small Hohman or stifle lever will give further focal retraction.

The lateral horn should also be examined by re-positioning the distractor if necessary. Injuries to the lateral horn are far less common than to the medial horn. To establish if any tears are present it is important to probe the meniscus directly. An undamaged meniscus is tough and will tolerate examination. A small meniscus probe is designed for this purpose.

5

Damaged parts of the meniscus should be removed. Damaged sections are difficult to grasp as they are covered by very slippery synovial fluid. Toothed Halsteads or a ligament clamp will be necessary. Resection is achieved using a small blade. The most useful is a pointed Beaver blade in a Beaver handle. A No 65 is similar to a small No 11. The No 65A is even smaller. In larger dogs there is space enough for a No 11 blade in a No 3 handle. The joint capsule is closed using absorbable sutures.



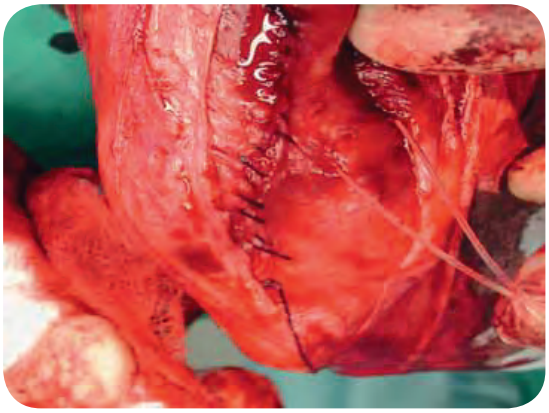
6

The lateral fabella is re-exposed. Gelpi self-retaining retractors or a Hohman retractor are useful as they hold back the biceps and fascia lata which otherwise obscure the fabella area. Passing the nylon suture behind the fabella appears to be the most difficult part of the procedure. It is well worth repeating that dissection of the peri-fabella structures on a cadaver specimen to identify fibrous structures is extremely useful.

The nylon may be passed around the fabella using either dedicated cruciate/fabella needles or appropriate graft passers. The fabella is a relatively mobile structure which can be identified and moved using the tip of the needle. By walking the needle tip over the caudal edge of the fabella it is possible to locate and penetrate the femorofabella ligament. If you are unable to pass the needle between femur and fabella it is essential that the needle passes at least through substantial fibrous tissue adjacent to the fabella. Avoid placing the suture distal to the fabella. If excessive soft tissue is included in the nylon loop, tension will be quickly lost as the nylon 'cheese wires' through. Keep the needle as close as possible to the fabella. Using a needle which is too large will also pick up too much soft tissue.

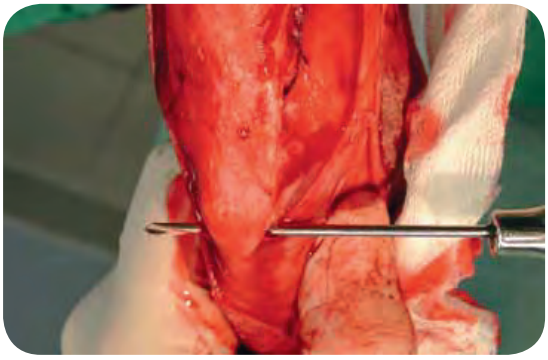
7

A single strand of monofilament nylon is pulled through. If the nylon is in the correct place it should be possible to virtually lift the dog up from the table without tearing through. Indeed the loop should be thoroughly tested to check correct positioning.



8

Drill hole (2.5 to 3.5mm diameter) in the proximal tibia close to the insertion of the straight patella ligament with a bone tunnel borer or drill. The hole should be as cranial and proximal as possible to maximise isometry.

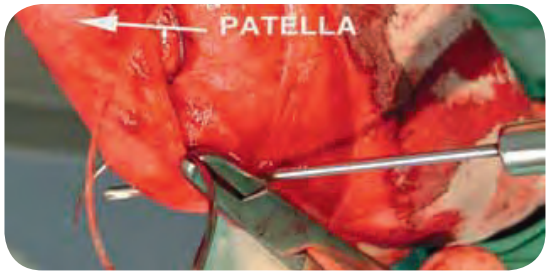


9

Positioning of distal hole in tibia.
In the lateral suture system the proximal position of the loop is always the lateral fabella (but see suture anchors). There are however some options when it comes to placing the hole(s) in the tibia. Passage and anchoring of the suture through the distal patella ligament is sometimes insecure.
An alternative is to use two holes distally. The first hole is as described above but the second is placed more caudally on a line between the lateral fabella and the first hole.

10

The top strand of the nylon is passed through the distal patella ligament in the lateral to medial direction. The needle should pass through the distal insertion to firmly locate it close to the hole in the proximal tibia.



11

The nylon strand is passed back through the hole in the proximal tibia using straight graft passer or cruciate/ fabella needle.

12

One free end of the nylon is passed through crimp tube. The other free end is fed through the other end of crimp tube. The crimp is free to slide at this time.

13

Gently crimp middle of tube so that nylon can be pulled through with some difficulty (about 60% of a full crimp). Until experienced, use incremental squeezes to obtain ideal resistance. Pulling the free ends through will create tension on the loop.
The greater the degree of crimp applied the higher the tension which can be applied without the nylon sliding back through.

14

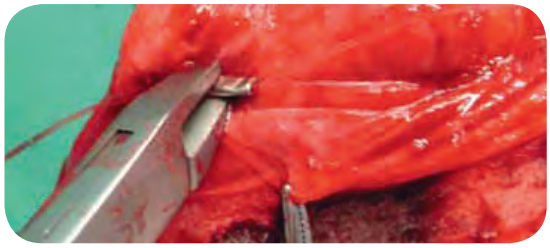
Pull the nylon suture tight enough to eliminate anterior drawer and check for full range of motion. Take care not to create an outward rotation of the tibia on the femur. Too much tension is as great a technical error as too little.

15

Tension may be applied using instrumentation. The tension device on the left grips the free nylon and pulls it through the crimp with a spin lock device. Alternatively the right hand illustration shows nylon tensioning clamps attached to the free nylon which are then distracted using a pair of standard Gelpis. Using instruments it is easy to overtighten.

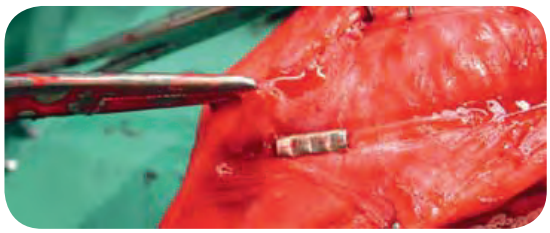
16

The crimp is oval in shape. It is important that the crimp is crimped across the wide part i.e. at right angles to the two strands of nylon. In addition care should be taken to make sure that all the crimps are in the same plane on the tube, otherwise the crimps neutralise each other. Tensioning the loop tends to pull the crimp flat to the soft tissues. In order to crimp across the wide part it helpful to pull one strand of nylon to tip the crimp to give the crimper access to the wide part of the crimp.



17

Squeeze the crimp hard in middle and both ends. Do not crimp too close to the end of the tube. Leave around 1mm uncrimped. Cut off the free ends close to the crimp. The crimp should sit over tibialis cranialis muscle close to the tibia. The arthrotomy is closed in layers. The illustration shows a crimp tube correctly crimped and in the correct position.



Crimping Errors

Unless the crimp is correctly performed early failure of the loop may occur.
This crimp is correct with 3 evenly spaced crimps. One or two crimps are not enough to ensure closure. Crimping too close to the end of the tube will damage the nylon and lead to early failure.

Crimp is correct with 3 evenly spaced crimps.

One or two crimps are not enough to ensure closure.

Crimping too close to the end of the tube will damage the nylon and lead to early failure.

Post Operative Care

- A Robert Jones Dressing may be applied for three days.
- For the next seven days there should be strict rest other than toilet walks.
- Over the next two months leash exercise gradually increasing mobility of the stifle.
- Hydrotherapy is beneficial to build muscle mass without weight bearing.

Final stability of the repair is due to periarticular fibrosis. The nylon will typically fail between 6 to 10 weeks if it is still stabilising the stifle at this time. Loop failure at this time does not affect outcome but may show itself as a transient lameness of 1-2 days.

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Instrumentation & Implants

Vi Lateral Suture Starter Kits

091154 CCL Suture System (Swaged on) Basic Kit Crimping Forceps
2 x each size nylon/needle/crimp sterile packs

091150 CCL Suture System (Swaged on) Compound Action Kit
2 x each size nylon/needle/crimp sterile packs

091151 CCL Suture System (Swaged on) Basic Kit Plus
Forceps 2 x each size nylon/needle/crimp sterile packs
plus Heavy Duty Needleholders

Sterile CCL Packs

Leader Line + Needle + Crimp

091155 50lb nylon line x 500mm on swaged-on
v. small fabella needle + 10mm crimp (sterile)

091156 80lb nylon line x 800mm on swaged-on
small fabella needle + 12mm crimp (sterile)

091157 100lb nylon line x 800mm on swaged-on
medium fabella needle + 12mm crimp (sterile)

091155/5 50lb nylon line x 500mm on swaged-on v. small
fabella needle + 10mm crimp (sterile) 5 Pack

091156/5 80lb nylon line x 800mm on swaged-on small
fabella needle + 12mm crimp (sterile) 5 Pack

091157/5 100lb nylon line x 800mm on swaged-on medium
fabella needle + 12mm crimp (sterile) 5 Pack

091159 5 of each sterile CCL pack (50lb, 80lb and 100lb.) 15 in total

Double Leader Line + Needle + Crimps

091165 50lb Double line (500mm x 2 as loop) on
v small fabella needle plus 2 x 10mm crimps (sterile)

091166 80lb Double line (800mm x 2 as loop) on
small fabella needle plus 2 x 12mm crimps (sterile)

091167 100lb Double line (800mm x 2 as loop) on
medium fabella needle plus 2 x 12mm crimps (sterile)

091165/5 50lb Double line (500mm x 2 as loop) on v small fabella
needle plus 2 x 10mm crimps 5 Pack (sterile)

091166/5 80lb Double line (800mm x 2 as loop) on small fabella
needle plus 2 x 12mm crimps 5 Pack (sterile)

091167/5 100lb Double line (800mm x 2 as loop) on medium fabella
needle plus 2 x 12mm crimps 5 Pack (sterile)

091169 5 of each sterile Double line CCL pack
(50lb, 80lb and 100lb.) 15 in total (sterile)

Double Leader Line + Needle (no crimp)

091160 50lb Double Line (500mm x 2 as loop) on V Small Fabella Needle
091161 80lb Double Line (800mm x 2 as loop) on Small Fabella Needle
091162 100lb Double Line (800mm x 2 as loop) on Medium Fabella Needle

Leader Line + Crimp (no needle)

091142 10mm Tube Crimp + 500mm x 50lb Nylon (Sterile Pack)
091137 12mm Tube Crimp + 800mm x 80lb Nylon (Sterile Pack)
091147 12mm Tube Crimp + 800mm x 100lb Nylon (Sterile Pack)

Leader Line (no needle or crimp)

091141 500mm x 50lb Nylon (Sterile Pack)
091139 800mm x 80lb Nylon (Sterile Pack)
091148 800mm x 100lb Nylon (Sterile Pack)

Fabella Cruciate Needles

091144VS Fabella Needle Very Small - Pack of 6 Has Regular Eye
091144 Fabella Needle Small - Pack of 6 Has Regular Eye
091145 Fabella Needle Medium - Pack of 6 Has Regular Eye
091146 Fabella Needle Large - Pack of 6 Has Regular Eye

Crimps

091140 10mm Tube Crimp for 50lb Line (Non Sterile)
091136 12mm Tube Crimp for 80lb + 100lb Line (Non Sterile)
091133 14mm Tube Crimp (Non Sterile) Suitable for Nylon over 100lb
091140/10 10mm Tube Crimp for 50lb Line (Non Sterile) 10 Pack
091136/10 12mm Tube Crimp for 80lb+100lb Line (Non Sterile) 10 Pack
091133/10 14mm Tube Crimp (Non Sterile)
Suitable for Nylon over 100lb 10 Pack

Bone Tunnel Borer

001070M Bone Tunnel Borer 2mm Modular
001073M Bone Tunnel Borer 2.5mm Modular
001071M Bone Tunnel Borer 2.7mm Modular
001072M Bone Tunnel Borer 3.5mm Modular

Countersinking Bone Tunnel Borer Modular Set

001075M Bone Tunnel Borer with Countersink Modular Set

Heavy Duty Needle Driver

091153 Heavy Duty Needle Driver with Tungsten Jaws 195mm Long

Crimping Forceps

091135 Crimping Forceps 195mm Long
091135C Compound Action Crimper 230mm Long

CCL Loop Tensioning Devices

091132P CCL Tensioning Device (Pair - Gelpis not included)
091132A CCL Loop Tensioner 175mm

Stifle Distractors

001112/L Stifle Distractor Large min spread 10mm max spread 40mm 210mm Long
001112 Stifle Distractor min spread 8mm max spread 30mm 190mm Long
001112S Stifle Distractor Small min spread 6mm max spread 20mm
001112XS Stifle Distractor Extra Small

Meniscus Surgery Set

001116 Meniscus Surgery Set
001117 Meniscus Surgery Set - Enhanced

Multi Arm Positioning Device

026000 Multi Arm - 'Improved' Version includes Single Limb Support
020062 Double Limb Support
020065 Limb Brace Attachment for Multi Arm
MULTIARMSET Multi Arm Set (as above)

Variations On A Theme

Suture Anchors

The lateral fabella and proximal tibial crest are not isometric points but are convenient as needle passage points for the lateral suture. Use of suture anchors enables the surgeon to position the lateral suture at isometric points. The isometric points around the canine stifle are nicely described by Simon Roe in VCOT 2008; 21:215-220.

Suture Screws

SS2006	2.0mm Diameter 6mm Long 1.0mm Hole Cortical
SS2010	2.0mm Diameter 10mm Long 1.0mm Hole Cortical
SS2708	2.7mm Diameter 8mm Long 1.5mm Hole Cortical
SS2714	2.7mm Diameter 14mm Long 1.5mm Hole Cortical
SS3512	3.5mm Diameter 12mm Long 2.0mm Hole Cortical
SS3520	3.5mm Diameter 20mm Long 2.0mm Hole Cortical
SS4016	4.0mm Diameter 16mm Long 2.0mm Hole Cancellous
SS4024	4.0mm Diameter 24mm Long 2.0mm Hole Cancellous
SSITKIT	Suture Screw Set (16 Screws + Introducer + 3 Suture Packs)
SSITUN	Universal Insertion Tool for all Suture Screws

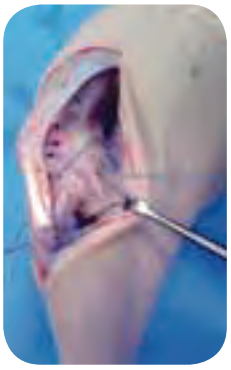
Suture Anchor Pins

SAP2.5	Suture Anchor Pin 2.5mm Diameter 1.0mm Hole 17mm Suture Anchor Length 125mm Overall Length
SAP3	Suture Anchor Pin 3mm Diameter 1.0mm Hole 21mm Suture Anchor Length 127mm Overall Length
SAP4	Suture Anchor Pin 4mm Diameter 2.0mm Hole 26mm Suture Anchor Length 136mm Overall Length

Arthrex Suture Anchors

VAR-2200	FASTak II with # 2 (5 Metric) FiberWires™ in Screwdriver Applicator - 5 Pack
VAR-2201	FASTak II Anchor only - 5 Pack

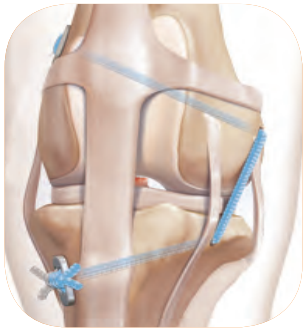
Arthrex FiberWire™



FiberWire is a composite material made from a core of polyethylene and a coat of polyester. It is, weight for weight, very strong and abrasion resistant compared with monofilament nylon. In addition it ties very well and does not need to crimped although a crimp is available. As a braided material there is a higher risk of infection than with the monofilament materials. If a serious infection occurs the whole loop should be removed and joint function re-assessed at a further four weeks to determine if further surgery is required. Widely used in human surgery, where FiberWire™ is not considered to be a high risk material. The FiberWire™ lateral suture has a standard curved cruciate needle at one end and a straight needle at the other.

VAR-2000	#5 (M7) FiberWire™ Lateral Suture (10)
VAR-2002	#2 (M5) FiberWire™ Lateral Suture (10)
BRCCLS	FiberWire™ Lateral Suture Step by Step Guide

Arthrex TightRope



Sutures may be threaded through bone tunnels positioned at isometric points. Arthrex TightRope and the LigaFiba IsoToggle systems use bone tunnels and are described in detail in separate brochures.

The isometric points used are:

- Femur: just cranial to and just distal to the lateral fabella close to the caudal border of the femoral condyle.
- Tibia: tubercle of Gurdy just cranial to the Long Digital Extensor.

VAR-2800	TightRope CCL
VAR-8920DC	Cannulated Drill Bit 3.5mm
VAR-8920P	Guidewire for TightRope (Pack of 6) 1.2mm
VAR-11796	FiberWire™ Scissors
VAR-2800-MULTI	TightRope CCL 5 Pack + Free Cannulated Drill Bit
BRTIGHT	TightRope Training Guide

Arthrex have produced a smaller version of the TightRope for dogs less than 18kg. The technique is the same as for the standard TightRope CCL but the guide wire and 2.7mm cannulated drills are smaller. Some users report that the Tensioner is more useful with the Mini TightRope (VAR-1529).

VAR-2801	Mini TightRope Single Set
VAR-8911DC	Cannulated Drill Bit 2.7mm (use with VAR-8920P)
VAR-1529	Tensioner with Tensiometer
VAR-8920P	1.2mm (0.049") Guidewire (Pack of 6)

Please note that Vi can only supply Arthrex products within the U.K.

To place an order contact our Vi Advisor Team on 0345 130 9596 or email info@vetinst.com

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