Veterinary
Instrumentation

Surgery Guide

LigaFiba® Lateral Button Suture

Surgery Guide:
LigaFiba® Lateral Button Suture

Management of Cranial Cruciate Ligament Disease/Rupture (CrCL) by placing a non-absorbable suture between the lateral fabella and the proximal cranial tibia has been a routine procedure since De Angelis first reported the technique in 1970. This is an extra-capsular suture technique (the implant is placed outside the joint) and is called a lateral suture, or a fabello-tibial suture. There have been improvements/modifications to the technique over the years, and this surgery guide reflects current clinical thinking and best practice, and describes the use of more modern material for performing a similar procedure.

Lateral View | Medial View

The lateral suture remains one of the most popular extracapsular surgical techniques performed today, and up until the early 2000s was considered amongst the best surgical techniques available for treatment of cranial cruciate ligament disease in the dog. Since the advent of the tibial osteotomy techniques, primarily TPLO and TTA, and as these osteotomy techniques have evolved, outcomes have improved, and complication rates have reduced. Today, clinical outcome with TPLO and TTA is considered the best available, and superior to outcome with extracapsular suture techniques. But the lateral suture is still commonly performed in first opinion and charity practice.

The ideal lateral suture system would perfectly replicate the origin and insertion points of the cranial cruciate ligament at the femur and at the tibia. These are called the isometric points. If perfectly replicated, the distance between these points, and therefore the length of the suture, would remain constant as the stifle is flexed and extended. However, as the cruciate ligament is intra-capsular (within the joint) and the lateral suture is an extracapsular implant (outside the joint), perfect replication of these isometric points is impossible to achieve. Therefore, contact points are chosen that are as close to isometric as (quasi-isometric). Utilising a bone tunnel and/or suture anchors can help to achieve location points as close to truly isometric as possible.

The Lateral Button Suture system is designed to simplify placement of the lateral suture including achieving as isometric a point as possible on the proximal tibia. Another advantage is that the suture material passes through a single bone tunnel, meaning a second bone or soft tissue tunnel for the suture to "return" through is not required.

Contents

Guidelines for Implant Choice

The Vi Lateral Button Suture system uses LigaFiba® (Ultra High Molecular Weight PolyEthylene (UHMWPE)) suture and a titanium button. UHMWPE is stronger than nylon for any given diameter and has better abrasion characteristics. Rose et al in Veterinary Surgery 41 (2012) 266-272 found that LigaFiba® outperformed FiberTape, FiberWire, Xgen OrthoFiber and Mason Leader Line with respect to tensile strength, stiffness at failure, loading at elongation and resistance to cyclic elongation.

Nylon or LigaFiba®?

Nylon is the traditional choice for lateral suture and has been in use since the technique was first described. It is a monofilament line and therefore carries a lower risk of infection. However, it is stiffer and can be difficult to handle, having what is termed 'good memory' (the line wants to spring back to its original shape). It is also more brittle and does not have very good resistance to abrasion, making it more prone to early weakening and failure.

LigaFiba® is a modern material, made of braided ultra high molecular weight polyethylene (UHMWPE). LigaFiba® has different properties, being much more flexible and considerably easier to handle ('poor memory', does not spring back to its original shape). Being a multifilament line, LigaFiba® carries a theoretical higher risk of infection, but as with all joint surgery, excellent attention to aseptic technique should mitigate any increased risk. LigaFiba® has higher resistance to abrasion than nylon and contours with better ease, making it less prone to early weakening and failure. Weight for weight, or diameter for diameter, LigaFiba® is stronger than nylon.

Fig 1. summarises the properties of nylon and LigaFiba®.

Nylon	LigaFiba®
Traditional	More modern
Monofilament nylon	Multifilament braided UHMWPE
Has high 'memory' - is more difficult to handle	Has low 'memory' - is easy to handle
Difficult to knot	Easy to knot
Can be used with crimps	Can be used with crimps
Available in a variety of sterile presentations	Available in a variety of sterile presentations
	Stronger than nylon for any given diameter
	Better abrasion resistance than nylon

Fig. 1

Nylon may be used for Lateral Button Suture at the surgeons discretion but LigaFiba® is strongly recommended.

Size of Line?

There are no set rules on choice of size/weight of line, but Fig.2 gives guidance as to appropriate choice of line. Surgeons may choose to err on the side of caution for boisterous patients, overweight patients, or where there is uncertainty over the owners ability/willingness to comply with post-operative instructions regarding restriction of exercise. Surgeons should also consider the size of the bone tunnel required for different weights of line, and whether that bone tunnel size is appropriate to patient bodyweight/anatomy.

Fig.2 offers guidance as to line choice according to patient bodyweight. If a patient is above their ideal bodyweight, is particularly boisterous, or if there are concerns about postoperative compliance, a surgeon may choose to go up a size at their own discretion.

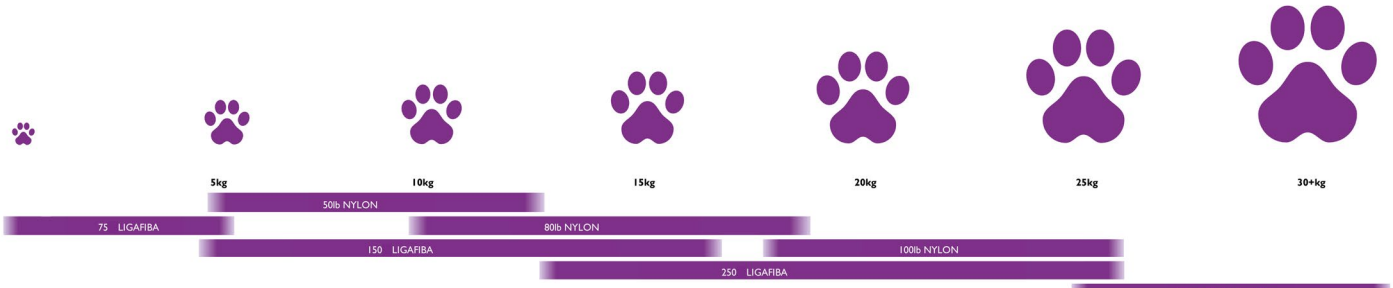


Fig. 2

The LigaFiba® Lateral Button Suture implant is supplied sterile and includes a titanium button and crimp. (Fig. 3).

Fig. 3

Surgical Technique

1. Patient Positioning

The dog is positioned in dorsal recumbency which gives good access to all aspects of the stifle but particularly cranial and lateral. The leg can be moved as required during the surgery for best possible access. The upper limb and foot are fully draped as per normal sterile surgery protocol (Fig. 4). Use of adhesive antibacterial drapes is recommended.

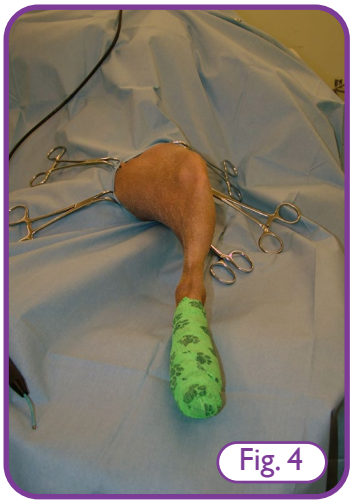


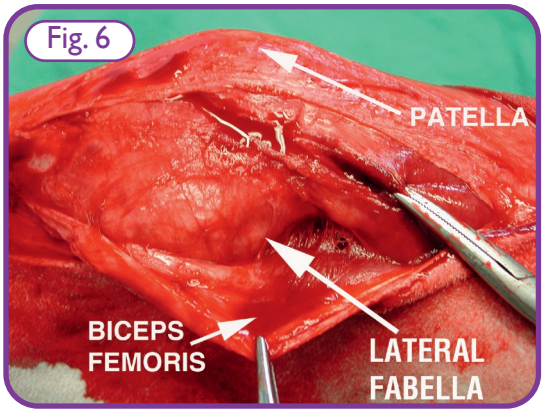
Fig. 4

2. Surgical Approach

Approach the stifle joint via a lateral para-patellar incision (Fig. 5). Incise through the aponeurosis of the biceps femoris and tensor fascia lata ie. the lateral retinaculum. Leave sufficient fibrous tissue on the patella to facilitate easy closure ie. make an incision several mm lateral to the patella. Do not incise into the joint capsule at this stage if possible.


Fig. 5

Staying outside the joint, reflect the biceps femoris caudally and dissect between it and the joint capsule to identify and expose the lateral fabella. The fabella is a sesamoid in the lateral head of the gastrocnemius; correct placement of the lateral fabella needle is just cranial to the fabella, ie. the fibrous/ligamentous tissue that is the origin of the lateral head of the gastrocnemius. The fabella is palpable on the caudal border of the femur just proximal to the condyle. It is not visualised directly but felt as a small protuberance; initially it can appear to be part of the femur but it is slightly mobile. If probed, it will move slightly, confirming the correct position (Fig. 6).



The anatomy is not easy for the inexperienced surgeon. It is strongly advised to perform a full dissection on a cadaver to identify the various structures which attach the fabella to the femur, ie. the femoro-fabella ligament. It is this fibrous tissue upon which the suture will depend. Failure to pass the suture through enough fibrous tissue is the most common cause of failure.

3. The Arthrotomy

Incise into the lateral joint capsule. Ideally, only do a sub-patellar 'mini' lateral arthrotomy, ie. do not extend the joint capsule incision proximally through the fibrous lateral femor-patellar ligament, as it is not necessary to do a full lateral arthrotomy, and to do so induces more degenerative joint disease.

Insert a blunt-tipped Gelpi retractor medio-laterally ie. one foot under the patella ligament and the other under the joint capsule. Insert a stifle distractor appropriate to the patient size proximo-distally with the proximal foot in the most cranial aspect of the intercondylar notch, and the distal foot at the cranial aspect of the tibial plateau. Gently squeeze the handles of the stifle distractor to distract the joint – if good visualisation is not achieved, repositioning the feet of the stifle distractor is usually helpful. If using a spinlock stifle distractor, the spinlock is used to hold the distracted position. Do not use the spinlock to distract the joint. Gelpis and stifle distractors are available in a wide range of sizes to suit all patient sizes.

The combination of Gelpi medio-laterally and stifle distractor proximodistally should allow for best intra-articular visualisation (Fig. 7). It can also sometimes be useful to use a Senn retractor or fat pad retractor to retract the fat pad for improved visualisation. Excellent surgical lighting is also required to adequately examine the inside of the stifle joint – a head torch may be useful.

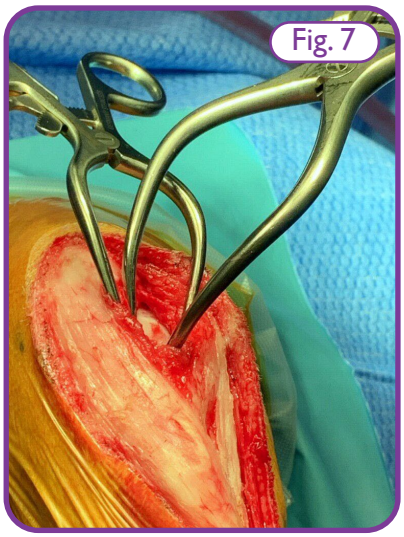


Fig. 7

4. Meniscal Inspection and Surgery:

Make a thorough intra-articular inspection of the stifle joint. In particular check both the lateral and medial meniscus.

The lateral meniscus is attached to the femur via the caudal menisco-femoral ligament and therefore moves with the femur, which minimises the chance of traumatic crushing and meniscal tear. Lateral meniscus tears are very rare.

The medial meniscus is securely attached to the tibia via the cranial and caudal menisco-tibial ligaments, but it is not attached to the femur. As such, the medial meniscus does not move with the femur and is thought to get trapped when the tibia thrusts cranial relative to the femur in the cruciate deficient stifle. The medial meniscus is therefore prone to injury and there is a high risk of medial meniscal tear. Injuries to the medial meniscus are common.

The more damaged the cranial cruciate ligament, the easier the menisci are to see. If the cruciate ligament is fully ruptured, good distraction can be achieved with the stifle distractor and then good visualization of both menisci can be achieved. However, if there is only a partial rupture of the cranial cruciate ligament, the remaining ligament will resist and limit the ability to open up the joint by the stifle distractors. This in turn will make examination of the caudal stifle, including the caudal horns of the menisci, very difficult and sometimes impossible. Fortunately, there is less likely to be a meniscal injury with a partial cruciate injury as the degree of stifle instability is also less i.e. at the same time the menisci are more challenging to visualize, the less the chance of a meniscal tear.

To establish if any tears are present it is important to fully visualize and probe the menisci directly. A small meniscus probe or Dandy nerve hook are ideal for this purpose; the proximal (upper) and distal (under) surfaces of the meniscus should be probed. A normal meniscus is tough and does not move much with probing, whereas if the meniscus is torn, the torn section will be unstable to probing, or the meniscal probe may get stuck in the tear.

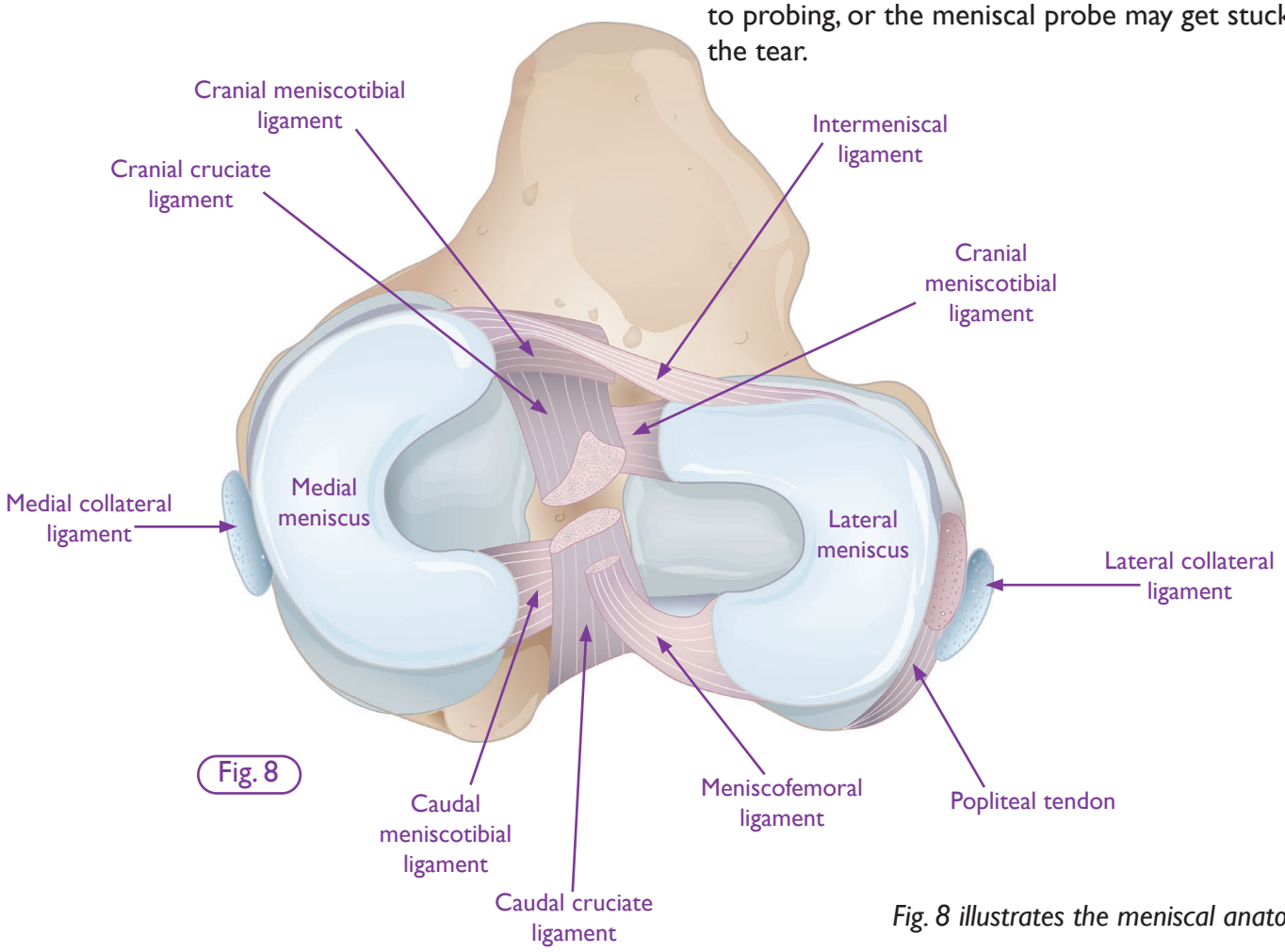


Fig. 8

Fig. 8 illustrates the meniscal anatomy

The axial (inner) surface of the medial meniscus may be seen with a wavy or undulating edge which may not be fully in contact with the tibial plateau; this is normal, and is not a sign of a meniscal tear.

Torn and damaged parts of the meniscus should be removed. Damaged sections are difficult to grasp as they are very small and covered by slippery synovial fluid. Toothed Halstead mosquito forceps are very useful for grasping portions of meniscus. Resection of the damaged portion is achieved using a small blade. A no.65 Beaver blade is similar to a small no. 11 and is perfect for most meniscal surgery. If required, the no.65A is even smaller.

If the meniscus is normal, no surgical action is taken.

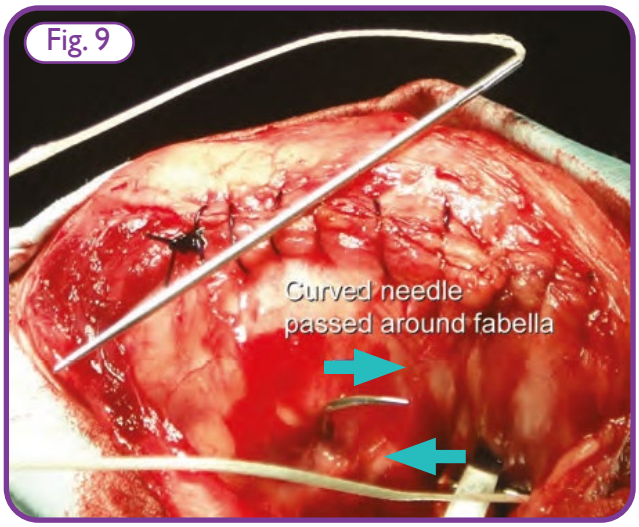
Once the joint has been explored thoroughly and the menisci treated as appropriate, the joint is thoroughly flushed, the stifle distractor and Gelpi retractor are removed and the joint capsule is closed using absorbable suture material such as PDS.

5. Placement of the Lateral Button Suture Implant

The lateral fabella is re-accessed. Gelpi self-retaining retractors can be helpful to retract the biceps and lateral retinaculum caudally, making access easier.

Passing the suture in the correct location around the origin of the lateral head of the gastrocnemius just proximal to the fabella is the most difficult part of the procedure. This is because the femoro-fabella ligament is very thin and broad in this location, and the space between the bone and the tendon and is very small and tight. It is highly advisable to practice this dissection and surgery on a cadaver before attempting surgery in a live patient.

Use the LigaFiba® curved swaged on needle and a pair of heavy-duty needle holders. The fabella is identified by palpation. By walking the needle tip over the caudal/proximal/medial edge of the fabella, the needle is driven from medial to lateral under the femorofabella ligament. Keep the needle as close to the bone as possible (Fig. 9).



Driving the needle should be very tight and difficult, ensuring the suture has good purchase. If the needle passes easily, it has not engaged the femoro-fabella ligament correctly, and will be loose or will quickly loosen. Do not place the needle distal to the fabella as the suture will slip distally and quickly loosen. The suture material is pulled through and security of placement is tested. If the suture material is in the correct place it should be possible to virtually lift the dog up from the table without tearing through. If the suture is not secure and strong, it should be removed and replaced, and tested again to ensure its security.

Suture anchor/screw. If secure purchase of the suture at the fabello-femoral ligament cannot be achieved, then an alternative technique is to place a suture anchor or suture screw in the femur immediately adjacent to the position of the lateral fabella.

To minimise the risk of infection, ensure that contact between the LigaFiba® suture material and the skin is kept to a minimum. The use of antibacterial adhesive drapes is recommended. Otherwise, place swabs on the skin and then when necessary, rest the LigaFiba® on the swabs to reduce potential contact.

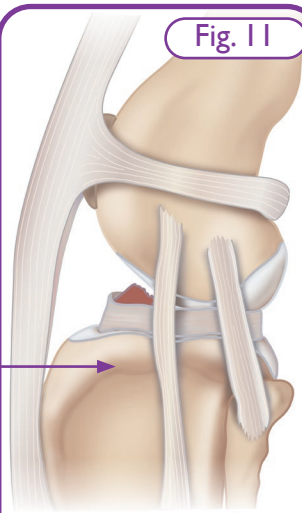
6. Tibial Tunnel Placement

Drill a hole wide enough to accept the suture material (please refer to Fig.10 below for suggested drill bit sizing. Surgeons should also consider whether that bone tunnel size is appropriate to patient bodyweight/anatomy). The bone tunnel should be located as close as possible to the insertion point of the cranial cruciate ligament (quasi-isometric). In other words, the hole should be as proximal and as close to the tibial plateau as possible (Fig. 11).

LigaFiba®		Nylon	
Size	Drill Size	Breaking Strain	Drill Size
150	2mm	50lb	2.5mm
250	2.5mm	80lb	2.7mm
500	3.5mm	100lb	3.5mm

Fig. 10

Fig. 11



Position of tibial bone tunnel placement

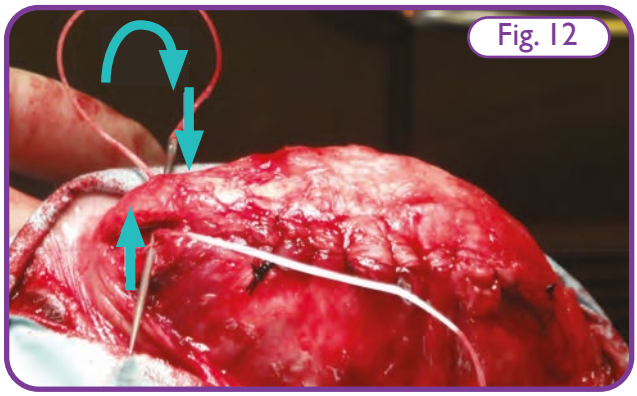
Lateral

Elevate a small section of cranial tibial muscle from the proximal aspect of the tibia close to Gerdy's tubercle i.e. just cranial to the long digital extensor tendon. Use a periosteal elevator to elevate from the muscle from the bone. As proximally and caudally as possible, drill a hole from lateral to medial across the tibia. The hole and dissection can be temporarily marked by inserting a K-wire until ready for the next step.

7. Passing the Suture Through the Bone Tunnel

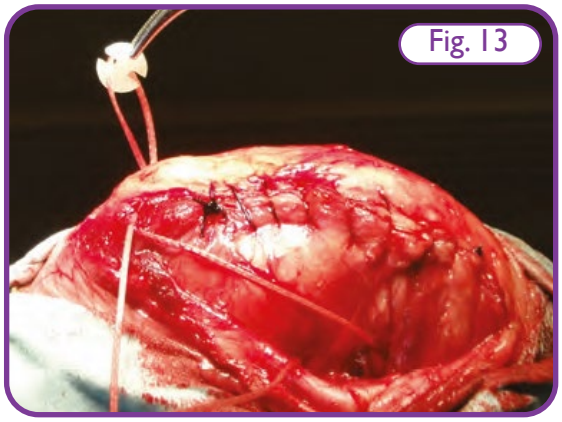
Using the LigaFiba® swaged on straight needle, drive it lateral to medial through the bone tunnel, taking the suture material with it. Retrieve on the medial aspect of the proximal tibia, make a loop and return the needle back through the tunnel from medial to lateral, being gentle and taking care not to damage the strand of LigaFiba® already in the bone tunnel (Fig 12).

Fig. 12



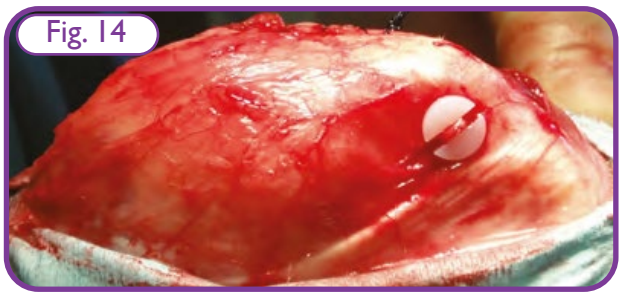
Place the slotted titanium button on the medial tibia under the loop of LigaFiba® (Fig. 13).

Fig. 13



Then pull the LigaFiba® tight laterally and keep the tension to avoid the button from slipping loose (Fig. 14).

Fig. 14



Returning to the lateral side and once you are satisfied everything is correctly placed, both needles are cut from the LigaFiba®. Cut the line close to the needles where it is stiffened, using dedicated LigaFiba® scissors. LigaFiba® is very strong, normal scissors will struggle to cut it.

One free end of the suture is passed through the crimp tube. The other free end is fed through the other end of the crimp tube. The crimp is free to slide at this time and is best positioned mid-length i.e. in between the fabella and the tibial bone tunnel.

8. Tensioning and Crimping

Pull the suture hand tight enough to eliminate any slack and until tension is reached to eliminate cranial drawer; check for full range of stifle motion.

Take care not to create so much tension as to restrict stifle range of movement or cause external rotation of the tibia relative to the femur. Too much tension is as significant a technical error as too little.

The stifle is positioned in mid flexion. Using heavy duty needle holders on each free end of the suture, the suture material is pulled tight in the crimp. The Ligafiba compound action crimper is used to firmly place a single crimp the middle of the crimp. Tension is checked; the suture should be tight and all cranial drawer eliminated. Stifle range of movement is checked for excessive restriction. There should be a good range of movement but there may be some restriction to full flexion and extension. Once all is checked, place an additional crimp at either end of the crimp tube using the crimping device, giving a total of 3 crimps on the crimp tube. Avoid crimping right at the edge/end of the crimp, as this will crush the line.

Scan the QR code below to view a video giving details of the crimping devices available from Vi.

Once crimping is complete, cut the free ends of the suture as close to the crimp as you can using the LigaFiba® scissors; because of the nature of the material a tapered 45 degree cut works better than a straight cut.

Advice on Correct Crimping Technique

The crimp is oval in shape. It is important that the crimp is crimped across the wide part and perpendicular to the direction of suture. In addition, care should be taken to make sure that all the crimps are in the same plane on the tube, otherwise the crimps neutralize each other. To hold and keep the crimp in the correct orientation for successful crimping, use a small haemostat if necessary.

Crimping Errors

Unless the crimp is correctly performed, early failure of the loop may occur. The crimp must be secured with 3 evenly spaced crimps, placed with evenly-applied pressure. One or two crimps are not enough to ensure closure. Crimping too close to the end of the tube will damage the line and lead to early failure (Fig. 16).

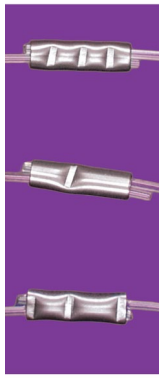


Fig. 16

9. Closure

- Flush the surgical site thoroughly.
- Close the fascia of the proximal cranial tibial muscle and the medial tibia.
- Close the lateral retinaculum.
- Close the subcutaneous fascia and the skin.

Final stability of the repair is due to periarticular fibrosis. The suture will typically fail between 6-10 weeks post-op and may show itself as a transient lameness of 1-2 days. Most stifles stabilized by extra-capsular suture are unstable to palpation at 6-8 week re-check.

With thanks to Gareth Arthurs PGCertMedEd MA VetMB CertVR CertSAS DSAS(Orth) FHEA FRCVS RCVS Recognised Specialist in Small Animal Surgery (Orthopaedics) for his invaluable assistance with the revised version (2023) of this Surgery Guide, and to Hamish Denny FRCVS for the original version.

Please note, this guide features UHMWPE buttons in some of the surgical images. All kits and packs are now only supplied with titanium buttons.

Featured Products

Please note, the following featured products are only a selection of those available in the range. Please refer to the Vi Catalogue or scan the QR code to view the Joint Surgery section of our website, and find full details of all relevant products.

LigaFiba® Lateral Button Suture With Crimp Starter Kit

LFLBSSTARTERTI LigaFiba® Lateral Titanium Button Suture With Crimp Starter Kit - Standard

LFLBSSTARTERTI/S LigaFiba® Lateral Titanium Button Suture With Crimp Starter Kit - Small

Please contact a member of the Vi team for a list of the contents of these kits.

LigaFiba® Lateral Titanium Button Suture

LFLBS75TI 75 LigaFiba® Lateral Button Suture Ti Button
LFLBS150TI. 150 LigaFiba® Lateral Button Suture Ti Button
LFLBS250TI. 250 LigaFiba® Lateral Button Suture Ti Button
LFLBS250DTI. 250 LigaFiba® Lateral Button Suture Double/Ti Button
LFLBS500TI. 500 LigaFiba® Lateral Button Suture Ti Button

Heavy Duty Needle Driver

091153 Heavy Duty Needle Driver With Tungsten Jaws 195mm Long

Compound Action Crimpers For LigaFiba®

091135M LigaFiba® Compound Action Crimpers 245mm

LigaFiba® Scissors

LFS140TC LigaFiba® Scissors T.C. 145mm

Bone Tunnel Borer

001070M Bone Tunnel Borer 2mm Modular
001073M Bone Tunnel Borer 2.5mm Modular
001071M Bone Tunnel Borer 2.7mm Modular
001075M Bone Tunnel Borer With Countersink Modular Set

LigaFiba® Crimps

LFCRIMP75 Crimp for 75lb LigaFiba®
LFCRIMP150 Crimp for 150lb LigaFiba®
LFCRIMP250 Crimp for 250lb LigaFiba®
LFCRIMP500 Crimp for 500lb LigaFiba®
091135M LigaFiba® Compound Action Crimpers 245mm

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