Veterinary
Instrumentation

Surgery Guide

LigaFiba® Isotoggle

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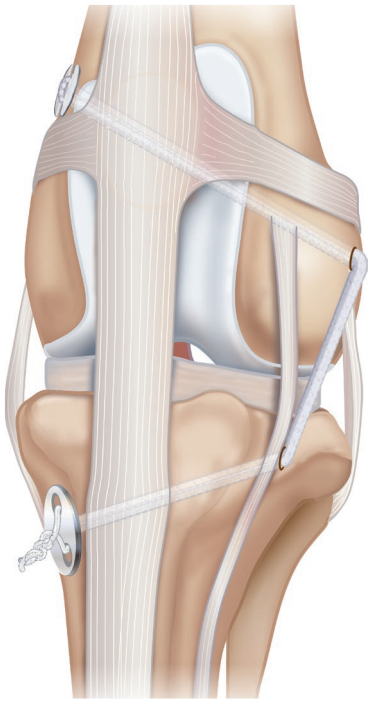
LigaFiba® Isotoggle



Stabilisation of the canine stifle using extra-articular sutures is a well-established technique. Although recent evidence suggests that outcome with TPLO and TTA procedures is superior, extracapsular techniques remain very popular. Various suture material and methods of securing the material have been described. The Isotoggle technique was developed utilising the principles of isometric suture placement with a bone tunnel in both the tibia and femur.

Interest in defining isometric points around the stifle has been generated by separate research by Don Hulse (2010) and Simon Roe (2008) but it is unlikely that truly isometric points can be established; rather quasi-isometric points. Nonetheless, Hulse established that there was minimal change in distance between two points defined as:

- Close to the distal pole of the lateral fabella and
- The caudal border of the extensor fossa on the lateral aspect of the proximal tibia.

Roe found that the femoral point (Fig. 1) was critical and was defined as the very caudal edge of the lateral femoral condyle adjacent to the distal border of the lateral fabella. The tibial point was less critical as long as it was placed proximally. These findings were incorporated in an extra-articular technique developed by James Cook, when a braided woven polyethylene/polyester tape was placed through bone tunnels and secured on the medial aspect of the femur and tibia (TightRope© technique).

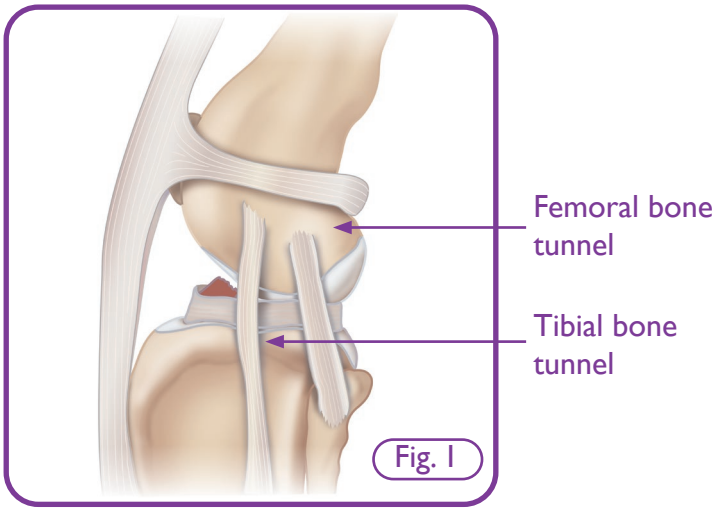


Fig. 1 shows the placement of the bone tunnels on the lateral aspect of the stifle joint.

Contents

The Isotoggle Implant

Isotoggle uses a loop of braided spun ultra high molecular weight polyethylene (UHMWPE) suture called LigaFiba®, secured over two titanium buttons, one with holes, one with slots. LigaFiba® is very strong (stronger than nylon weight for weight/diameter for diameter), has very good abrasion characteristics and is very flexible. Rose et al in Veterinary Surgery 41 (2012) 266-272 found that LigaFiba® outperformed other similar products with respect to tensile strength, stiffness at failure, loading at elongation and resistance to cyclic elongation.

The LigaFiba® Isotoggle implant is supplied sterile in three line sizes (150, 250 and 500), individually double wrapped. In each Isotoggle pack there is a straight threading needle with a nylon loop, plus 2 titanium buttons, one with holes and one with slots (Fig. 2).

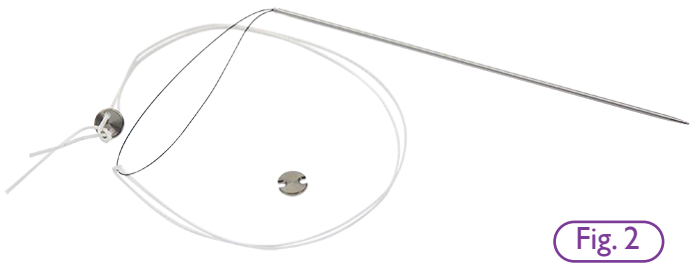


Fig. 2

Isotoggle implant size guide:
150 (0.6mm) Dogs up to 15kg
250 (1.0mm) Dogs up to 25kg
500 (1.6mm) Dogs over 25kg

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. 3). Use of adhesive antibacterial drapes is recommended.

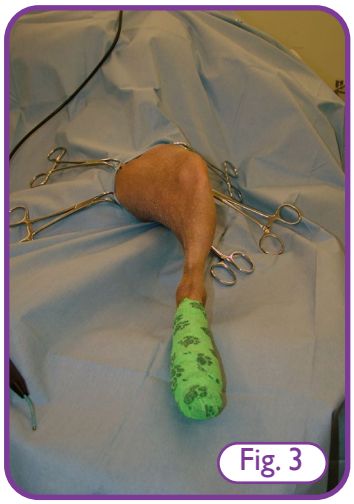


Fig. 3

2. Surgical Approach

Approach the stifle joint via a lateral para-patellar incision (Fig. 4). 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. 4

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, 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. 5).

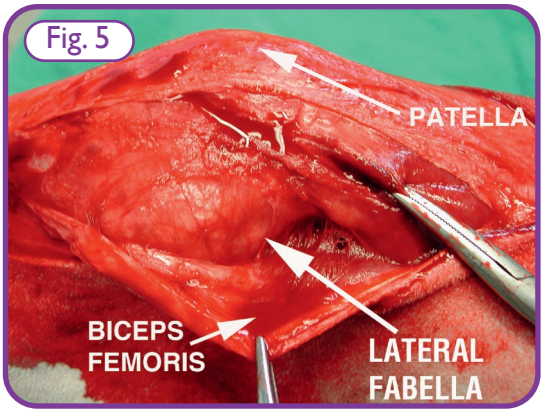


Fig. 5

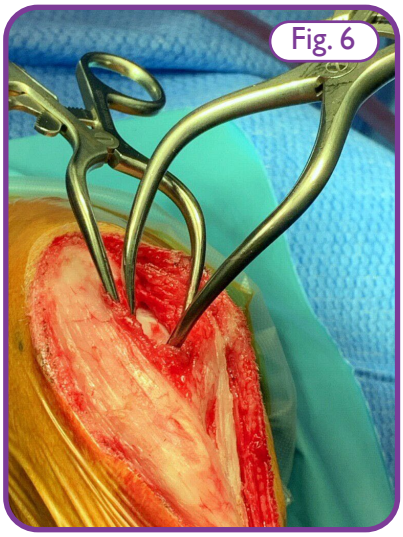
The anatomy is not easy for the inexperienced surgeon. It is strongly advised to perform a full dissection on a cadaver to identify the various structures.

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 femoro-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. 6). 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 is strongly recommended.



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.

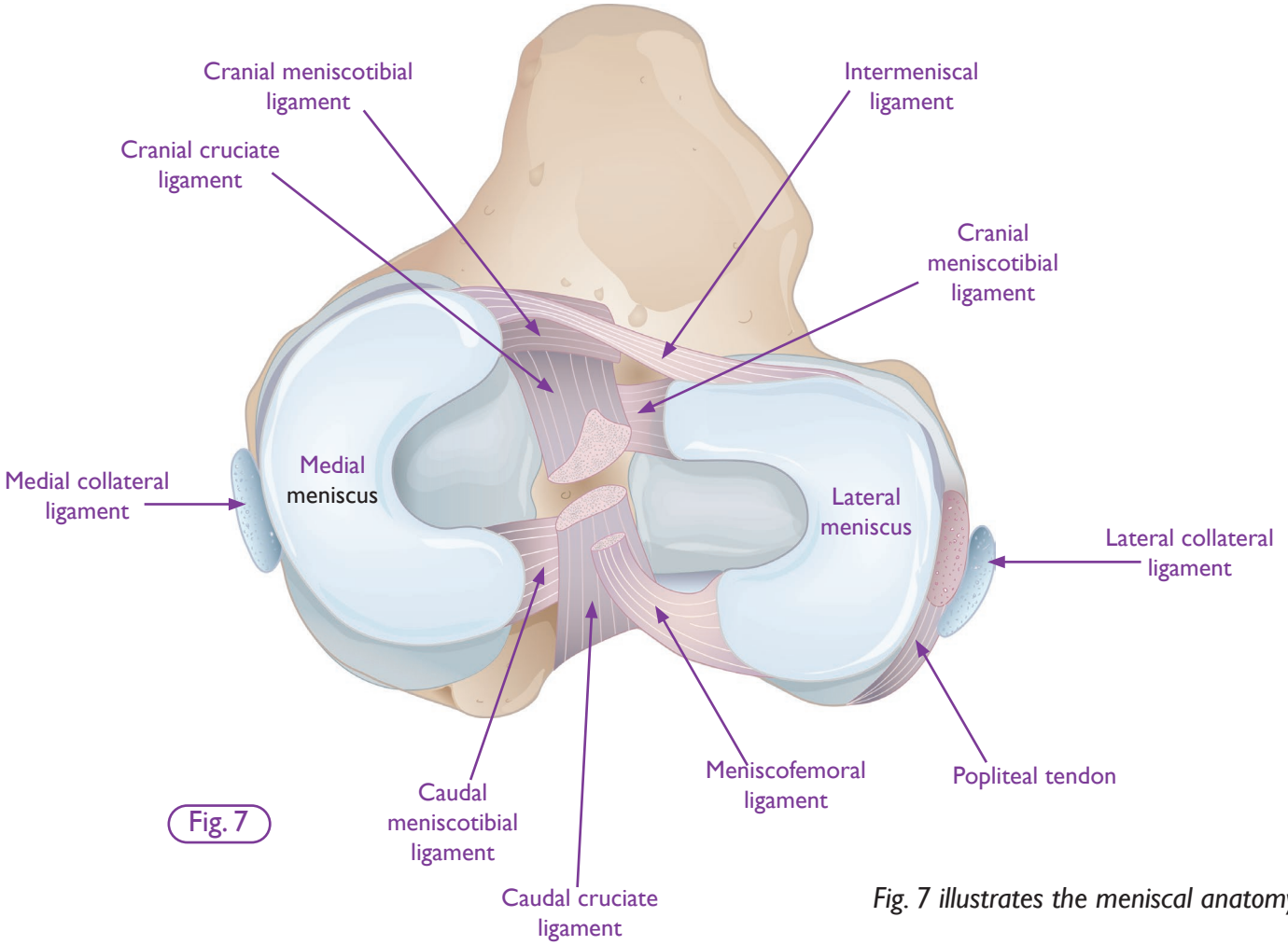


Fig. 7 illustrates the meniscal anatomy

The more damaged the cranial cruciate ligament is, 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.

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. Drilling of Femoral Tunnel

- The incised lateral fascia/retinaculum is reflected caudally.
- The lateral fabella is identified, on the caudal proximal aspect of the lateral femoral condyle (Fig. 8).

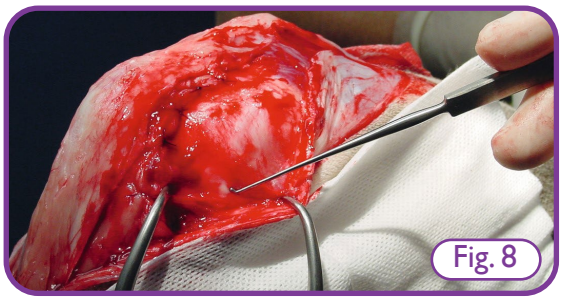


Fig. 8

- The femoral isometric point is identified on the caudal edge of the femoral condyle adjacent to the cranial pole of the lateral fabella (Fig. 9).

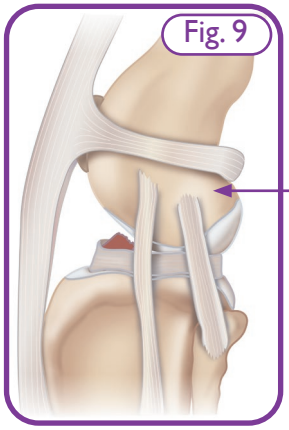


Fig. 9

Femoral bone tunnel

- An appropriate sized drill bit is selected according to the size of Isotoggle implant being used. Use of an antiskid drill bit will minimise the chance of slippage. Use of a cannulated drill bit will allow a K-wire to be placed into the bone tunnel before withdrawal of the drill bit. This allows the hole position to be securely identified, and avoids the frustration of the hole getting lost with soft tissue movement. Use of a drill guide is recommended regardless of choice of drill bit.

Weight	Drill Size	Product Code
150 LigaFiba®	2mm Drill	H090102AS / H090102CAN
250 LigaFiba®	2.5mm Drill	H090112AS / H090112CAN
500 LigaFiba®	3.5mm Drill	H090106SAS / H090106CAN

The initial direction of the drill/bone tunnel is at right angles to the bone; this reduces the chances of the drill bit slipping off the caudal edge of the femoral condyle. Once the drill bit has entered the cortex of the lateral femoral condyle the drill is re-directed to create a bone tunnel that emerges more proximally on the medial side of the femur just underneath the caudal edge of the medial gastrocnemius muscle belly (Fig. 10).

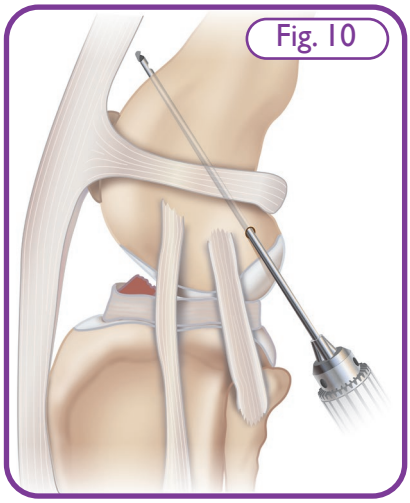


Fig. 10

The tunnel is flushed with sterile saline and the edges of the holes should be rounded off using a countersink. The soft tissues on the medial side of the femur around the drill bit/ hole/ K-wire are cleared away for a short distance to accommodate the titanium button.

6. Drilling of Tibial Tunnel

The correct point on the lateral aspect of the tibia is identified (Fig. 11) i.e.

- Gerdy's tubercle (the prominence at the cranial aspect of the extensor fossa of the long digital extensor tendon) is palpated as a landmark and the long digital extensor tendon is retracted cranially.

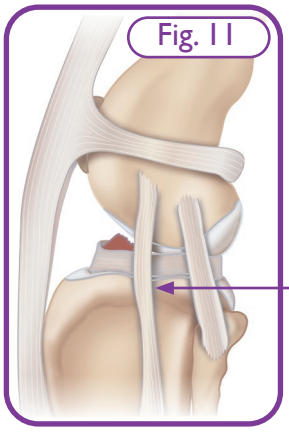


Fig. 11

- The drill bit is placed proximally in the tibial extensor groove, resting against the caudal edge of the groove.
- Using an appropriate sized drill bit and a drill guide, the bone tunnel is drilled across the tibia in an oblique direction to emerge on the medial aspect of the tibia, close and cranial to the distal medial collateral ligament (Fig. 12).

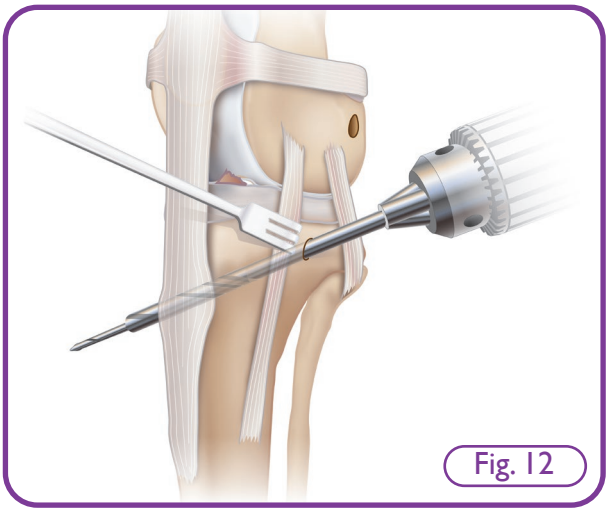


Fig. 12

- Placement of the bone tunnel in this way avoids damage to the tendon at the time of drilling and tendon interference or damage by rubbing from the LigaFiba® suture once in situ.

The tunnel is flushed with sterile saline and the edges of the holes should be rounded off using a countersink. The soft tissues around the drill hole on the medial side of the tibia are cleared away to allow the titanium tie-down button to rest flush against the bone.

7. LigaFiba® Isotoggle Placement

The appropriate size LigaFiba® Isotoggle pack is opened, taking care not to drop the buttons. (The titanium button with holes is pre-loaded on the LigaFiba, the slotted button is loose). The long swaged threading needle with nylon loop is used to pull the LigaFiba® through the tunnels. The objective is to secure the prosthesis against the medial aspect of the tibia, therefore threading of the implant starts from this point.

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.

Locate the medial aspect of the tibial bone tunnel and direct the needle through the bone tunnel in a medial to lateral direction. The needle will emerge on the lateral aspect of the tibia. Care must be taken to ensure that the needle/implant emerges caudal to the long digital extensor tendon (Fig. 13).

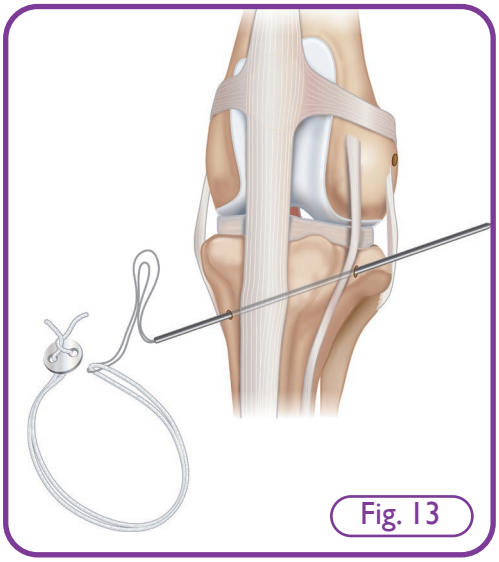


Fig. 13

This will avoid tendon interference/damage by rubbing from the Ligafiba suture once in situ. The prosthesis is carefully pulled through the tunnel until the titanium button with holes (which is pre-loaded on the LigaFiba®) rests on the medial tibia.

The lateral aspect of the femoral tunnel is located and the threading needle is re-directed in a lateral to medial direction across the femur (Fig. 14).

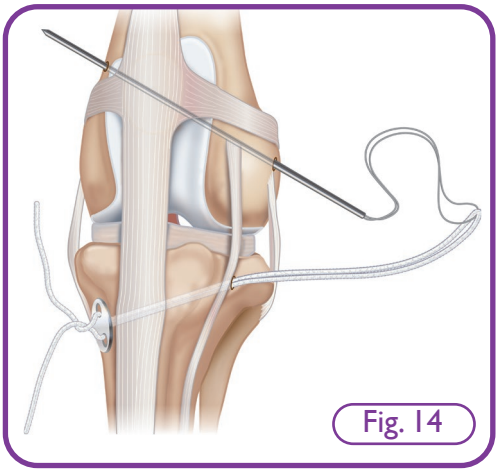


Fig. 14

The needle emerges under the medial gastrocnemius muscle belly in the space previously cleared. The prosthesis is then drawn through the femoral tunnel. When the LigaFiba® has fully emerged from the bone tunnel, the nylon loop of the passing needle is cut, and the needle and nylon loop are removed.

The slotted titanium button is inserted into the loop of the LigaFiba® over the medial femoral bone tunnel (Fig. 15).

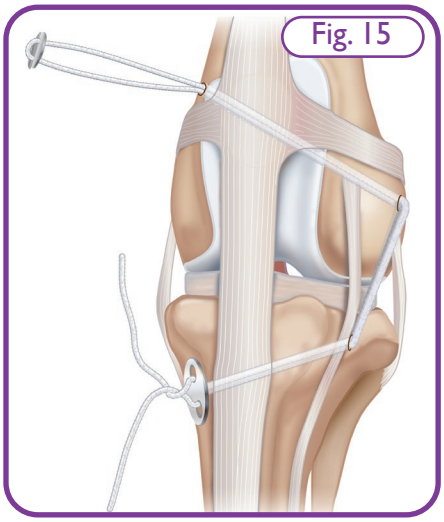


Fig. 15

Holding this button in position directly against the medial femoral cortex, the LigaFiba® is pulled in reverse direction i.e. lateral through the femur and medial through the tibia. The prosthesis is progressively tightened working backwards from the medial femur to lateral femur, to lateral tibia, to medial tibia. As the loop is gradually tightened and made snug, the holed titanium button is secured onto the medial aspect of the tibia and the loop is temporarily tightened.

The stifle joint is manipulated through a full range of motion and stability is checked. A very slight residual amount of cranial drawer may be present but there should be no restriction of joint movement.

Once the surgeon is satisfied with the stability of the joint and the holed titanium button is secure on the medial aspect of the tibia, the LigaFiba® prosthesis is secured by placing multiple throws over the button on the medial tibia (Fig. 16). The excess suture material is cut using specific scissors (LFS140TC).

Fig. 16

An alternative locking mechanism for the suture on the medial tibia is the interference screw which screws into the bone tunnel, over the LigaFiba®, effectively jamming the suture into position. This option precludes the use of the medial button and knot (Fig. 17).

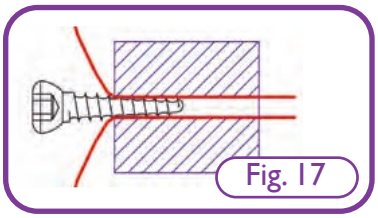


Fig. 17

8. Finish and Close

The entire surgical site is flushed thoroughly. The fascia is closed over the medial tibia with interrupted or continuous sutures of an absorbable monofilament material such as PDS. After thorough irrigation of the soft tissues on the lateral side of the joint, the lateral fascia incision is closed with a continuous suture pattern of an absorbable monofilament suture such as PDS. The wound is then closed in a routine manner. A light dressing can be applied to the surgical wound.

9. Suggested Post-Operative Care (at the Surgeons Discretion)

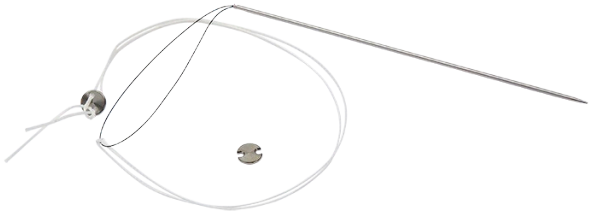
- Opioid analgesia for 1-3 days post-op.
- NSAIDs for 7-14 days post-op.
- Sutures are removed at 10 days.
- Physiotherapy/ passive range of movement joint exercises should begin as soon as possible after surgery.
- Owners should be instructed to confine the patient to leash walking only for 4 weeks.
- After 4 weeks of confinement, lead walks may be gradually increased and sit-walk exercises and hydrotherapy can begin.
- Patients are expected to be starting to weight bear within a week of surgery and then show gradually improving limb use thereafter.

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 Geoff Robins for the original version.

Featured Products

Please note, the following featured products are only a selection of those available in the range.

LigaFiba® Isotoggle Sutures



LFITS150TI 150 Isotoggle Suture Set
LFITS250TI 250 Isotoggle Suture Set
LFITS500TI 500 Isottoggle Suture Set
LFISOKIT Isotoggle Starter Kit (250 & 500) x2 of Each

LigaFiba® Scissors

LFS140TC LigaFiba® Scissors T.C. 145mm

Titanium Buttons

TIBUT6H Titanium Button 6mm 2 Holes
TIBUT6S Titanium Button 6mm 2 Slots
TIBUT9H Titanium Button 9mm 2 Holes
TIBUT9S Titanium Button 9mm 2 Slots
TIBUT11H Titanium Button 11mm 2 Holes
TIBUT11S Titanium Button 11mm 2 Slots

Isotoggle Consumables

H090102AS 2.0mm Antiskid Drill (150) 100mm
H090112AS 2.5mm Antiskid Drill (250) 115mm
H090106SAS/L 3.5mm Antiskid Drill (500) 180mm

Isotoggle Aiming Device - Adjustable Drill Guide

ADJDG2035 Adjustable Drill Guide 175mm

LigaFiba® Isotoggle Locking Interference Screw

LFIS253518SS Interference Screw 3.5 Stainless 18mm
LFIS253518TI Interference Screw 3.5 Titanium 18mm
LFIS354523SS Interference Screw 4.5 Stainless 23mm
LFIS354523TI Interference Screw 4.5 Titanium 23mm

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