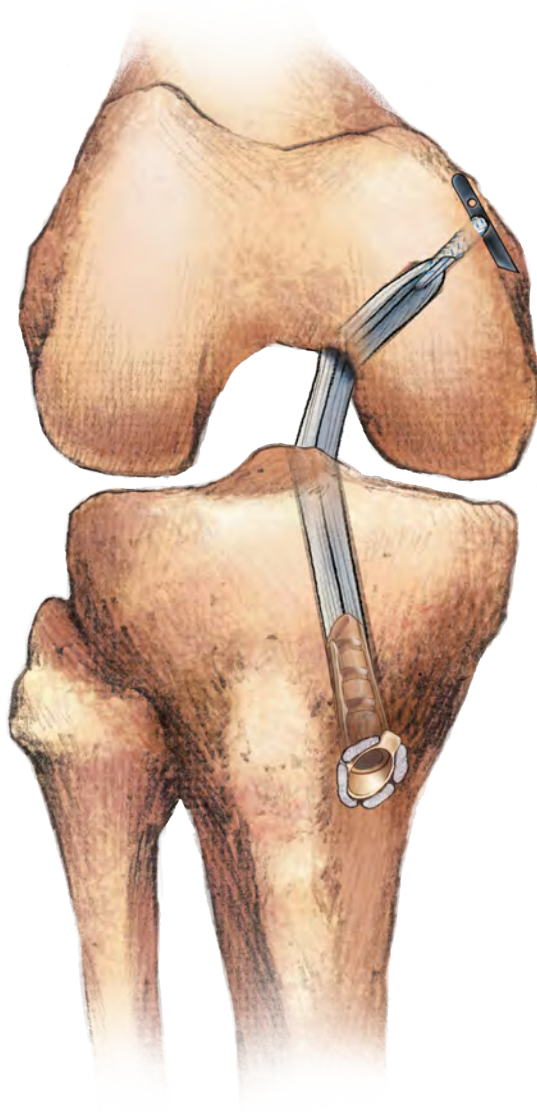


# Arthroscopic PCL Reconstruction

Using Soft Tissue Graft and TunneLoc® Tibial Fixation  
with ToggleLoc™ Fixation Device with ZipLoop™ Technology

Surgical Technique  
by Mark Ganjianpour, M.D.





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## Surgical Technique

### Graft Choice

Graft choice is left to surgeon preference. Soft tissue graft is recommended on the femoral side to allow for ease of passage through the tibial tunnel and the “killer turn” at the tibial footprint of the posterior cruciate ligament (PCL). If a soft tissue graft is chosen, place a modified Krackow stitch using a #2 MaxBraid™ at the ends of each strand to allow for traction and supplemental fixation if necessary.

### Setup

Place the patient in a supine position on the operative table and apply a thigh-high tourniquet. Perform examination under anesthesia to thoroughly evaluate the stability of the knee with special attention given to potential injury to the anterior cruciate ligament (ACL), the lateral collateral ligament (LCL), and the Posterolateral corner of the knee. Use an arthroscopic leg holder proximally on the thigh just distal to the tourniquet and flex the end of the table to allow flexion of the knee up to 120 degrees. Alternatively, use a lateral post without a leg holder. Pad and protect the non-operative leg, while applying elastic compression stockings.

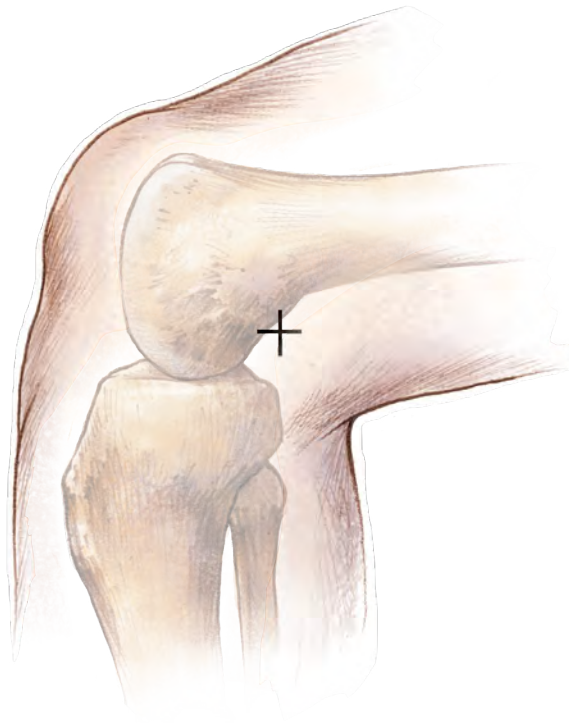


Figure 1

## Diagnostic Arthroscopy and Preparation for Reconstruction

Initiate arthroscopy using standard anterolateral and anteromedial portals and a pressure sensitive pump. Both a 30 and 70 degree arthroscope should be available to allow for complete joint visualization. Establish a posteromedial portal under direct visualization and use it alternatively as a working portal and a viewing portal during the preparation of the tibial foot print and drilling of the tibial tunnel. Establish the portal approximately 2 cm proximal and 1 cm inferior to the medial femoral epicondyle with the knee flexed at 90 degrees (Figure 1). Use a spinal needle first to establish the direction of the portal placement. Perform a complete arthroscopic knee evaluation to address all meniscus and cartilage pathologies. Confirm the presence of a PCL tear.

Resect the PCL remnant using shavers, elevators and an electrocautery device. If the ACL is intact, give attention to avoid damage to its fibers.

## Tibial Preparation and Drilling

The tibial insertion of the native PCL is approximately 15 mm below the posterior tibial joint line just proximal to the posterior slope of the tibial metaphysis. In order to have good visualization of the tibial foot print, a 70 degree scope is recommended if viewing from the anterior portals.

Place the instruments through the posteromedial portal to gain access to the foot print. Alternatively, a 30 degree scope may be used through the posteromedial portal and instruments brought in through the anterior portals. Strip the soft tissue off of the posterior tibia and identify the PCL foot print. Often, the PCL remnant is adhered to the posterior capsule and should be released and resected. The posterior capsule should not be violated to avoid extravasation of fluid into the posterior soft tissue.

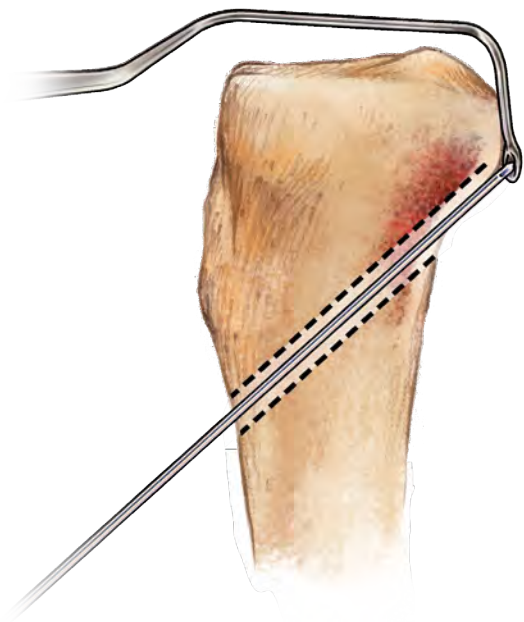


Figure 2

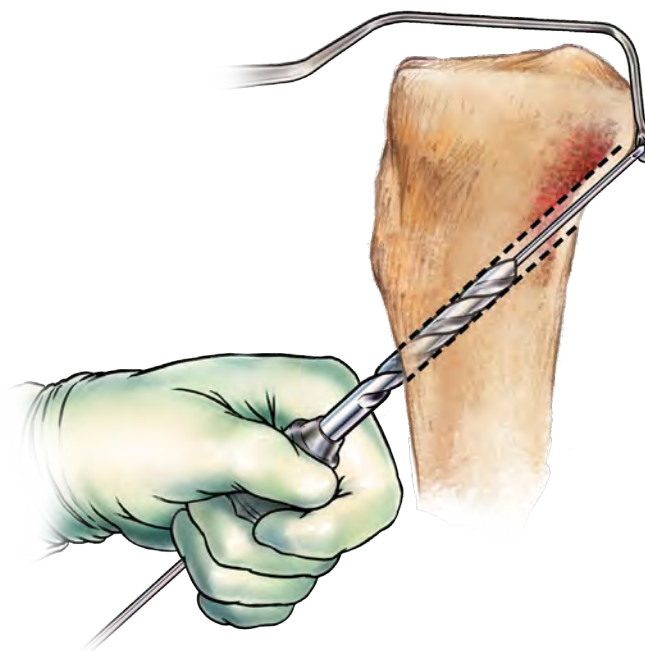


Figure 3

### Tibial Preparation and Drilling (cont.)

Place a 2 cm incision 5 cm distal to the joint line just medial to the tibial tuberosity. Surrounding soft tissue is stripped off the anterior face of the tibia to allow easy passage of the graft into the tunnel. Using the PCL guide of your choice, place the guide through the anteromedial portal while viewing the tibial foot print from the postromedial portal. The tip of the PCL guide should be approximately 5 mm proximal to the posterior slope of the tibial metaphysis and approximately 15 mm below the joint line. Dial the desired angle and advance the bullet to make contact with the medial face of anterior tibia and lock in place.

Drill a guide wire and carefully advance to meet the tip of the aiming arm of the guide on the posterior tibia (Figure 2).

This step should be done under direct visualization to avoid over advancement of the wire beyond the posterior capsule which may cause damage to the neurovascular structures. Place a PCL elevator/wire catcher over the tibial guide wire to avoid advancement into the soft tissue.

Next, drill the size specific tibial reamer over the guide wire. As an added precaution, use the tibial drill under power up to the posterior tibial cortex. Then, by hand drill the remaining posterior cortex to avoid damage to the posterior structures (Figure 3).



Figure 4

### Tibial Preparation and Drilling (cont.)

Once drilling is completed, use a curved rasp to smooth the edges of the posterior tibial tunnel and to chamfer the edges (Figure 4). Insert a universal cannula into the tibial tunnel to maintain joint distention.

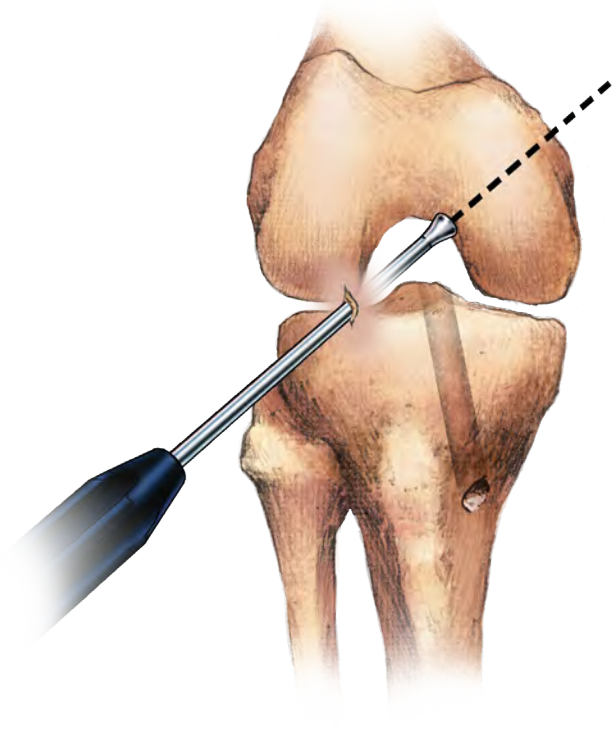


Figure 5

### Preparation of the Femoral Tunnel

Identification of both the native PCL (AL and PM) bundles is critical for correct femoral tunnel placement. The PCL footprint is elliptical and wide (approximately 28 mm in length from the superior notch to the inferior aspect of the notch) extending from the 12 to 5 o'clock position. High in the notch, it is only 3 mm from the articular edge and it extends further into the notch inferiorly to about 5 mm from the articular edge. Maintain the remnant of the native PCL to identify the femoral attachment of the PCL.

After the footprint is identified, place a size specific femoral aimer from the lateral portal and adjust knee flexion to allow coverage of the footprint and provide the correct angle for drilling (Figure 5).

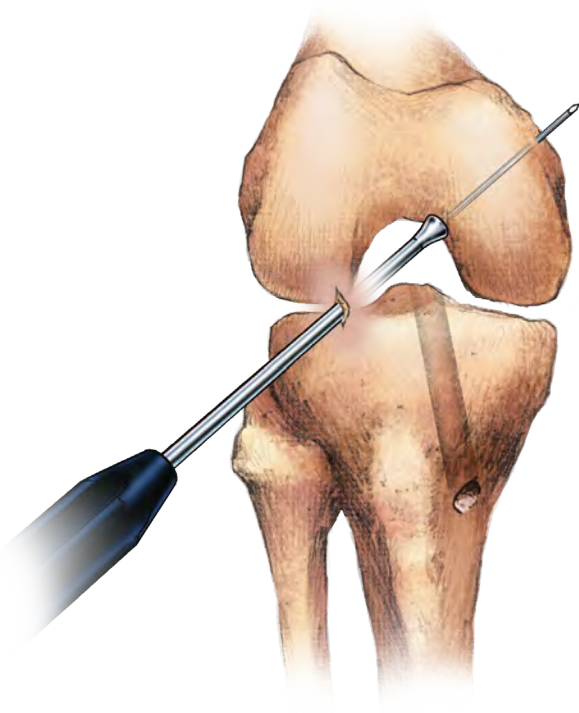


Figure 6

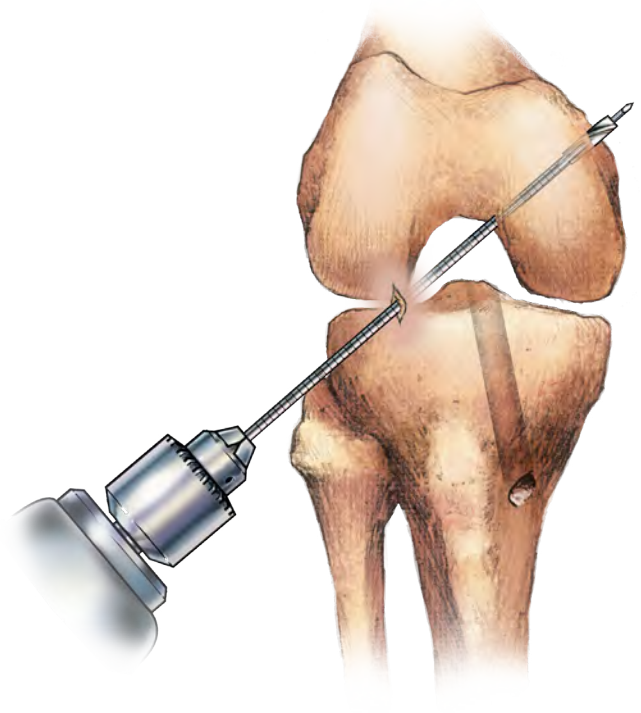


Figure 7

## Preparation of the Femoral Tunnel (cont.)

An accessory inferolateral portal may be necessary to attain the proper angle. Drill a guide wire through the cannulated aimer and exit just proximal to the medial femoral epicondyle (Figure 6).

Remove the femoral aimer and use a 4.5 mm drill to drill over the guide wire and through the medial femoral cortex (Figure 7).



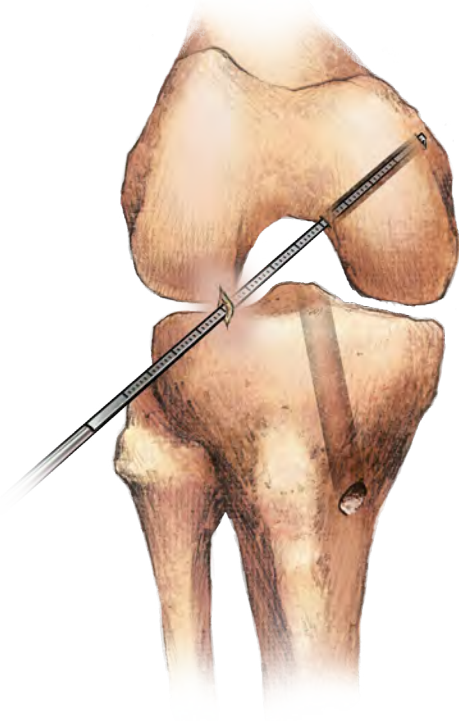


Figure 8

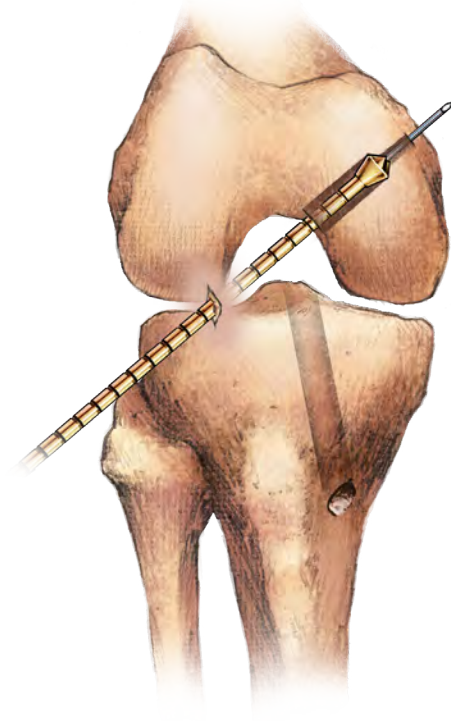


Figure 9

## Preparation of the Femoral Tunnel (cont.)

Remove the guide wire and use a depth gauge to measure the depth of the 4.5 mm tunnel (total tunnel length) (Figure 8).

Place the guide wire back through the lateral portal and drill over the guide wire with the size specific femoral acorn reamer. The depth of the femoral socket should be at least 10 mm shorter than the 4.5 mm tunnel to leave an intact medial cortex to support the ToggleLoc Fixation Device (Figure 9).

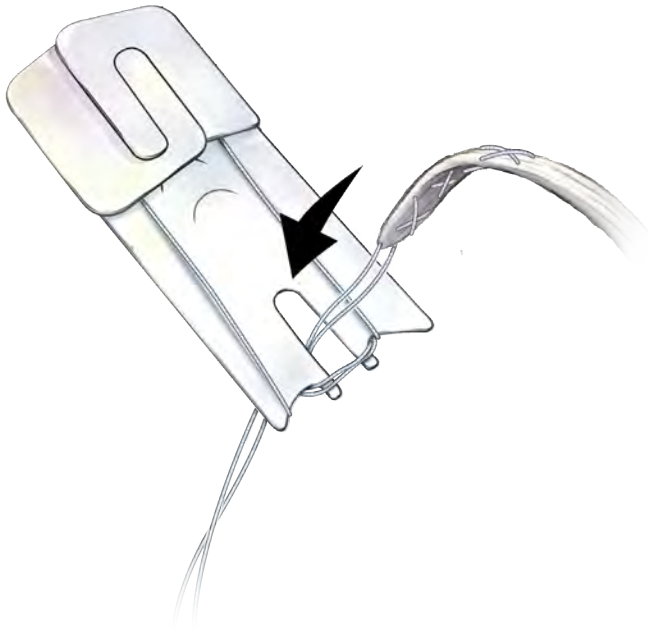


Figure 10

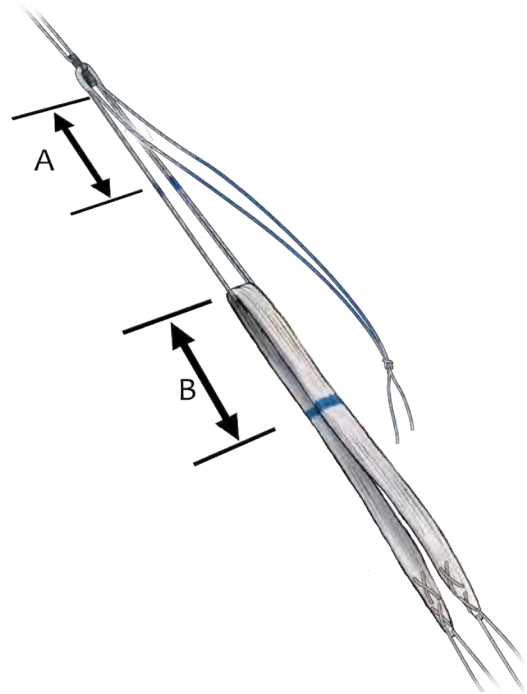


Figure 11

## Graft Preparation

Now that the femoral tunnel is complete, load the selected graft onto the ToggleLoc Fixation Device by passing the tissue through the card as shown (Figure 10).

Remove the card and prepare to mark the graft. The ZipLoop Sutures should be marked by placing the ToggleLoc Fixation Device Button on the flat side and measuring with a ruler from the distal end of the button to the corresponding femoral tunnel length (see measurement A on Figure 11).

Mark the graft to represent the femoral socket depth (see measurement B on Figure 11). Finally, mark the knotted Zippering sutures to easily identify them in the joint space.

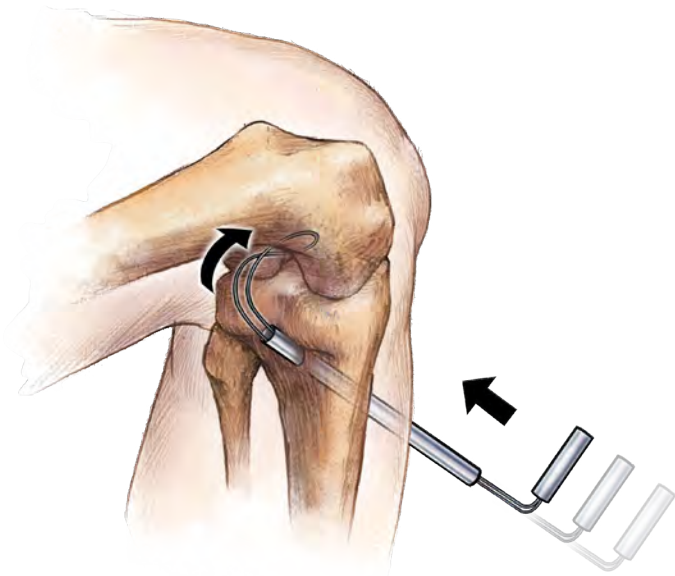


Figure 12

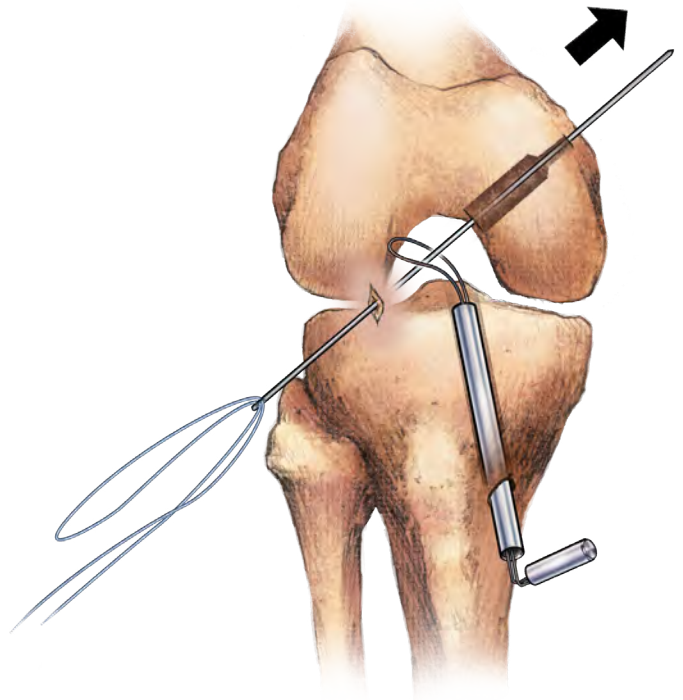


Figure 13

## Graft Fixation

In order to pass the graft, create a shuttle suture through the tibial tunnel and femoral tunnel. To do this, pass the Magellan™ Suture retriever through the tibial tunnel and advance the looped nitinol wire into the joint space (Figure 12).

Next, load both free ends of a MaxBraid #2 suture (shuttle suture) through the eyelet of a beath pin and pass the pin from the lateral portal through the nitinol loop in the joint space and out the femoral tunnel (Figure 13).

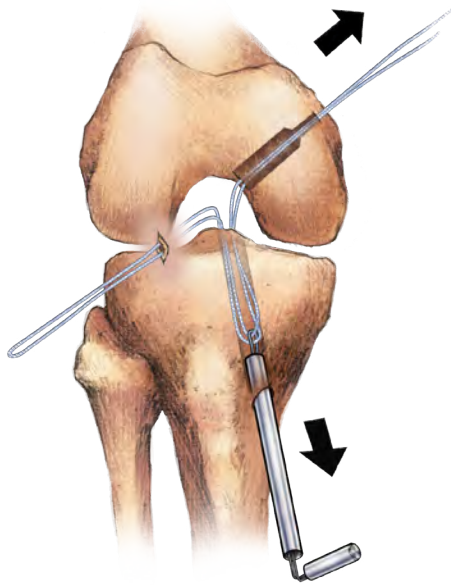


Figure 14

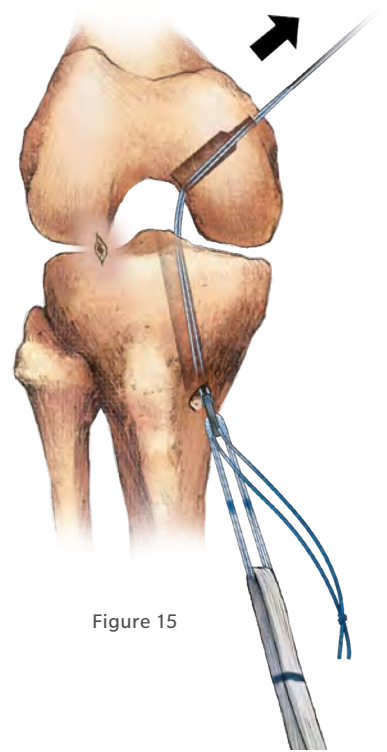


Figure 15

### Graft Fixation (cont.)

Grab the two free strands of the shuttle suture on the outside of the femur while pulling distally on the Magellan which will pull the looped end of the suture through the tibial tunnel (Figure 14).

Load the pull strand of the ToggleLoc Fixation Device through the looped end of the shuttle suture and pull the ToggleLoc Fixation Device pull strands through the tibial tunnel and out the femoral tunnel (Figure 15).

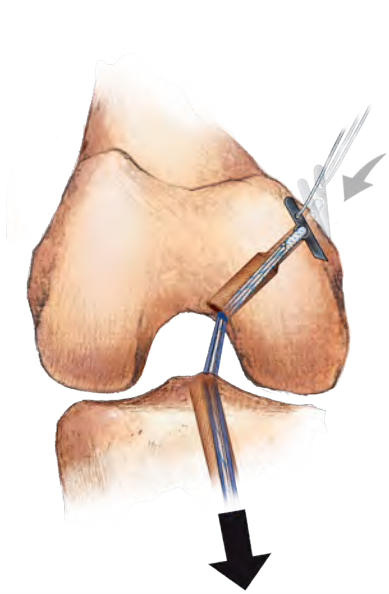


Figure 16

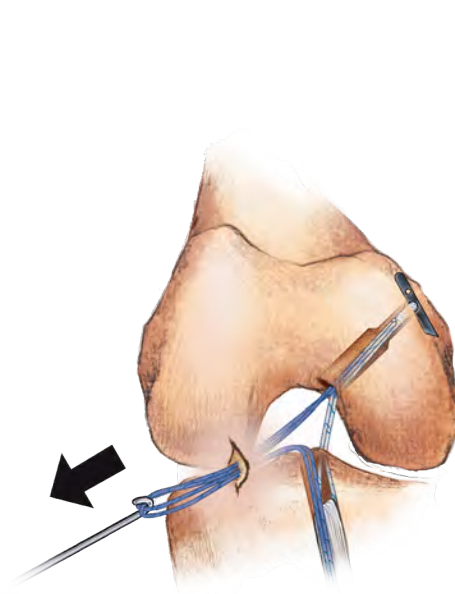


Figure 17

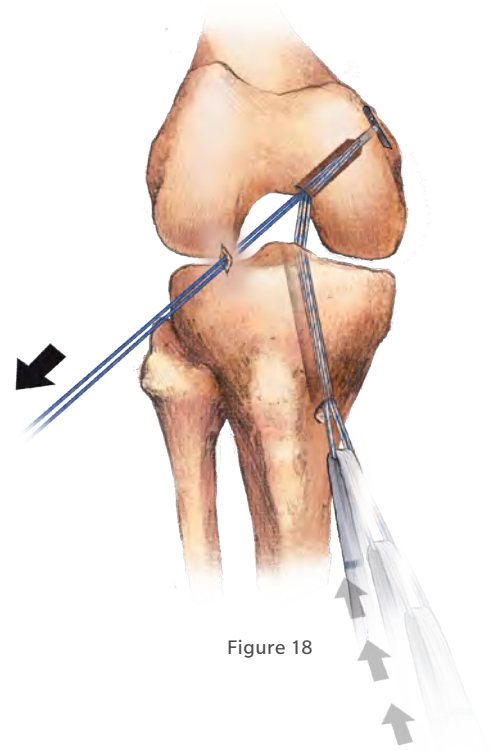


Figure 18

### Graft Fixation (cont.)

Pass the ToggleLoc Fixation Device through both tunnels while ensuring that the flat side of the button enters the femoral tunnel medially until the markings on the looped sutures just pass the entrance of the femoral tunnel. Seat the button by pulling on the distal end of the soft tissue graft (Figure 16).

Then, retrieve the zip sutures through the lateral portal and pull them towards the surgeon while maintaining tension on the graft. This will zip the graft into the femoral tunnel (Figures 17 and 18).

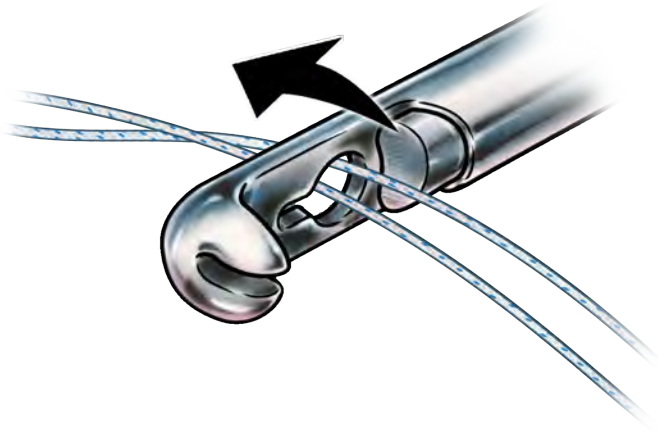


Figure 19

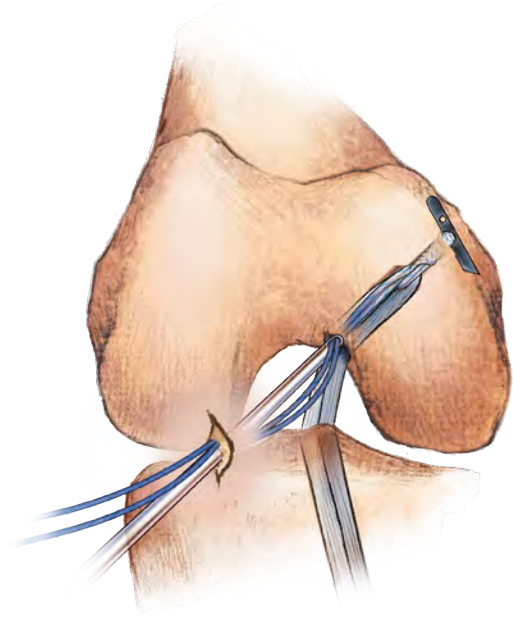


Figure 20

### Graft Fixation (cont.)

Cut the zip sutures using the Super MaxCutter™ as close to the graft as possible (Figures 19 and 20).

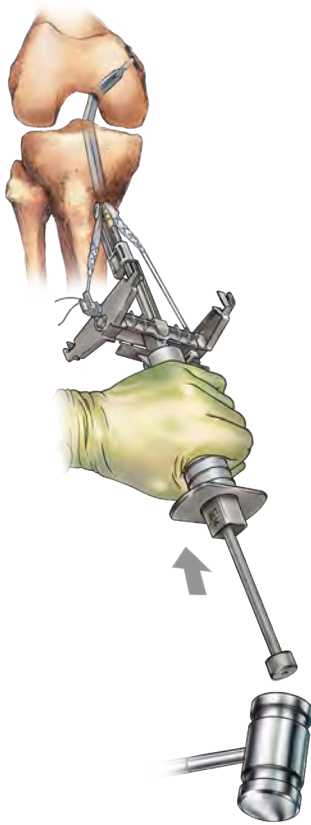


Figure 21

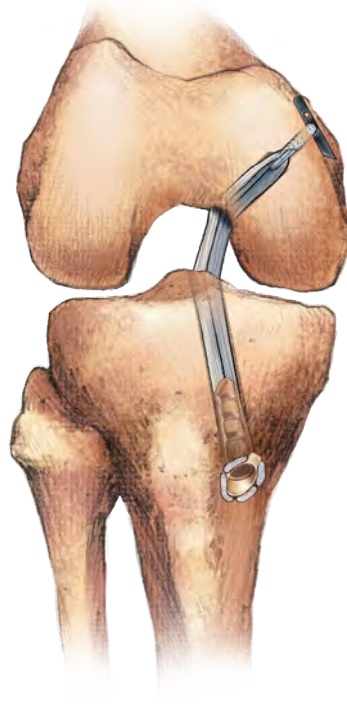


Figure 22

## Tibial Fixation

Reference the TunneLoc Tibial Fixation surgical technique for tibial fixation (Figure 21).

Fixation is now complete (Figure 22). Close the wound according to the surgeon's preference.

## Post-operative Protocol

Apply a hinged knee brace locked in full extension for the first two post operative weeks to protect the PCL. Ambulation with toe touch weight bearing is allowed during this time. At two weeks, open the hinges to allow full extension and up to 60 degrees of flexion. Avoid flexion beyond 60 degrees to minimize posterior translation of tibia by the direct posterior pull of the hamstrings at terminal flexion. Passive full flexion and active extension may be performed during this time to regain motion faster. Full weight bearing is allowed with the brace on. At four weeks, open the hinges fully to allow non-restricted range of motion. Start closed chain kinetic exercises at six weeks with minimal resistance initially (bicycling) and progress from 6–16 weeks. Avoid side to side drills and cutting activities for six months and return to sports is delayed for 9–12 months depending on quad and hamstrings strength as well as stability of the knee during drills.



## Ordering Information

### Implants

Part Number	Size	Description
909848	–	ToggleLoc ZipLoop Implant Kit
904754	–	ToggleLoc ZipLoop Extended Implant
909846	–	ToggleLoc WasherLoc™ Disposable Kit
906512	8 mm	TunneLoc Tibial Fixation
906513	9 mm	
906514	10 mm	
906515	11 mm	

### Instrumentation

Part Number	Size	Description
904776	–	ZipLoop Puller
900342	–	Super MaxCutter Suture Cutter
904766	–	ToggleLoc Depth Gauge
904760	4.5 mm	Drill Bit (Disposable)
904765	4.5 mm	Drill Bit (Reusable)
909800	–	Fanelli™ PCL /ACL Guide Body
909804	–	Fanelli Guide Bullet
909808	–	Fanelli Magellan
909799	–	Fanelli Calibrated Probe
909798	–	Fanelli Tunnel Awl
909791	–	Fanelli PCL Curved Rasp
909792	–	Fanelli PCL Cupped Curette
909793	–	Fanelli PCL (Over The Back) Cupped Curette
909794	–	Fanelli PCL Open Curette Angled
909795	–	Fanelli PCL (Over The Back) Open Curette
909790	–	Fanelli PCL Capsule Rasp



## Instrumentation (cont.)

Part Number	Size	Description
909796	–	Fanelli PCL Hook Knife
909525	–	Graft Tensioning Boot
909747	7 mm	Double Bundle Femoral Aimer
909748	8 mm	
909749	9 mm	
909750	10 mm	
909751	11 mm	
909752	12 mm	
909623	–	Femoral Aimer Handle
909627-03	–	Femoral Aimer Replacement Ring Nut
909911	7 mm	Cannulated Drill Bit
909913	8 mm	
909915	9 mm	
909917	10 mm	
909919	11 mm	
909921	12 mm	
906820	–	Graft Sizing Block
906570	7 mm	Low Profile Reamer
906571	7.5 mm	
906572	8 mm	
906573	8.5 mm	
906574	9 mm	
906575	9.5 mm	
906576	10 mm	
906577	10.5 mm	

**INDICATIONS FOR USE**

The ToggleLoc System devices, except the ToggleLoc XL device, are intended for soft tissue to bone fixation for the following indications:

**Shoulder**

Bankart lesion repair  
 SLAP lesion repairs  
 Acromio-clavicular repair  
 Capsular shift/capsulolabral reconstruction  
 Deltoid repair  
 Rotator cuff tear repair  
 Biceps Tenodesis

**Foot and Ankle**

Medial/lateral repair and reconstruction  
 Mid- and forefoot repair  
 Hallux valgus reconstruction  
 Metatarsal ligament/tendon repair or reconstruction  
 Achilles tendon repair  
 Ankle Syndesmosis fixation (Syndesmosis disruptions) and as an adjunct in connection with trauma hardware for Weber B and C ankle fractures (only for ToggleLoc with Tophat/ZipTight Fixation Devices)

**Elbow**

Ulnar or radial collateral ligament reconstruction  
 Lateral epicondylitis repair  
 Biceps tendon reattachment

**Knee**

ACL/PCL repair / reconstruction  
 ACL/PCL patellar bone-tendon-bone grafts  
 Double-Tunnel ACL reconstruction  
 Extracapsular repair: MCL, LCL, and posterior oblique ligament  
 Iliotibial band tenodesis  
 Patellar tendon repair  
 VMO advancement  
 Joint capsule closure

**Hand and Wrist**

Collateral ligament repair  
 Scapholunate ligament reconstruction  
 Tendon transfers in phalanx  
 Volar plate reconstruction  
 The ToggleLoc XL device is used for fixation of tendons and ligaments in cases of unanticipated intraoperative complications such as cortical breaching during orthopedic reconstruction procedures, such as Anterior Cruciate (ACL) or Posterior Cruciate (PCL) Reconstruction.

**CONTRAINDICATIONS**

1. Infection.
2. Patient conditions including blood supply limitations, and insufficient quantity or quality of bone or soft tissue.
3. Patients with mental or neurologic conditions who are unwilling or incapable of following postoperative care instructions.
4. Foreign body sensitivity. Where material sensitivity is suspected, testing is to be completed prior to implantation of the device.

**INDICATIONS FOR USE**

To provide fixation of soft-tissue grafts within the tibial tunnel during anterior cruciate ligament (ACL) and/or posterior cruciate ligament (PCL) reconstruction.

**CONTRAINDICATIONS**

1. Active infection.
2. Patients with mental or conditions who are unwilling or incapable of following postoperative care instructions.
3. Patient conditions including: blood supply limitations, insufficient quantity or quality of bone for attachment or latent infections.
4. Pathologic soft tissue conditions, which would prevent secure fixations.



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