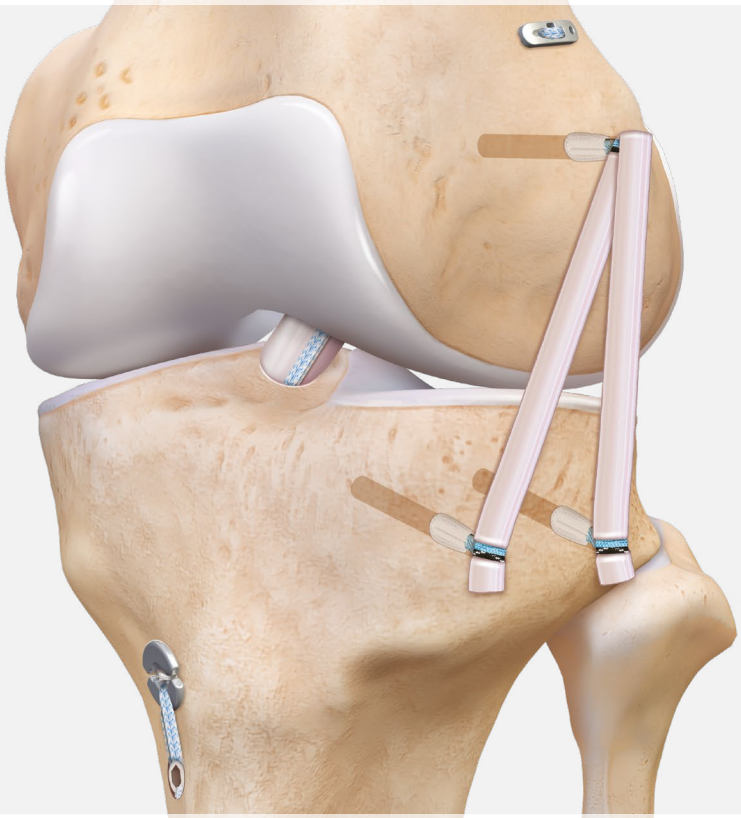
Two-Strand ALL Reconstruction Using Knotless Knee FiberTak® Anchors

Surgical Technique



Arthrex®

History of Anterolateral Reconstruction

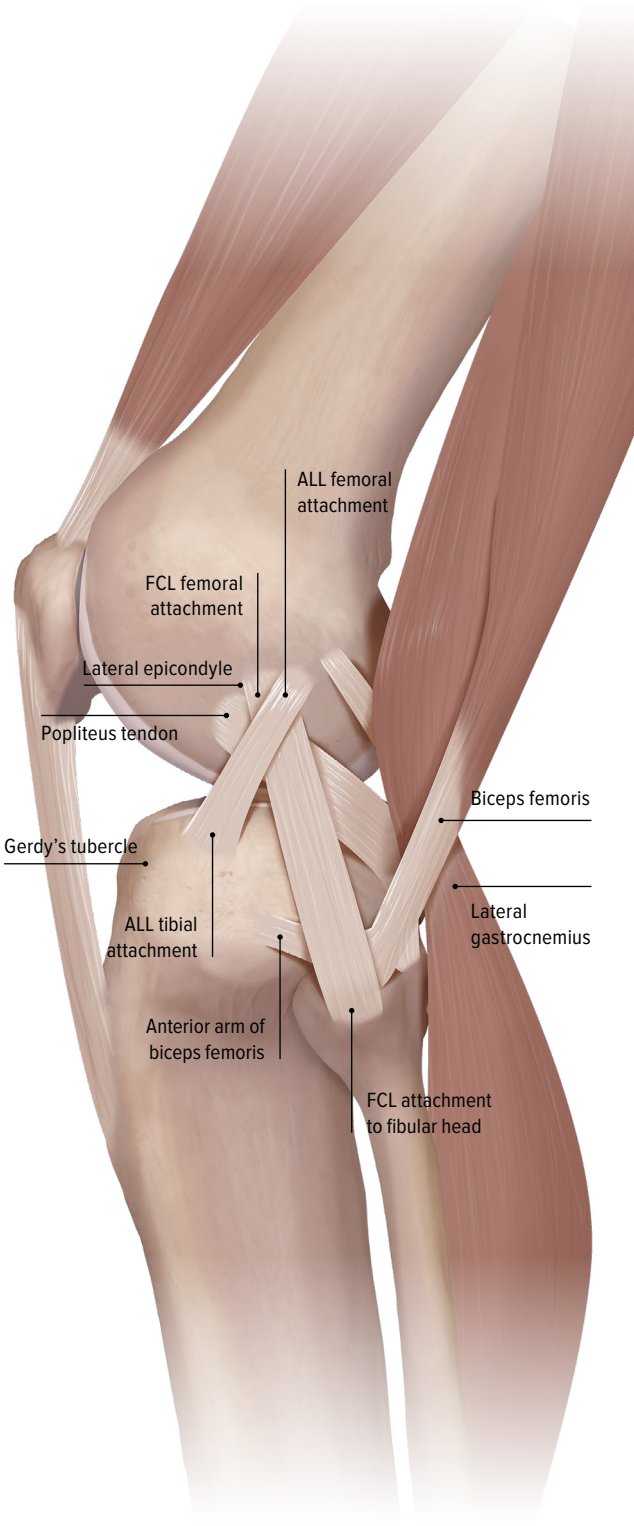
Anterolateral Ligament (ALL) Reconstruction

In 1879, the French surgeon Paul Segond described a remarkably constant avulsion fracture pattern at the proximal-lateral tibia as a result of forced internal rotation. He noted the existence of "a pearly, resistant, fibrous band"[1] connecting the femur with the lateral tibia that seemed to show "extreme amounts of tension during forced internal rotation of the knee."[1] Later, Hughston described the importance of the middle third capsular ligament—in essentially the same anatomic location described by Segond—and how it was frequently torn in combination with an ACL tear.[2] This anatomical structure has been comprehensively characterized as the anterolateral ligament (ALL) only recently in Claes's 2013 publication.[3]

Given its location at the anterolateral aspect of the knee, the ALL was found to act as an important restraint to internal tibial rotation. With the pivot shift consisting of a coupled translation/rotation phenomenon, experimental sectioning of the ALL was found to invariably induce high-grade pivot shifts in ACL-deficient cadaveric knees, unlike isolated ACL injury. In other words, high-grade pivot shifts were only seen in the combination of ACL plus ALL injuries. With the continued occurrence of unsettled rotational laxity despite appropriately performed anatomic ACL reconstruction being a significant issue in current practice, the aforementioned new insights of the anatomy and function of the ALL could open the door to a potential solution. Specifically, reconstruction of the ALL could play a major role in improving results of isolated ACL reconstruction by providing better rotational control of the knee.

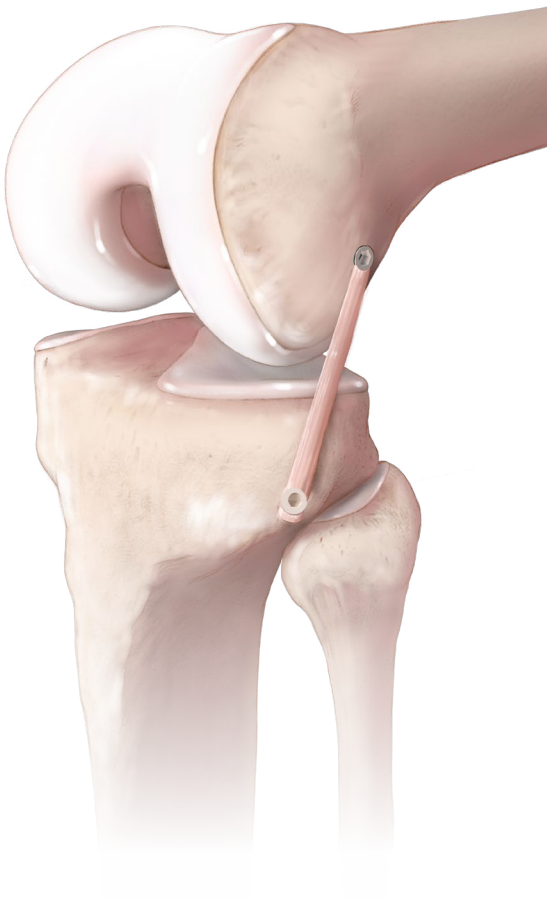
The goal of ALL reconstruction is to eliminate any residual rotational laxity and reduce the risk of ACL graft rupture. Although contemporary ACL reconstruction is generally thought to deliver good results with excellent control of anterior-posterior (AP) laxity, the persistence of some degree of rotational instability characterized by a positive pivot shift test in some patients is not uncommon. Rotational laxity after ACL injury is best quantified in the pivot shift phenomenon, which is the most specific test that correlates best with functional outcome after reconstruction. However, the problematic persistence of a positive pivot shift remains an unsolved issue in a significant amount of cases after both single and double ACL reconstruction.[4]

Historically, anterior laxity in ACL-deficient knees was treated surgically by isolated extra-articular iliotibial (IT) band tenodesis, as described by Lemaire, Jacob, and MacIntosh.[5,6] This procedure in isolation was largely abandoned when arthroscopic single-bundle intra-articular ACL reconstruction emerged as the gold standard of surgical treatment for ACL tears. More recently, the ALL has been shown to have an effect on rotational stability in several studies when performed in association with a standard intra-articular reconstruction of the ACL.[7-9]



Applications

ALL reconstruction is aimed at augmenting rotational stability in the ACL-reconstructed knee. Because combined injuries to both the ACL and ALL or deep IT band act as a prerequisite for the occurrence of an IKDC grade III pivot shift, ACL-injured patients with a high-grade pivot shift might benefit from an additional ALL reconstruction in order to avoid persistent rotational laxity. Hyperlax females with excessive recurvatum and physiologic joint laxity are potentially appropriate candidates for combined ACL reconstruction and extra-articular stabilization.

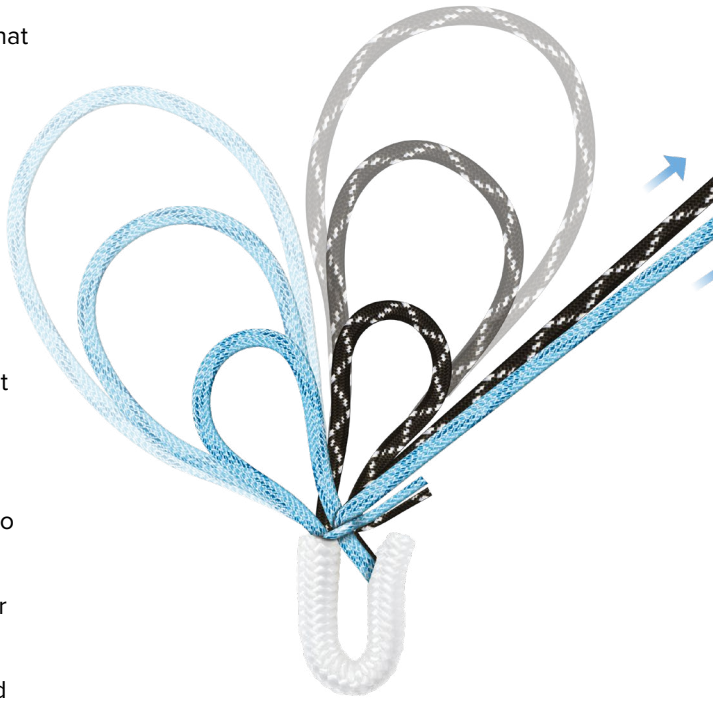


Furthermore, in ACL-injured pivoting athletes who require absolute stability, ALL reconstruction should be contemplated if only an IKDC grade II pivot shift is present. Finally, revision ALL reconstruction cases commonly exhibit significant rotational laxity due to a tendency for increased joint laxity from previous meniscus removal or resultant laxity of secondary ligamentous restraints. Especially in the absence of frank retrauma or obvious technical errors explaining graft failure, concomitant ALL reconstruction should always be considered as a means of improving stability in these complex cases.

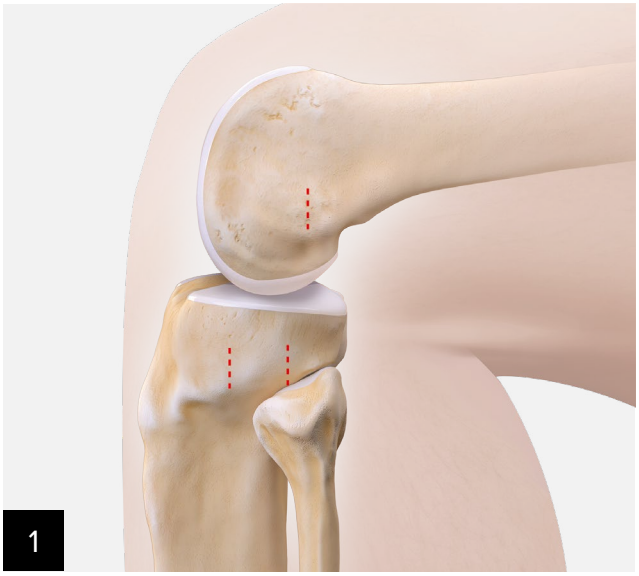
FiberStaple™ Technique Using Knee FiberTak® Anchors

Knee FiberTak anchors are the first line of suture anchors designed specifically for the knee. The Knee FiberTak lineup consists of 5 different anchor variants with unique features and benefits. Each implant features a new, redesigned anchor body and the sheath is less densely woven, making deployment easy and reliable, especially in uniformly hard bone commonly encountered in procedures around the knee.

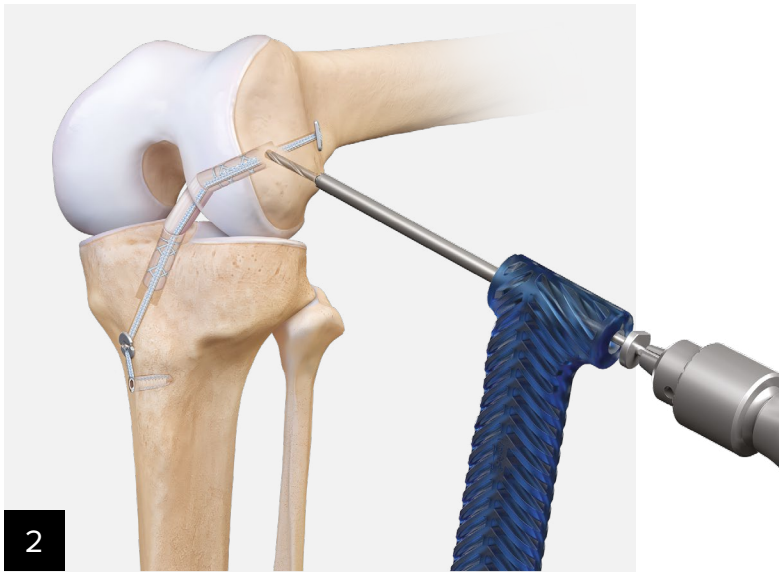
Additionally, Knee FiberTak anchors are the first suture anchors that use SutureTape in a tensionable knotless mechanism, combining the benefits of SutureTape with retensionability. The SutureTapes feature vibrant new blue-and-black braid designs that make suture identification and management easier in an open surgical environment. For additional efficiency, the knotless implants feature preconverted tensionable loops, eliminating the need to shuttle the repair suture through the splice. Disposable and reusable, the instrumentation was ergonomically designed with a short working length to allow the surgeon to get close to the anatomy. The surgeon can prep a pilot hole using a calibrated drill, an awl, or even a self-punch in appropriate bone density.



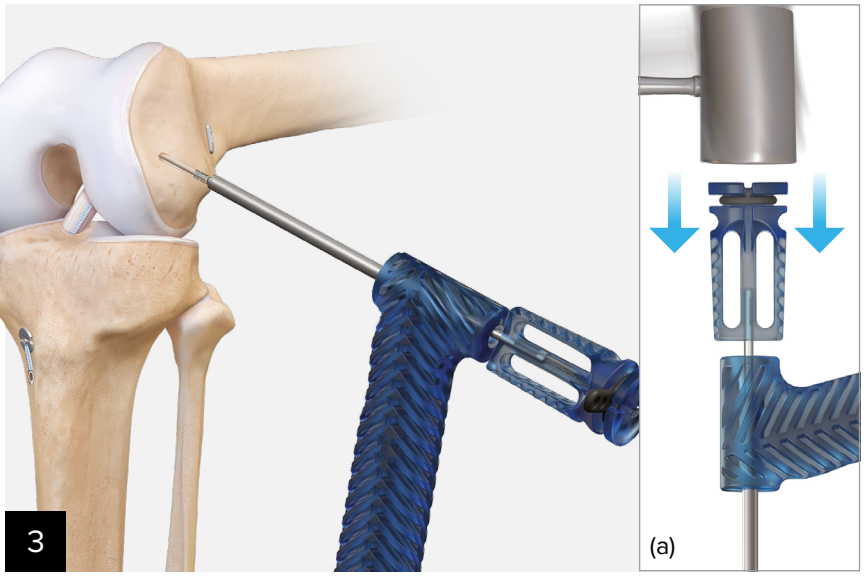
- Shorter guides and inserters allow surgeons to operate closer to the site with instrumentation designed for open surgery
- Knee FiberTak anchors feature flat, vivid-colored SutureTape for improved visualization and easier suture management
- Double Knotless Knee FiberTak anchors feature 2 preconverted knotless tensionable loops of 1.3 mm SutureTape



The ALL runs obliquely to the anterolateral tibia. Make the femoral incision slightly proximal and posterior to the lateral epicondyle. Then make the tibial incision 22 mm posterior to Gerdy's tubercle, which is approximately halfway between Gerdy's tubercle and the center of the fibular head.

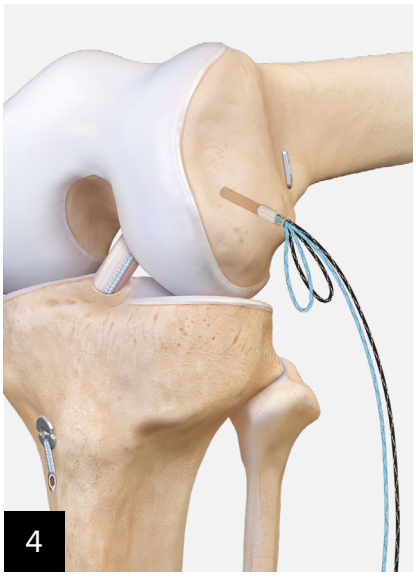


Direct the FiberTak® drill guide anteriorly and proximally, taking care to avoid the femoral socket of the ACL reconstruction. The anchor can be inserted by self-punching, drilling a pilot hole, or using the awl to punch a pilot hole.

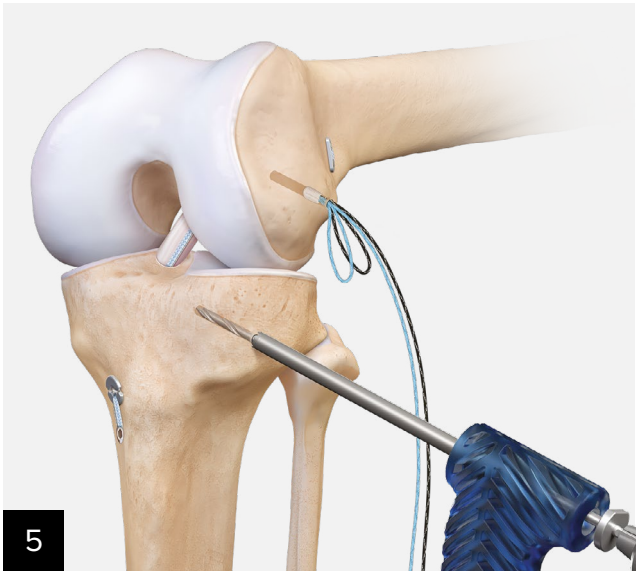


Insert the knotless FiberTak soft anchor through the drill guide and mallet the inserter down to the back of the guide handle **(a)**.

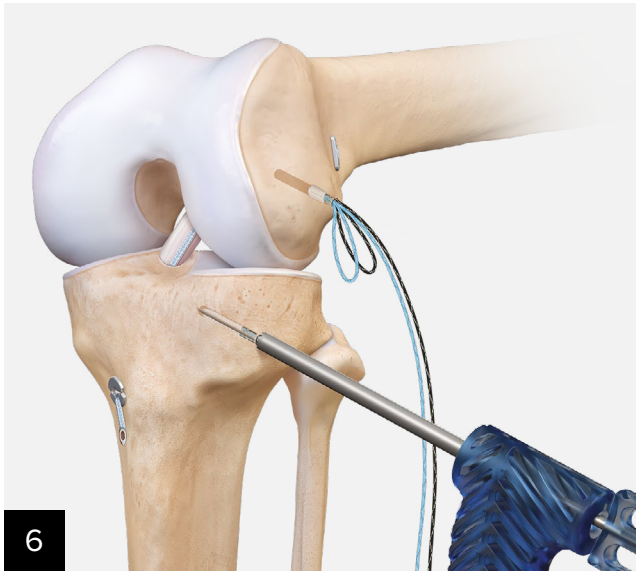
Note: Do not continue to impact the driver once the anchor inserter handle reaches the back of the guide handle. This could inadvertently advance the tip of the guide into bone, compromising the cortex and potentially impacting fixation strength.



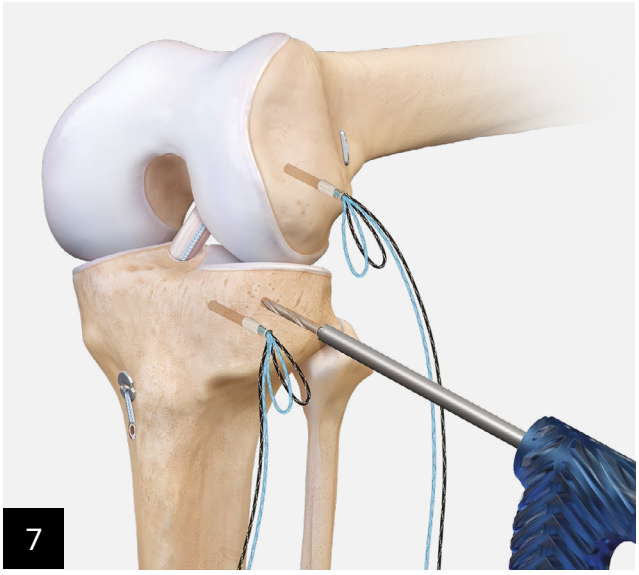
Pull the black suture-release tab, uncoil the sutures, and pull back the anchor handle to remove the inserter. Remove the white retention suture from the preconverted loops. Place a probe through both loops of the anchor and apply gentle tension to set the anchor.



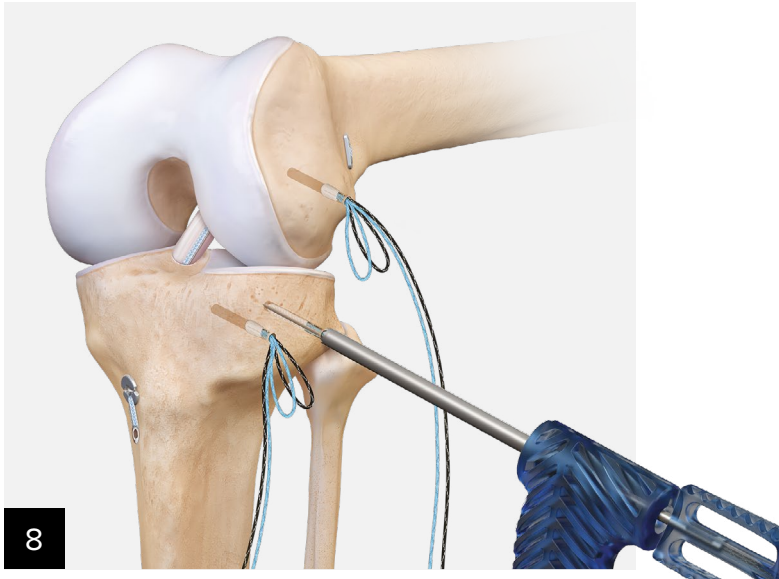
Repeat pilot hole preparation at a point 1 cm distal to the joint line at the posterior aspect of Gerdy's tubercle.



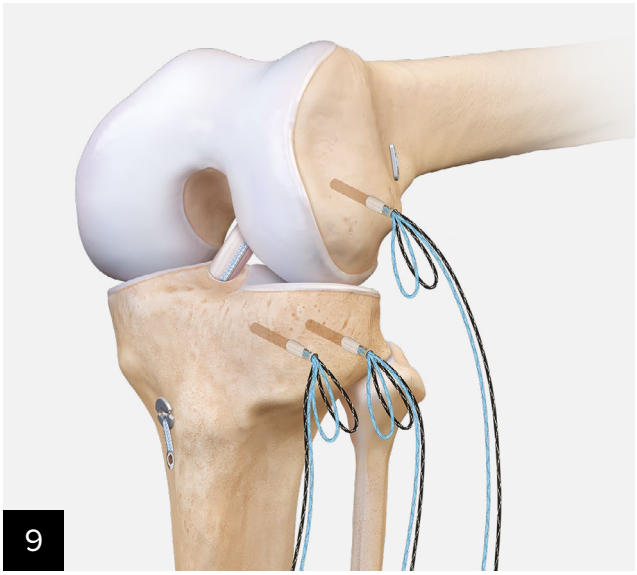
Repeat anchor insertion steps, being careful not to overimpact the inserter.



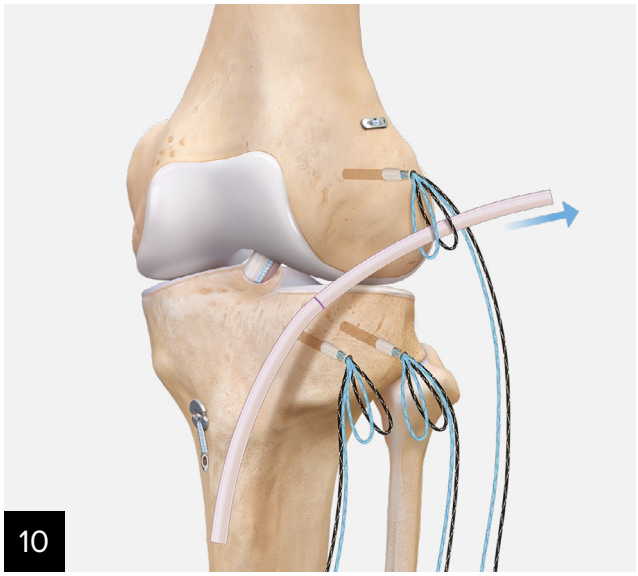
Prepare a second tibial attachment site at a point 1 cm distal to the joint line, approximately 1 cm posterior the first tibial anchor at a point halfway between the fibular head and Gerdy's tubercle.



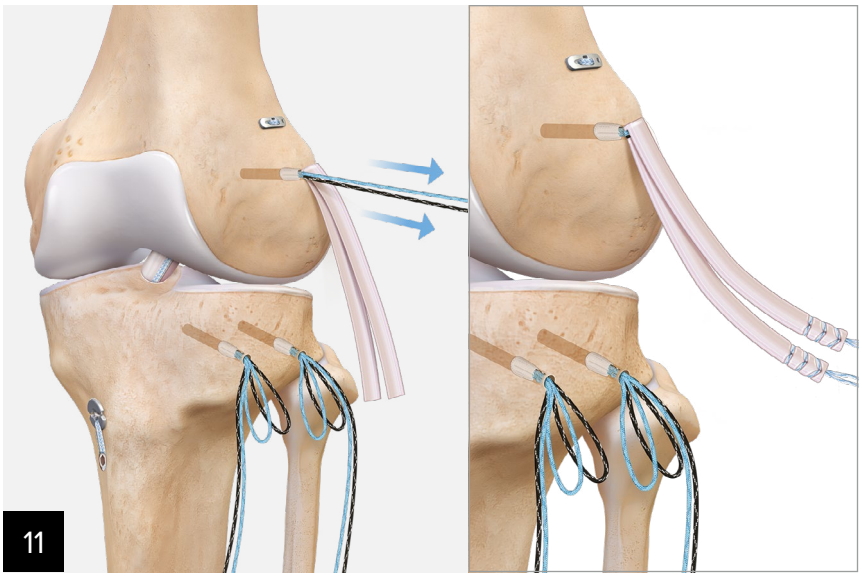
Repeat anchor insertion steps, being careful not to overimpact the inserter.



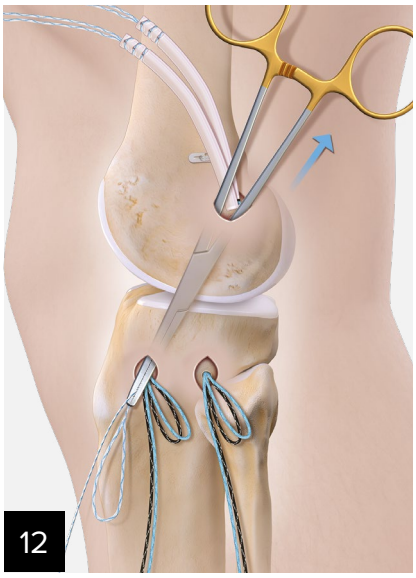
Again, unwind the sutures and remove the FiberTak® anchor inserter.



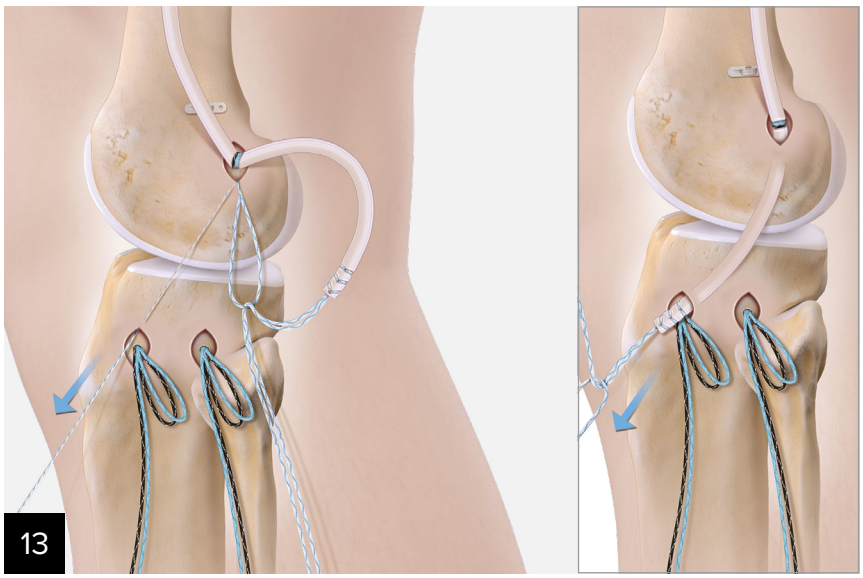
Mark the graft at the midpoint and pass it through both loops of the femoral Double Knotless Knee FiberTak anchor.



Pull the blue and black tensioning sutures alternatingly, reducing the midpoint of the graft down the femoral attachment side.

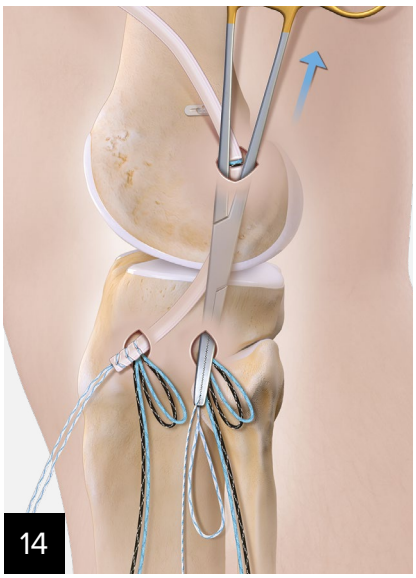


Through the femoral incision, use a hemostat under the IT band to create a tunnel down to the anterior tibial socket, shuttling the loop of a FiberSnare® suture out of the femoral incision, bringing along a FiberSnare suture to pass the graft.

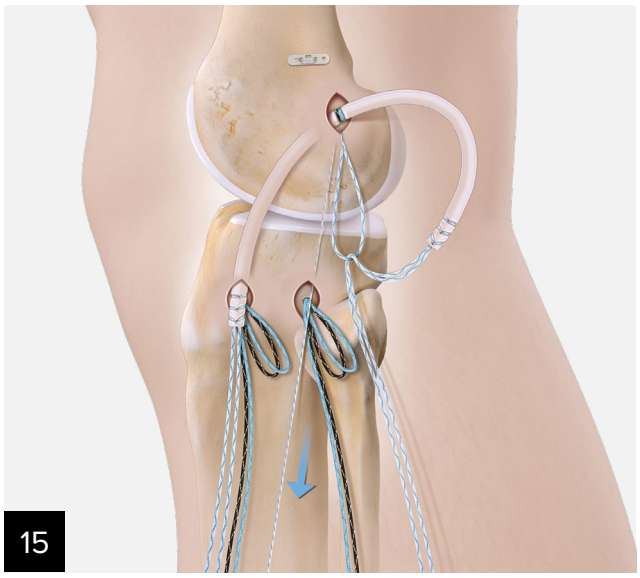


Using the FiberSnare® suture, shuttle the anterior limb of the graft distally out of the anterior tibial incision.

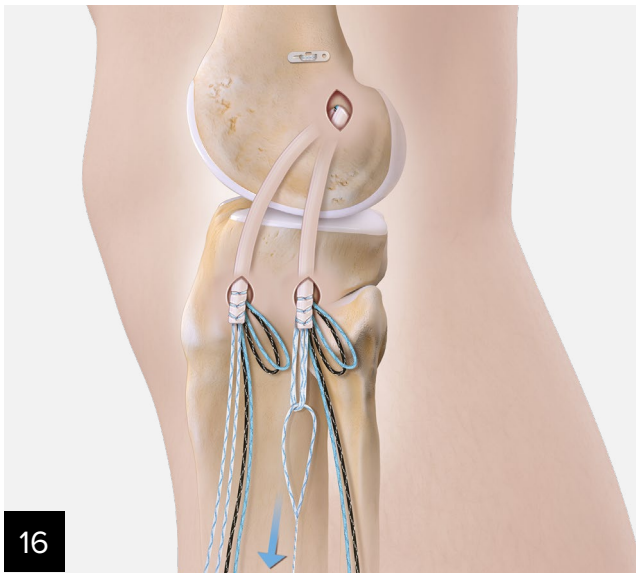
Locate the free end of the FiberSnare suture in the anterior tibial socket, and pull distally to pass the graft.



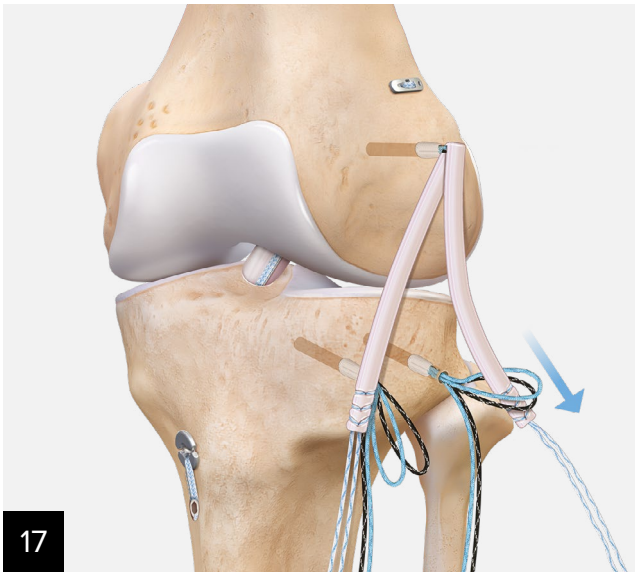
Use the hemostat under the IT band to pass another FiberSnare suture through both the femoral and posterior tibial socket. Repeat the steps for the passing the posterior graft limb by retrieving and shuttling the loop of a FiberSnare suture out of the femoral incision.



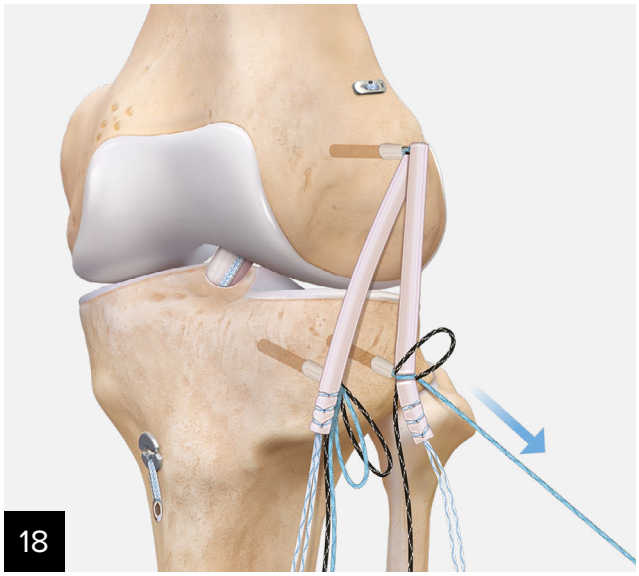
Using the FiberSnare suture, shuttle the posterior limb of the graft distally out of the posterior tibial incision.



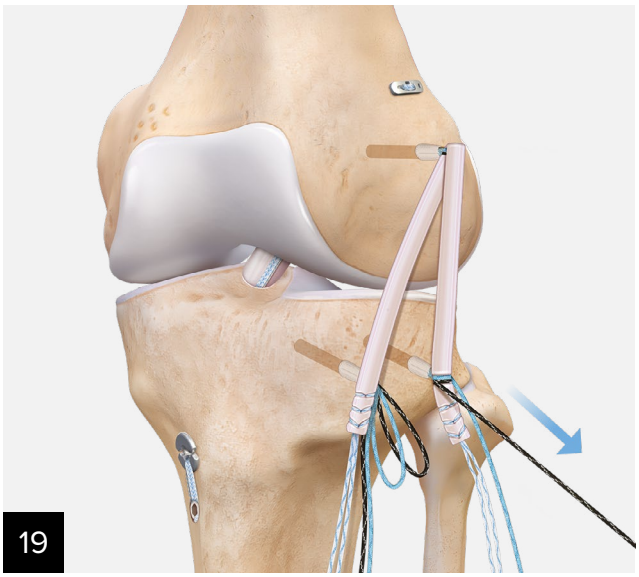
Locate the free end of the FiberSnare suture now in the posterior tibial socket, and pull distally to pass the graft.



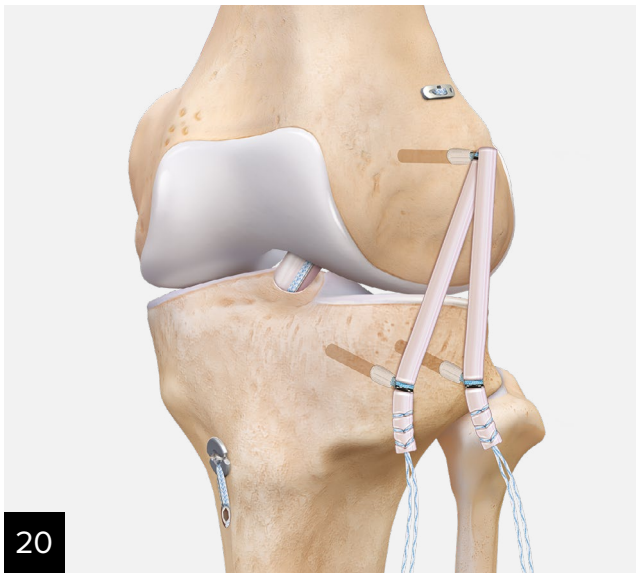
Through the posterior incision, pass the posterior graft limb through both loops of the Double Knotless Knee FiberTak® anchor.



Gently pull the blue tensioning limb of the Double Knotless Knee FiberTak anchor with light tension on the graft limb to achieve provisional fixation. By not pulling the anchor to final tension, graft tension can be fine-tuned prior to pulling final tension on the construct.



Upon confirmation of appropriate tension, place the knee in full extension and neutral rotation and pull both black and blue tensioning limbs of the Double Knotless Knee FiberTak anchor to final tension.



Repeat the tensioning and fixation technique for the anterior graft limb. The Double Knotless Knee FiberTak tensioning tails can be retensioned and cut flush. Alternatively, the tensioning tails can be passed through the graft tissue using a free needle and tied to augment fixation.

Ordering Information

Implants

Product Description	Item Number
Double Knotless Knee FiberTak® anchor	AR-**3740SP**
Hybrid Knee FiberTak anchor	AR-**3770SP**
Double Knotted Knee FiberTak anchor	AR-**3730SP**
Knee FiberTak button	AR-**3780SP**
Knee FiberTak anchor for the *Interna*lBrace™ technique	AR-**3750SP**

Instruments

Product Description	Item Number
Knee FiberTak disposable drill guide kit	AR-**3710**
2.7 mm Knee FiberTak disposable hard-bone drill	AR-**3712-27**
2.8 mm Knee FiberTak disposable hard-bone drill	AR-**3712-28**
2.9 mm Knee FiberTak disposable hard-bone drill	AR-**3712-29**
3 mm Knee FiberTak disposable hard-bone drill	AR-**3712-30**
2.6 mm Knee FiberTak reusable punch	AR-**3714**

Products advertised in this brochure / surgical technique guide may not be available in all countries. For information on availability, please contact Arthrex Customer Service or your local Arthrex representative.

The *Interna*lBrace surgical technique is intended only to augment the primary repair/reconstruction by expanding the area of tissue approximation during the healing period and is not intended as a replacement for the native ligament. The *Interna*lBrace technique is for use during soft tissue-to-bone fixation procedures and is not cleared for bone-to-bone fixation.

References

1. Segond PF, Thompson SR. *Recherches Cliniques Et Expérimentales Sur Les Épanchements Sanguins Du Genou Par Entorse.* V.A. Delahaye & Co, Libraires-Editeurs; 1879.
2. Hughston, JC. *Knee Ligaments: Injury & Repair.* Mosby, Inc; 1993.
3. Claes S, Vereecke E, Maes M, Victor J, Verdonk P, Bellemans J. Anatomy of the anterolateral ligament of the knee. *J Anat.* 2013;223(4):321-328. doi:10.1111/joa.12087
4. Ehlers CB, Curley AJ, Fackler NP, et al. The statistical fragility of single-bundle vs double-bundle autografts for ACL reconstruction: a systematic review of comparative studies. *Orthop J Sports Med.* 2021;9(12):23259671211064626. doi:10.1177/23259671211064626
5. Lemaire M, Combelles F. Technique actuelle de plastie ligamentaire pour rupture ancienne du ligament croisé antérieur [Plastic repair with fascia lata for old tears of the anterior cruciate ligament (author's transl)]. *Rev Chir Orthop Reparatrice Appar Mot.* 1980;66(8):523-525.
6. Escalas F, Figueras JM, Merino JA. Dislocation of the peroneal tendons. Long-term results of surgical treatment. *J Bone Joint Surg Am.* 1980;62(3):451-453.
7. Sonnery-Cottet B, Daggett M, Lutz C, Imbert P, Thaunat M. Outcomes after combined ACL and ALL reconstruction: response. *Am J Sports Med.* 2015;43(7):NP17-NP18. doi:10.1177/0363546515591556
8. Pomajzl R, Maerz T, Shams C, Guettler J, Bicos J. A review of the anterolateral ligament of the knee: current knowledge regarding its incidence, anatomy, biomechanics, and surgical dissection. *Arthroscopy.* 2015;31(3):583-591. doi:10.1016/j.arthro.2014.09.010
9. Parsons EM, Gee AO, Spiekerman C, Cavanagh PR. The biomechanical function of the anterolateral ligament of the knee. *Am J Sports Med.* 2015;43(3):669-674. doi:10.1177/0363546514562751

Notes

Arthrex®

This description of technique is provided as an educational tool and clinical aid to assist properly licensed medical professionals in the usage of specific Arthrex products. As part of this professional usage, the medical professional must use their professional judgment in making any final determinations in product usage and technique. In doing so, the medical professional should rely on their own training and experience and should conduct a thorough review of pertinent medical literature and the product's directions for use. Postoperative management is patient-specific and dependent on the treating professional's assessment. Individual results will vary and not all patients will experience the same postoperative activity level or outcomes.

Arthrex manufacturer, authorized representative, and importer information (Arthrex eIFUs)

US patent information

arthrex.com