

All-Onlay MPFL Reconstruction With Knee FiberTak[®] Anchors

Surgical Technique



Introduction

The medial patellofemoral complex, consisting of the medial patellofemoral ligament (MPFL) and the medial patellotibial ligament, is the main passive stabilizer of the patellofemoral joint. Since it has been shown that MPFL rupture is the primary pathological consequence of patellar dislocation¹ and biomechanical studies have demonstrated that the MPFL is an important passive restraint against patellofemoral instability (PFI) and lateral patellar displacement, MPFL reconstruction has become a widely accepted technique for restoration of patellofemoral stability. Therefore, numerous techniques for MPFL reconstruction have been described with promising clinical results.² Because a nonanatomic MPFL reconstruction can lead to nonphysiologic patellofemoral loads and kinematics,³ the goal of surgical intervention must be an anatomic reconstruction.

Multiple studies have evaluated the femoral insertion of the MPFL. Based on these anatomic,¹ biomechanical,⁴ and radiologic⁵ findings, it is now possible to avoid the complications of increased patellofemoral pressure that are associated with nonanatomic (too anterior/proximal)³ fixation of the graft.

The anatomic double-bundle MPFL reconstruction technique replicates the native shape of the MPFL, provides outstanding flexion and extension, and effectively limits rotation throughout the range of motion (ROM), minimizing postoperative instability. The technique, if accomplished directly and anatomically, may also provide for more aggressive rehabilitation protocols and earlier return to activity.⁶

As mentioned above, an important determinant of a successful outcome of MPFL reconstruction is the proper position of the femoral fixation of the graft, and the technique incorporates the use of a femoral template to ensure proper placement of the graft in the femur. This position provides a static fixation point that equalizes the tension across the graft in flexion and extension, thus minimizing the stresses across the patellofemoral joint.

Pathomorphology of PFI Overview

The pathomorphology of PFI is dependent on different static and passive factors, such as lower-limb alignment, trochlear dysplasia, and MPFL functionality. The patella is primarily stabilized by the MPFL from full extension to approximately 20° of flexion and has no bony guidance, forcing the MPFL complex to bear the load of restraint against the lateralizing vector of the quadriceps muscle.

At about 20° of flexion, the patella should engage into the trochlear groove, where the lateral trochlear facet is providing the static stabilization against patellar lateralization. The trochlea provides stability up to 60° to 70° of flexion, where the patella begins engaging into the notch. In cases of trochlear dysplasia, the patella cannot be guided properly, and dislocation of the patella is more common.

Very seldom, there are cases in which the patella does not engage the notch in greater than 70° of flexion, and instability occurs. This can happen in cases of a valgus deformity or internal rotation of the distal femur where the trochlear groove and the notch are positioned medially and the patella cannot engage. Chronic patellar dislocation is often seen in these cases with the patella tracking on the lateral condyle during the entire ROM. In such cases, a realignment procedure should be considered.

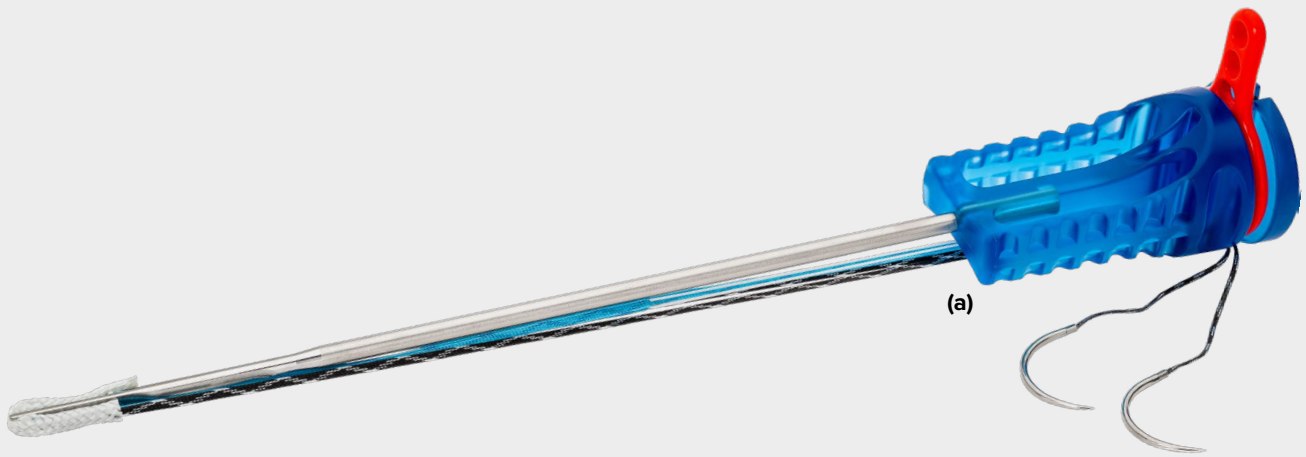
Application for MPFL Reconstruction

Since most cases of patellar instability occur in extension or slight flexion with a slight underlying trochlear dysplasia, the majority can be treated with a reconstruction of the MPFL.

In almost all cases, the MPFL is ruptured after an acute patellar dislocation and is additionally weakened in cases of congenital trochlear dysplasia since the patella tracks improperly from early childhood. The additional stresses and tension on the medial soft-tissue complex from this maltracking can lead to an underdeveloped or insufficient MPFL and subsequent instability.

Patellar Onlay Fixation

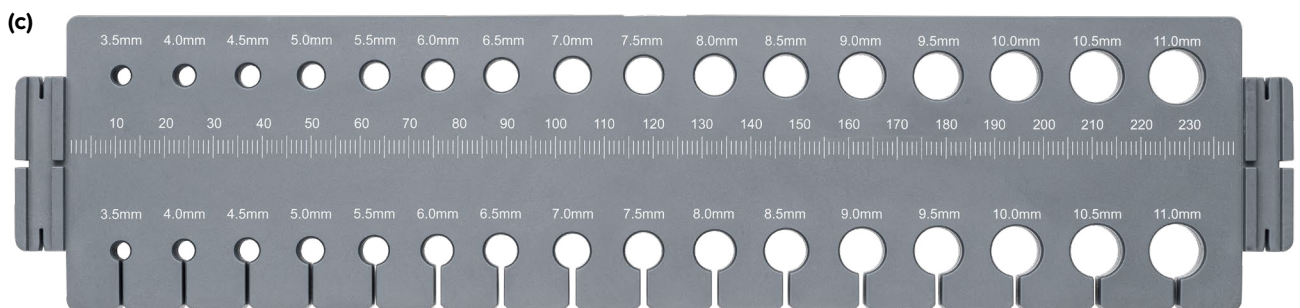
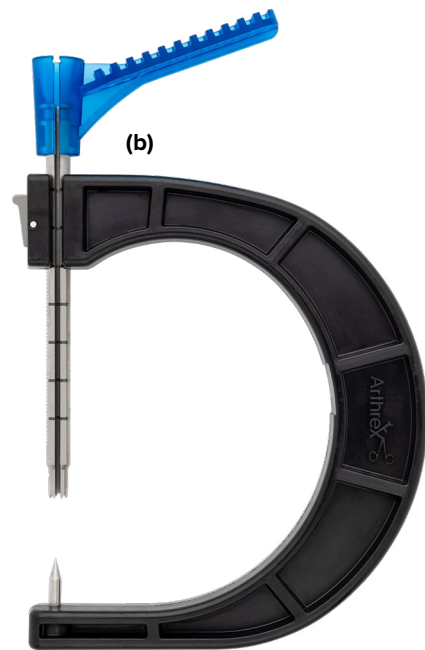
In published peer-reviewed biomechanical research, all-suture Knee FiberTak® anchors have demonstrated similar time-zero cyclic elongation to interference screw fixation with stiffness and ultimate load to failure significantly greater than the native MPFL.⁷ Clinical peer-reviewed research has shown onlay fixation to be associated with lower complication and fracture rates than socket-based fixation, with comparable redislocation rates and PROMs.⁸



Knee FiberTak® All-Onlay Kit

Features and Benefits

- › Hybrid Knee FiberTak anchors feature 1 preconverted tensionable knotless SutureTape loop and 1 sliding 1.3 mm SutureTape with swaged needles.
- › The All-Onlay MPFL Kit features 3 Hybrid Knee FiberTak anchor **(a)** on tapered, non-self-punching inserters for easy anchor implantation.
- › The included Knee FiberTak ratcheting guide **(b)** stabilizes the patella while drilling the pilot hole and implanting the anchor.
- › The drill sleeve, when removed from the C-clamp, can be used as a stand alone drill guide.
- › A 2.8 mm hard-bone drill, included in the kit, is optimized for dense bone commonly encountered in the patella.



- › The disposable graft sizer/prep board **(c)** includes a ruler and closed and slotted graft sizing holes ranging from 3.5 mm up to 11 mm in 0.5 mm increments.
- › The tool can also be used as a disposable graft prep board for stripping muscle tissue from autografts as well as pre-tensioning grafts using the suture cleats.

Atraumatic Tendon Harvester (AR-10300)

The atraumatic tendon harvester facilitates minimally invasive harvesting from an anterior or a posterior incision. The smooth edge bluntly dissects the tendon off the muscle to decrease the amount of muscle removed, which may lessen the time needed to prepare the graft and lead to decreased harvest morbidity.



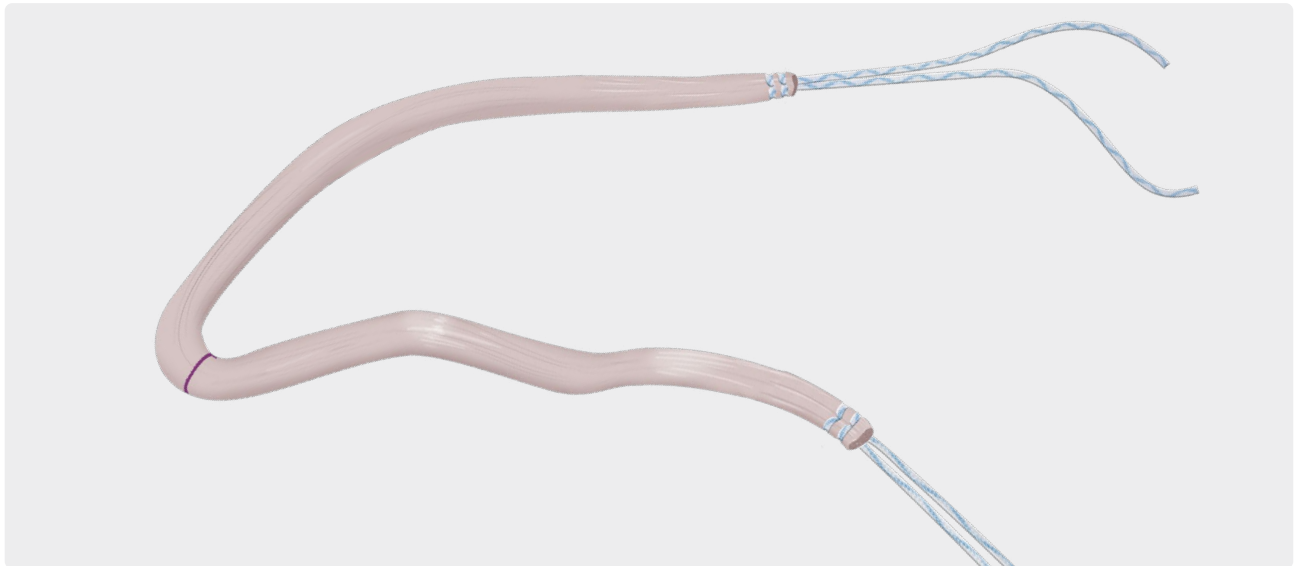
Blunt Edge:

- › May reduce premature amputation
- › Bluntly dissects the tendon off muscle, which decreases the amount of muscle removed and may lead to reduced morbidity compared to cutting
- › Less muscle on the harvested tendon may reduce graft preparation time

Opening/Closing Tip:

- › Facilitates loading tendons into the harvester
- › Secures the tendon in the closed tip
- › Allows the distal hamstring to remain attached to the tibia if necessary

Surgical Technique



01

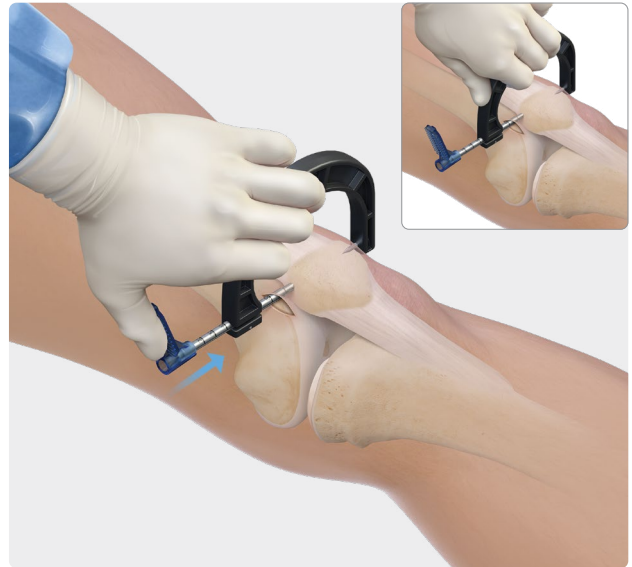
Graft Selection: Use a gracilis autograft as the size (approximately 4 mm diameter) and strength have been shown to be sufficient for MPFL reconstruction.⁶ The minimum graft length is 18 cm. Whipstitch 10 mm at each end with the included 0.9 mm SutureTape FiberLoop® sutures.



02

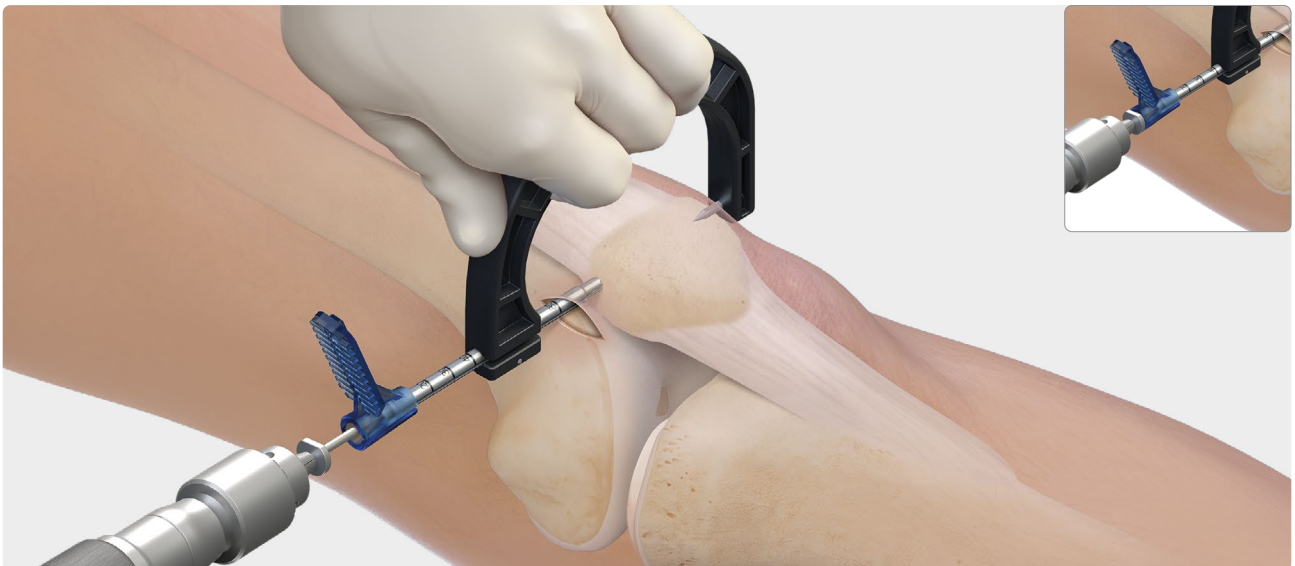
Palpate the medial patellar border and make a 2 cm skin incision from the superomedial corner, extending to the center of the medial edge of the patella. Dissect down and expose the medial edge of the patella. Create a groove on the medial patellar edge using a rongeur or powered burr. Identify and mark two points of fixation approximately at the level of the equator and 3 mm distal to the proximomedial corner of the patella.

These should be spaced roughly 15 mm to 20 mm apart.



03

Create a small poke-hole incision to place the spike of the ratcheting Knee FiberTak® guide firmly on the lateral rim of the patella. Slide the ratcheting drill sleeve down to the medial rim of the patella to the previously identified point of desired anchor placement. Compress the ratcheting sleeve firmly.



04

Create a pilot hole for the anchor by advancing the 2.8 mm hard-bone Knee FiberTak drill until it bottoms out against the back of the drill sleeve.



05a

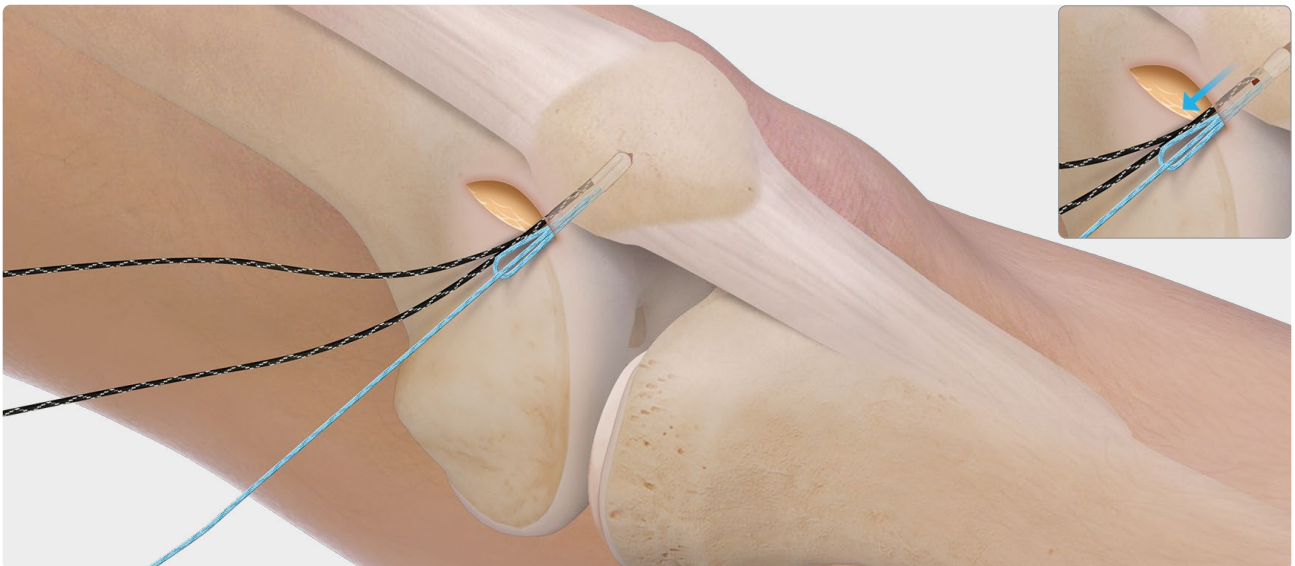
Insert the Hybrid Knee FiberTak® anchor by hand, advancing the tip of the anchor until it is within the pilot hole. Using a mallet, gently advance the inserter until the inserter handle bottoms out against the back of the drill sleeve.



05b

Remove the rubber suture-release tab and needle envelope from the driver handle, and remove the anchor inserter. Press the button on the black guide to disengage the ratchet and remove the guide. Gently pull the black suture limbs to set the anchor in the patella.

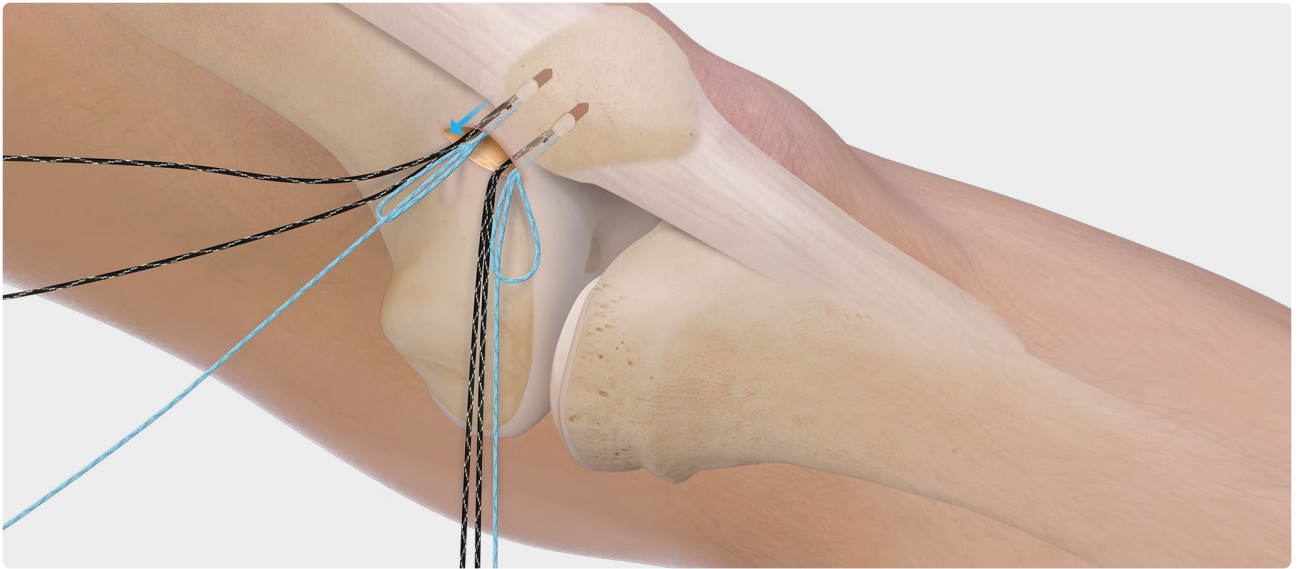
Note: Do not continue to impact the driver once the anchor inserter handle reaches the back of the guide handle. This could inadvertently advance the tip of the guide into bone, compromising the cortex and potentially impacting fixation strength.



06

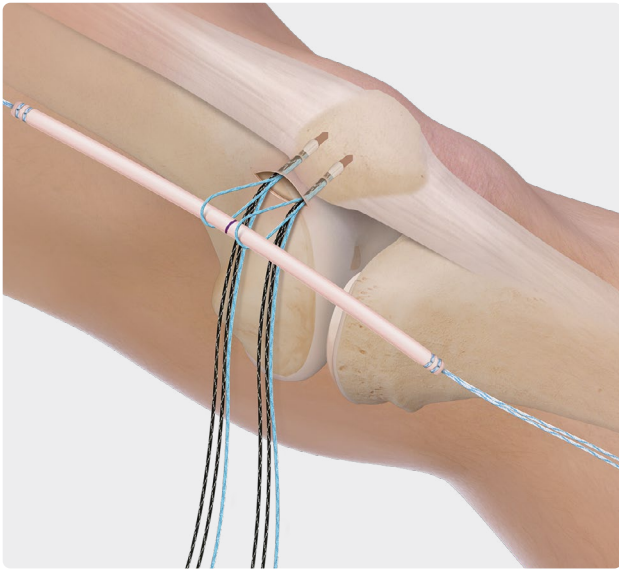
Remove the rubber suture-release tab and needle envelope from the driver handle, and remove the anchor inserter. Gently pull the black suture limbs to set the anchor in the patella.

Note: Do not pull on the blue tensioning suture. Doing so will reduce the knotless loop mechanism.

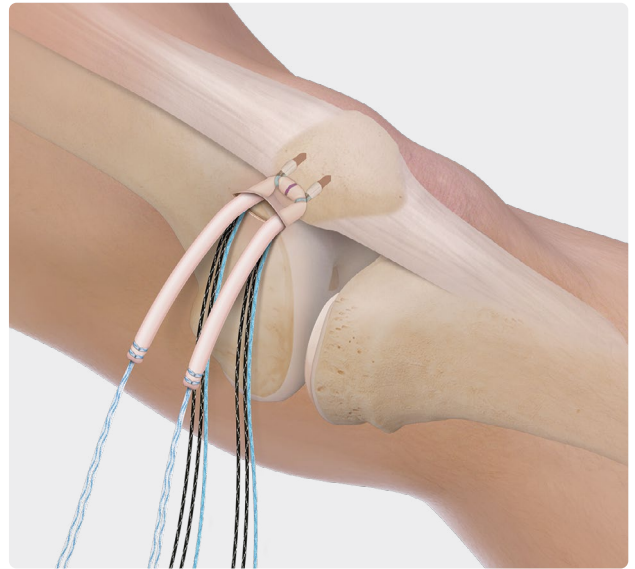


07

Repeat the drilling, insertion, and setting process to place a second Hybrid Knee FiberTak® anchor spaced approximately 15 mm to 20 mm from the first anchor.



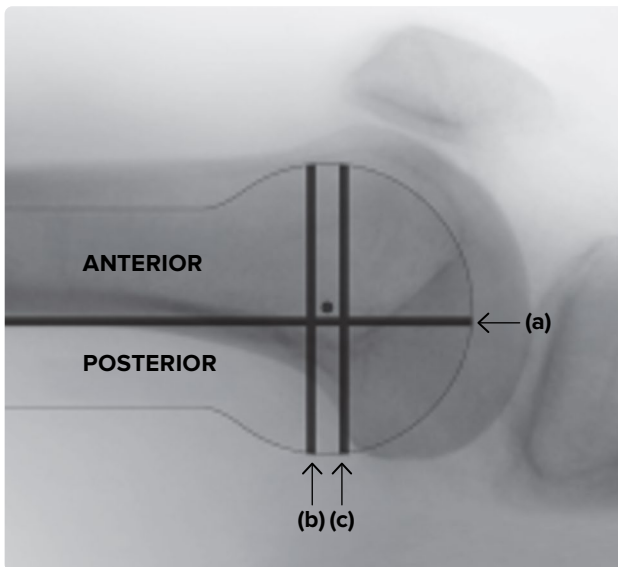
08a



08b

Pass the graft through the blue knotless loops of both Hybrid Knee FiberTak anchors and tension down to the medial patella by pulling the single blue tensioning strand.

Femoral Preparation



01a

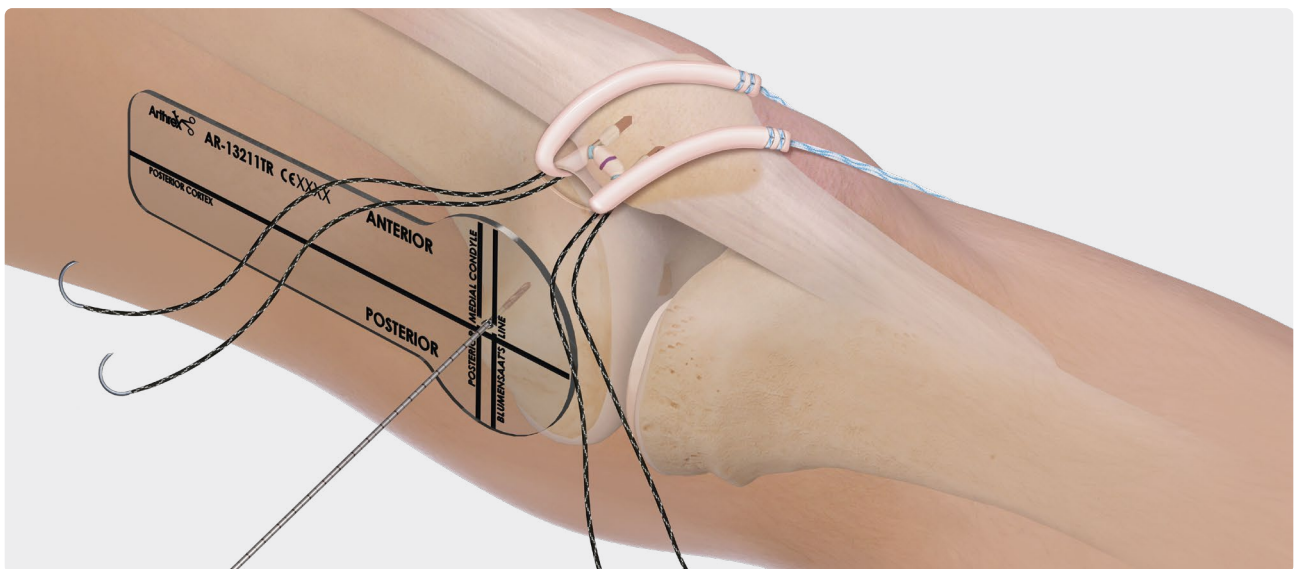
The proper position of the femoral insertion of the MPFL is very important to maintain proper biomechanics of the patellofemoral joint throughout the entire range of motion. Using the MPFL template can help establish the position of the anchor.

Note: The insertion point is approximately **(a)** 1 mm anterior to the posterior cortex extension line, **(b)** 2.5 mm distal to the posterior articular border of the medial femoral condyle, and **(c)** proximal to the level of the posterior point of Blumensaat's line.



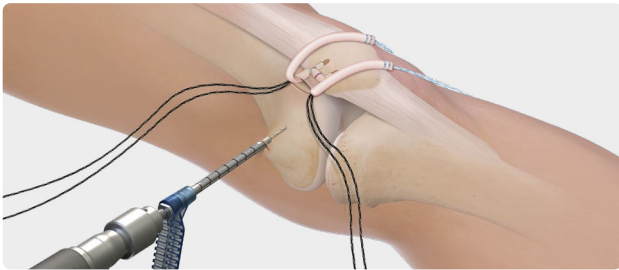
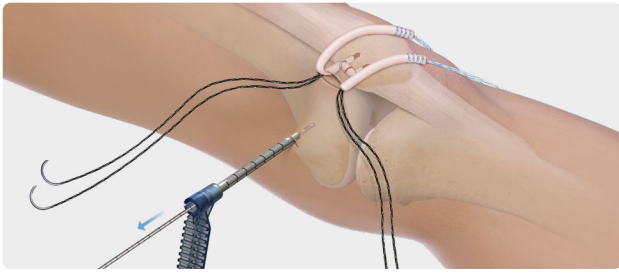
01b

When removed from the C-clamp, the guide sleeve functions as a stand-alone drill and implantation guide for the Hybrid Knee FiberTak® anchor.



02

Place the template on the area of the medial epicondyle on the distal femur and, under fluoroscopic guidance, provisionally advance a 2.4 mm zebra pin (AR-1250ZS, available separately) into the femur to a depth of approximately 2 cm and at the trajectory of the intended anchor placement. Once isometry is confirmed, slide the drill sleeve from the ratcheting Knee FiberTak guide down the guide pin and hold it in place on the bone. Remove the zebra pin while maintaining the trajectory with the drill guide sleeve.

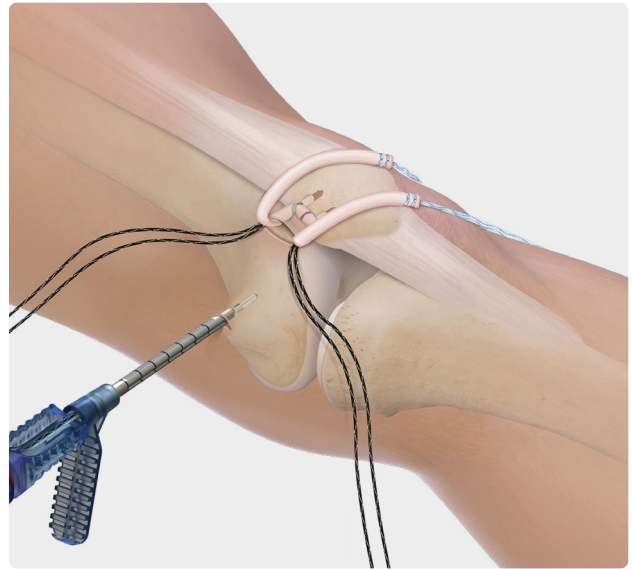


03

Slide the guide sleeve down the pin until it is resting on the cortex. Remove the pin while holding the guide in place to maintain the correct position and trajectory.

04

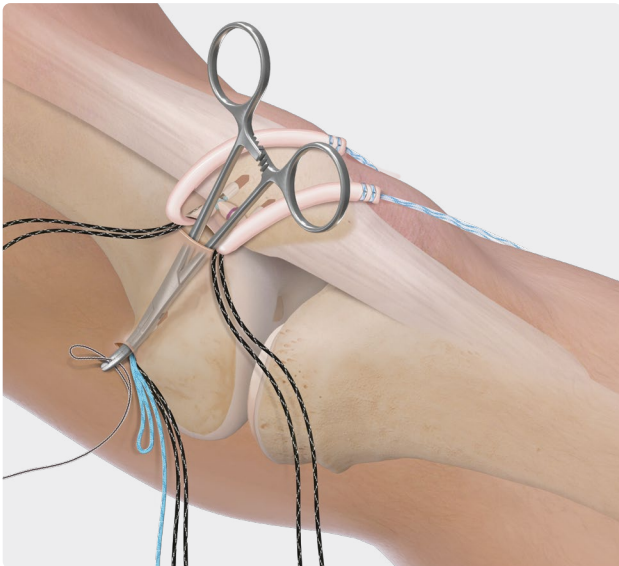
If unusually hard bone is encountered, dilate the pilot hole by advancing the Knee FiberTak® drill until the hub bottoms out against the top of the drill sleeve.



05

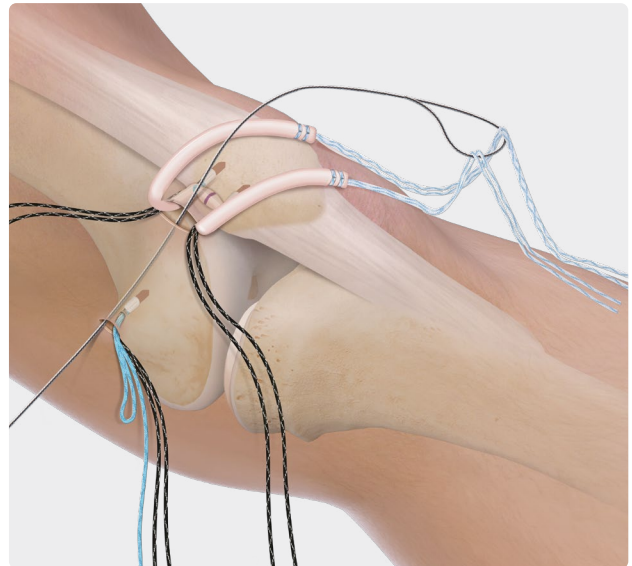
Insert the Hybrid Knee FiberTak anchor by hand, advancing the tip of the anchor until it is within the pilot hole. Using a mallet, gently advance the inserter until the handle bottoms out against the back of the drill sleeve. Remove the rubber suture-release tab and needle envelope from the driver handle, and remove the anchor inserter.

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.



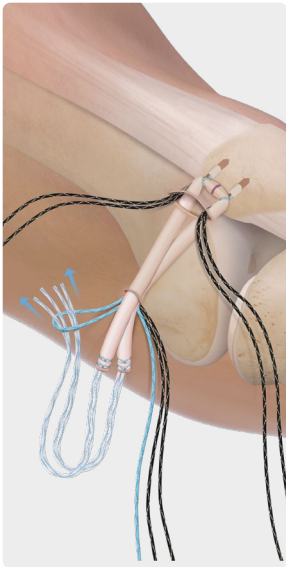
06a

Identify space between the vastus medialis (the second layer of soft tissue) and the capsule (the third layer of soft tissue), and bluntly dissect toward the femoral insertion area with scissors, leaving the capsule intact. Insert a right-angle clamp into the prepared layer down to the medial epicondyle and turn the tip of the clamp toward the skin.



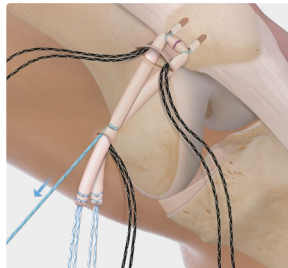
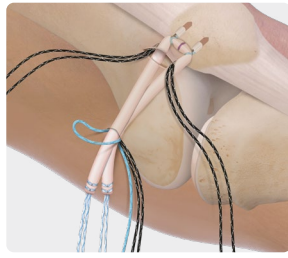
06b

Using the clamp, pass the looped end of a FiberSnare® suture back to the patellar insertion area. Loop the whipstitched graft ends through the loop of the FiberSnare suture and pass the suture from the patellar origin to the insertion point at the medial femoral epicondyle. Deliver the sutures out of the medial incision and pull the graft down to the medial epicondyle.



07

Load the graft sutures through the blue knotless tensionable loop of the Hybrid Knee FiberTak® anchor. With the knee at 30° of flexion, manually fixate the lateral patellar facet flush with the lateral femoral condyle. While maintaining gentle tension on the graft, pull the blue tensioning suture of the femoral Hybrid Knee FiberTak anchor to provisionally fixate both limbs of the graft.



08

Using the attached curved needle, pass the black 1.3 mm sliding SutureTape limb from the anchor through both limbs of graft to augment femoral fixation.



09

Tie the suture limbs and amputate the excess graft.



10

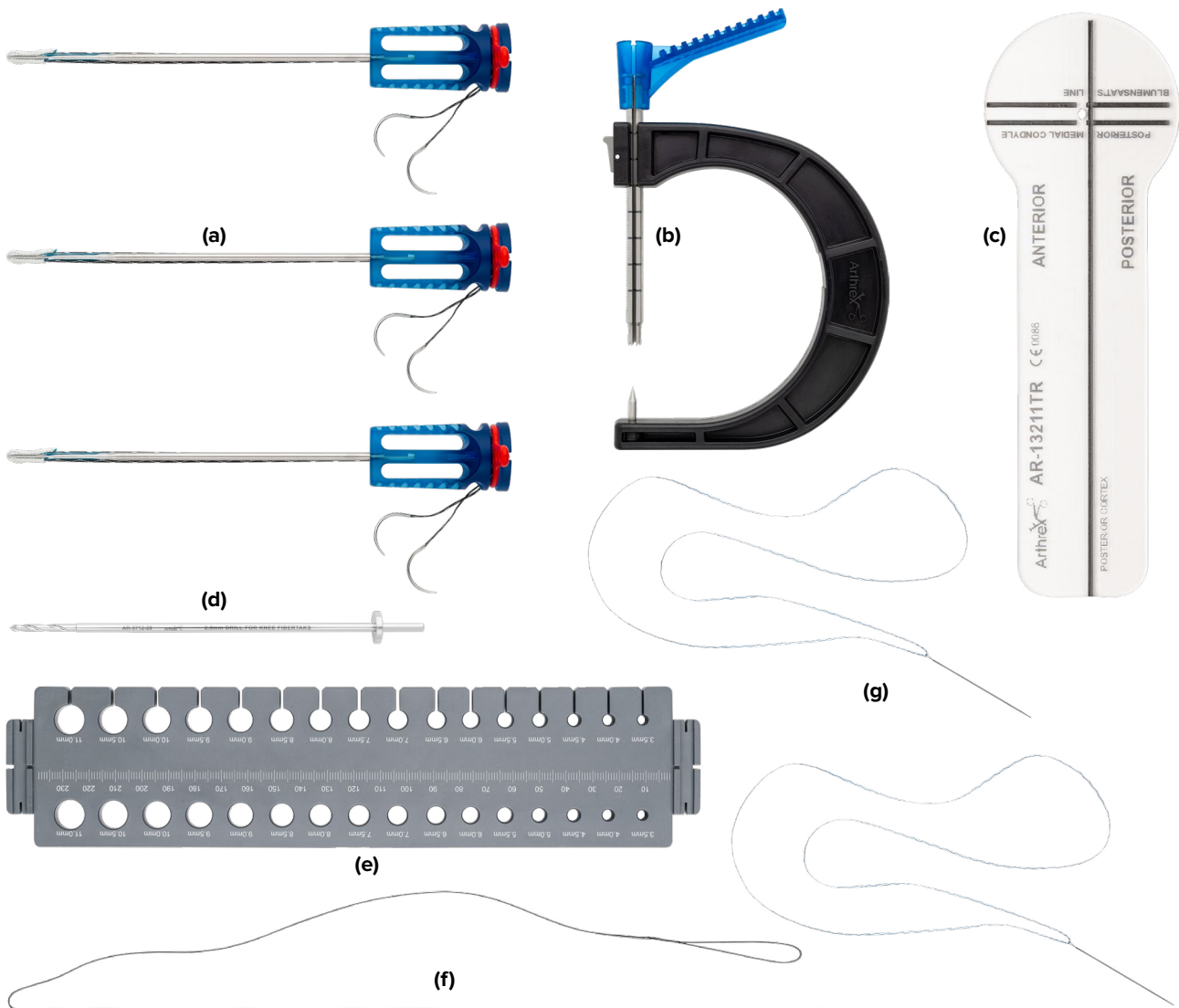
The black 1.3 mm sliding SutureTape limbs with swaged needles from the patella Hybrid Knee FiberTak anchors provide added versatility and can be used to close the retinaculum, passed through the graft for additional fixation, or to accomplish a VMO advancement as needed.

Ordering Information

MPFL Onlay Implant System, Hybrid Knee FiberTak® Femoral Fixation (AR-1360KFT)

- Hybrid Knee FiberTak anchor, non-self-punching, qty 3 **(a)**
- Knee FiberTak ratcheting guide **(b)**
- MPFL template **(c)**
- 2.8 mm Knee FiberTak drill **(d)**
- Graft sizer / prep board **(e)**
- FiberSnare® suture, black/white **(f)**
- 0.9 mm SutureTape FiberLoop® suture, 20 in, white/blue, qty. 2 **(g)**

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.



References

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5. Schöttle PB, Schmeling A, Rosenstiel N, Weiler A. Radiographic landmarks for femoral tunnel placement in medial patellofemoral ligament reconstruction. *Am J Sports Med.* 2007;35(5):801-804. doi:10.1177/0363546506296415
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8. Desai VS, Tagliero AJ, Parkes CW, et al. Systematic review of medial patellofemoral ligament reconstruction techniques: comparison of patellar bone socket and cortical surface fixation techniques. *Arthroscopy.* 2019;35(5):1618-1628. doi:10.1016/j.arthro.2018.10.150

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



US patent information