

MPFL Reconstruction With Knee FiberTak[®] Anchors and a BioComposite FastThread[™] Interference Screw

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.

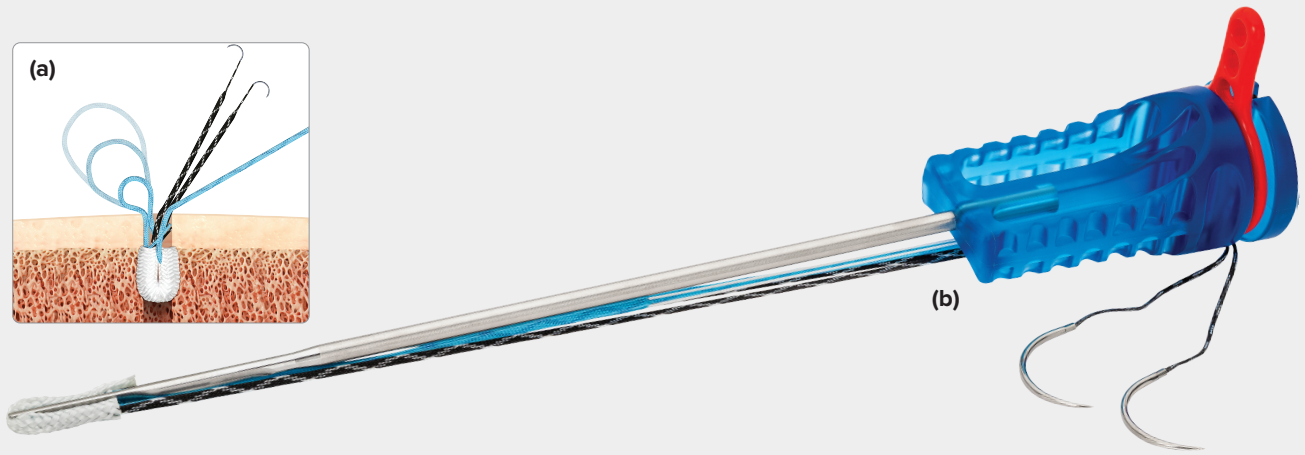
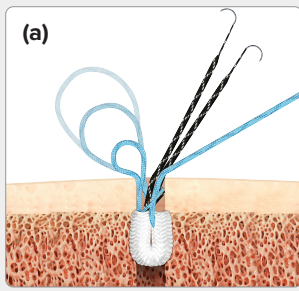
Application for MPFL Reconstruction

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. Also, in cases with a PFI in deeper flexion, MPFL reconstruction should be considered as a concomitant procedure to provide stability in extension.

Patellar Onlay Fixation

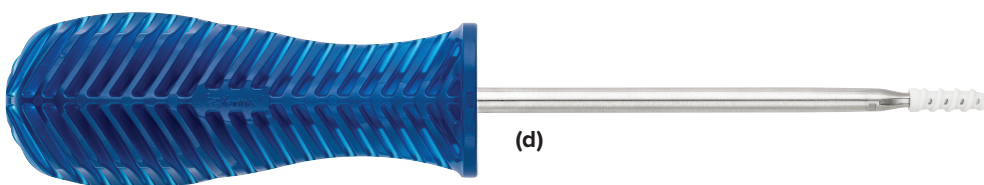
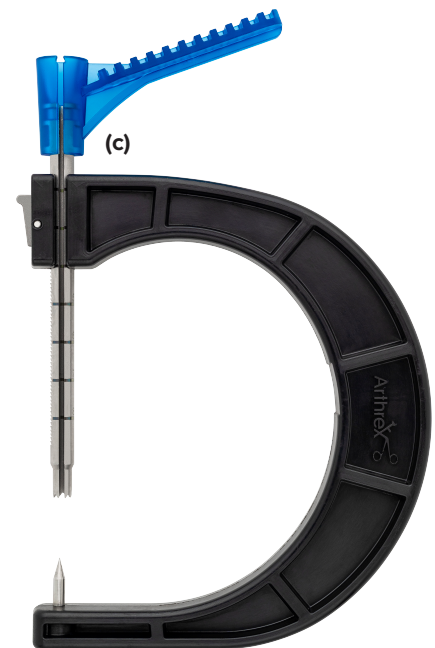
In published peer-reviewed biomechanical research, all-suture Knee FiberTak® anchors have demonstrated similar time-zero cyclic elongation to interference screw fixation with stiffness and ultimate load to failure significantly greater than the native MPFL.⁷ Clinical peer-reviewed research has shown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



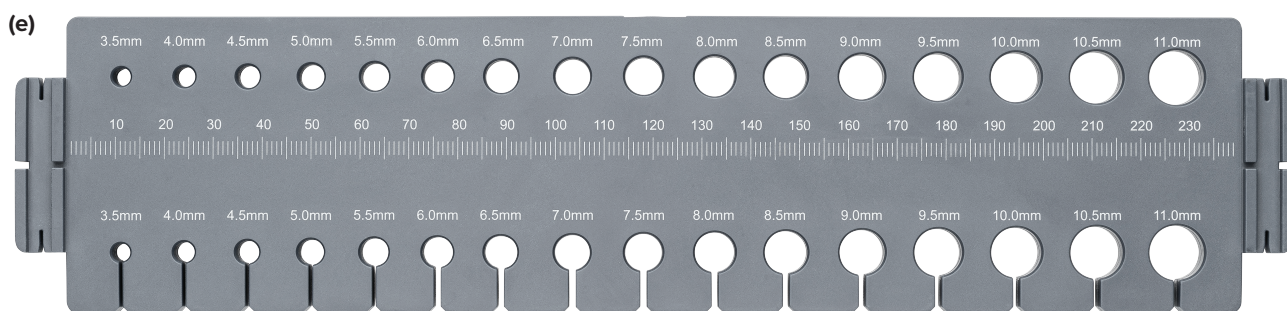
MPFL Onlay Implant System, 6 mm FastThread™ Femoral Fixation (AR-1360FT-KFT)

Features and Benefits

- › Hybrid Knee FiberTak® anchors for patellar fixation feature one preconverted tensionable knotless SutureTape loop and one sliding 1.3 mm SutureTape with swaged needles **(a)**.
- › The Onlay MPFL Kit features 2 Hybrid Knee FiberTak anchors **(b)** on tapered, non-self-punching inserters for easier anchor implantation.
- › The included ratcheting Knee FiberTak guide **(c)** stabilizes the patella during drilling and anchor insertion.
- › When removed from the clamp, the drill sleeve can be used as a standalone drill guide.
- › A 2.8 mm hard-bone drill, included in the kit, is optimized for dense bone commonly encountered in the patella.



- › Kit includes a 6 mm × 20 mm Biocomposite FastThread™ interference screw **(d)** for femoral graft fixation, with a convenient, disposable trilobe screwdriver included
- › **Proven outcomes:** 98% resorption and replacement with bone and no tunnel widening at 2 to 5 years²
- › **Less material:** Vented sidewalls and screw geometry decrease material by 22% without losing strength^{1,3}
- › **Solid clinical history:** With more than a decade of clinical use and millions of implantations,⁴ Arthrex's proprietary biocomposite material has withstood the test of time
- › **Faster insertion:** Prominent leading thread and large thread pitch facilitate screw engagement and advancement
- › **Strength:** Optimized screw threads improve pullout strength compared to longer screws of the same diameter¹
- › **Graft protection:** Threads are designed to minimize friction against the graft while the rounded end is intended to protect the graft at the aperture



- > Versatile disposable graft sizer / prep board **(e)** includes a ruler and closed and slotted graft sizing holes ranging from 3.5 mm to 11 mm in 0.5 mm increments
- > Can be used as a disposable graft prep board for stripping muscle tissue from autografts or for 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 reduced patient morbidity.



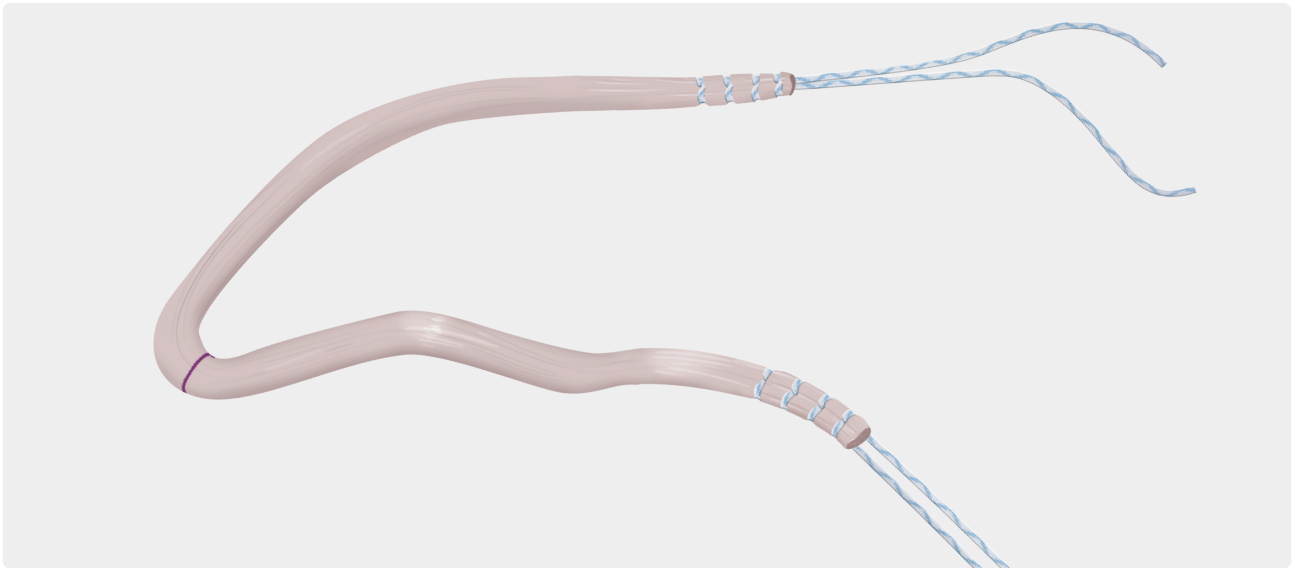
Blunt Edge

- > 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 of tendons into the harvester
- > Secures the tendon in the closed tip
- > Allows the distal hamstring to remain attached to the tibia if necessary

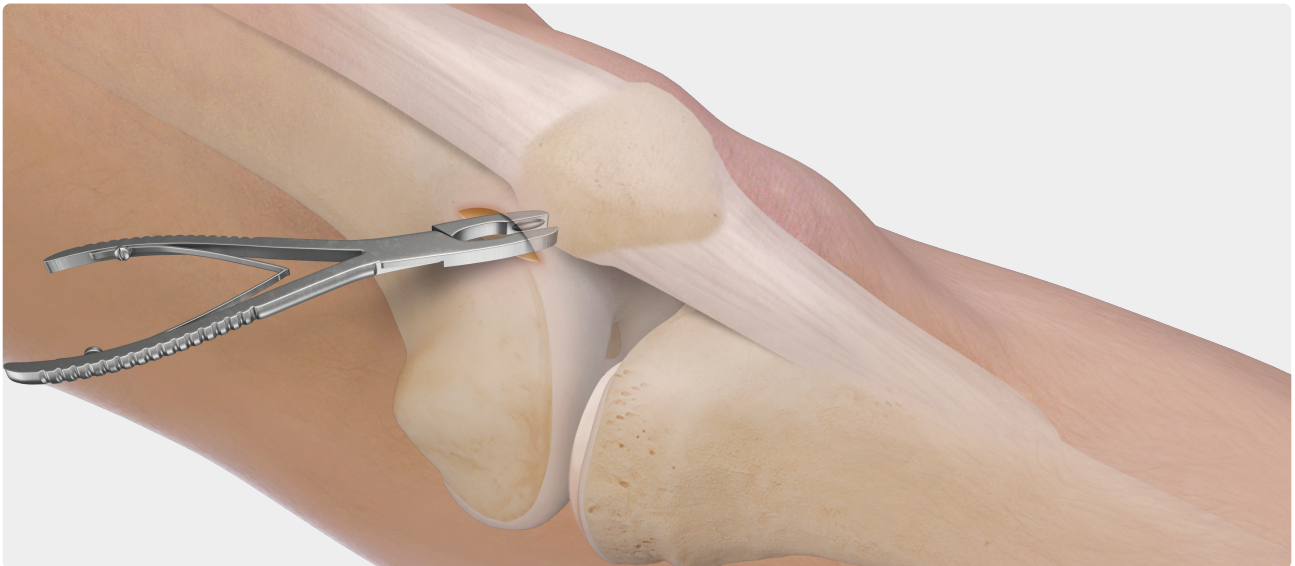
Surgical Technique



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. It can be helpful to mark the graft at the midpoint.

Patella Preparation



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.

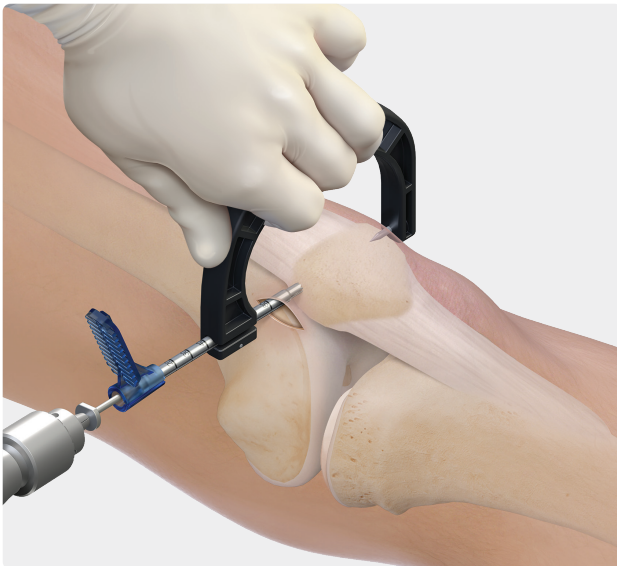


03a

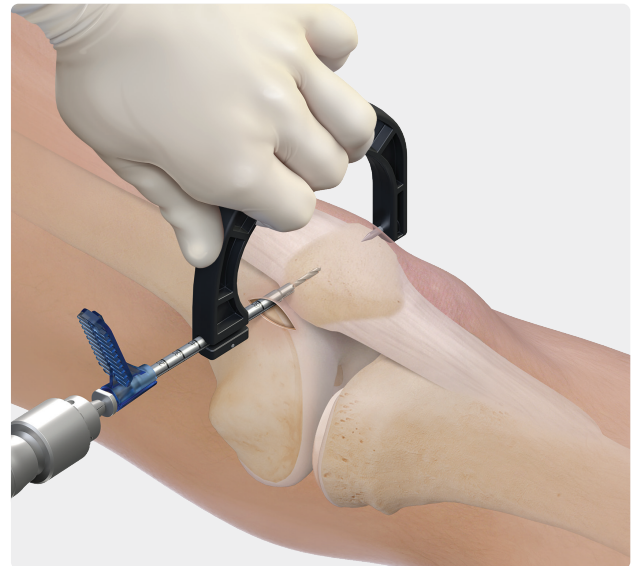


03b

Create a small poke-hole incision to place the spike of the ratcheting Knee FiberTak® anchor 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.



04a



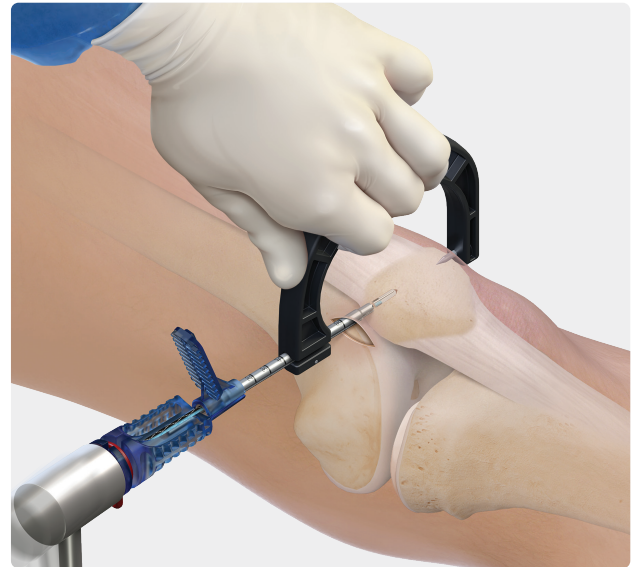
04b

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.



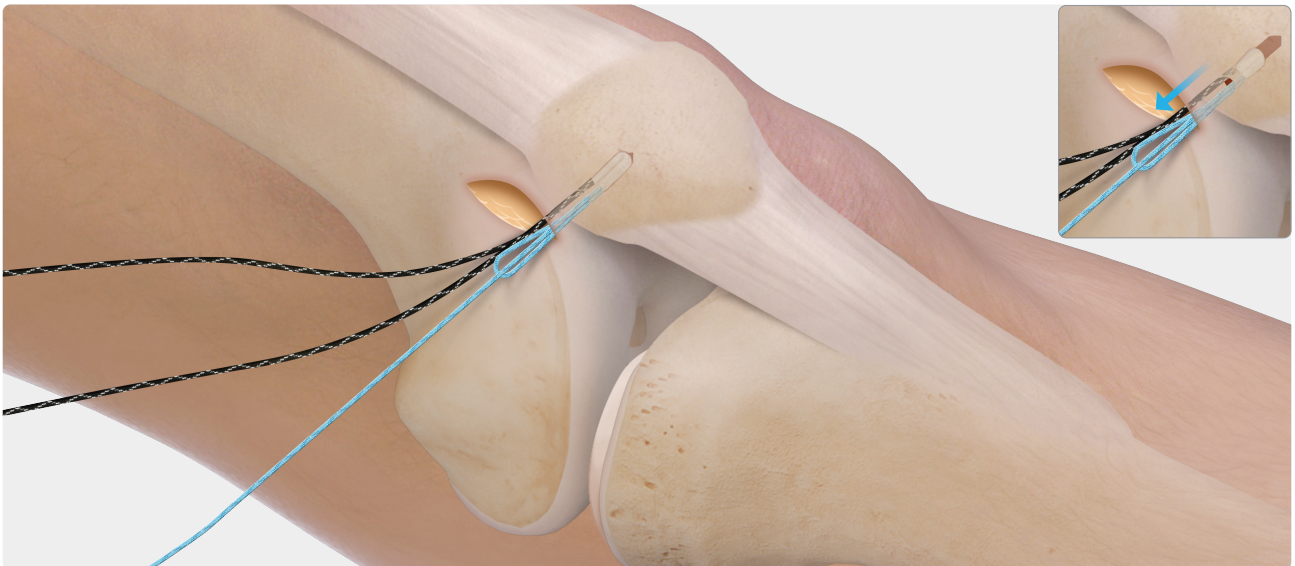
05a

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

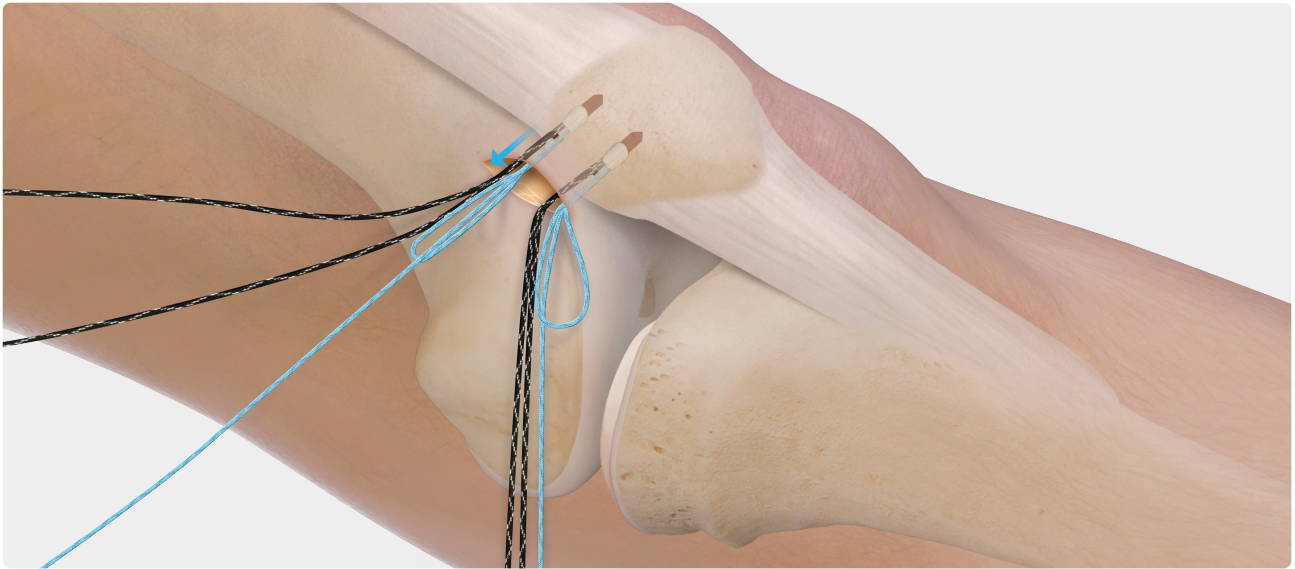
Note: Do not continue to impact the driver once the anchor inserter handle reaches the back of the guide handle. This could inadvertently advance the tip of the guide into bone, compromising the cortex and potentially impacting fixation strength.



06

Remove the rubber suture-release tab and needle envelope from the driver handle, and remove the anchor inserter. 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.

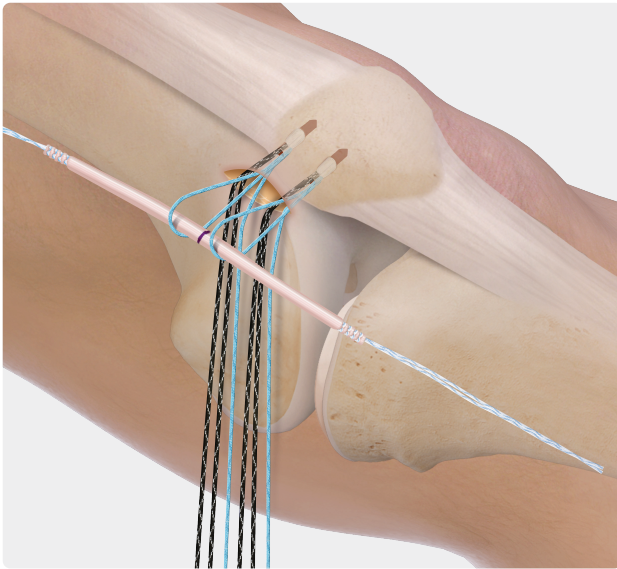
Note: Do not pull on the blue tensioning suture. Doing so will reduce the knotless loop mechanism.



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.

Patella Graft Fixation



08

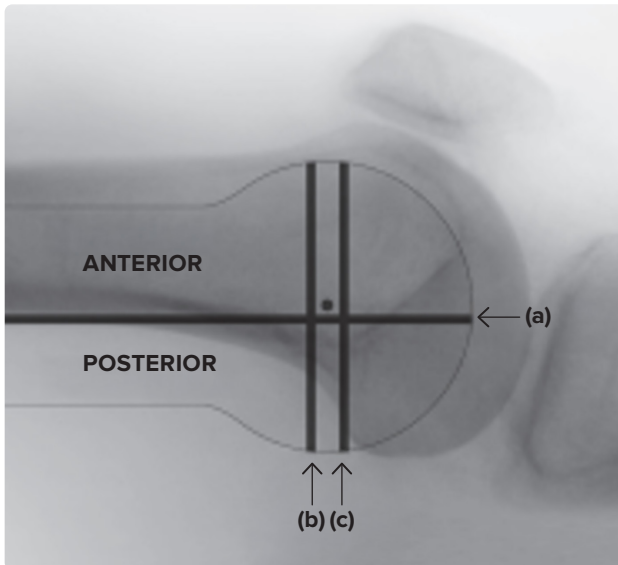
Shuttle the graft through the blue preconverted tensionable loops, aligning the midpoint of the graft halfway between the anchors and leaving graft limbs of equal length.



09

With the graft stabilized, gently tension the blue limbs of the Hybrid FiberTak anchors to reduce the knotless loops and tension the graft down to the medial patella.

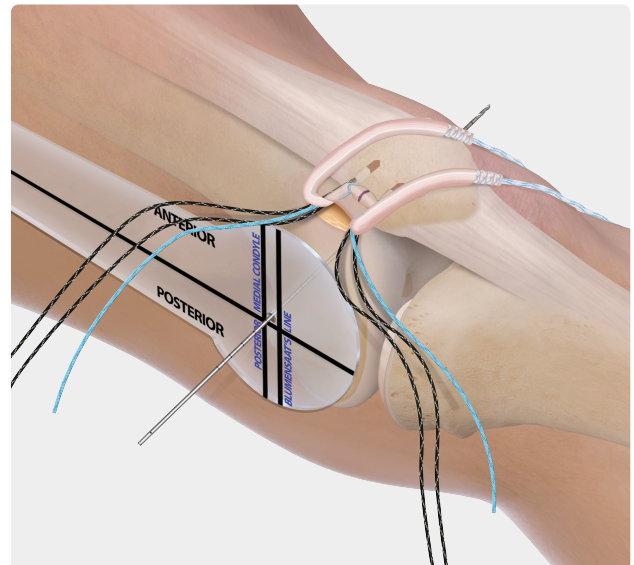
Femoral Preparation



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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 guide pin.

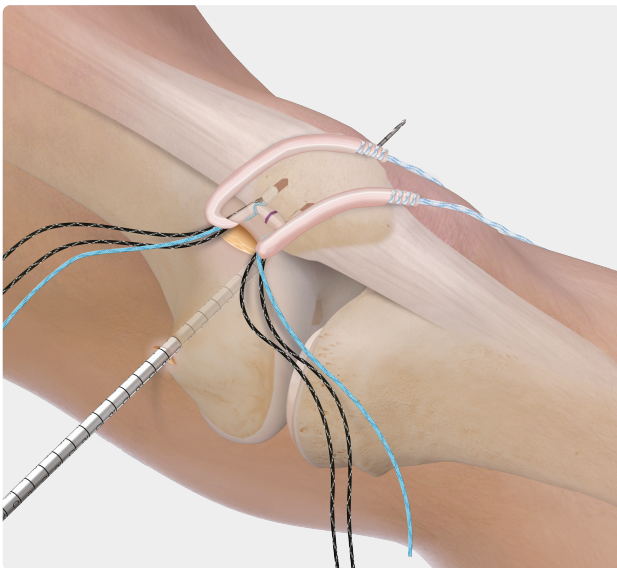
Note: The insertion point is approximately **(a)** 1 mm anterior to the posterior cortex extension line, **(b)** 2.5 mm distal to the posterior articular border of the medial femoral condyle, and **(c)** proximal to the level of the posterior point of Blumensaat's line.



01b

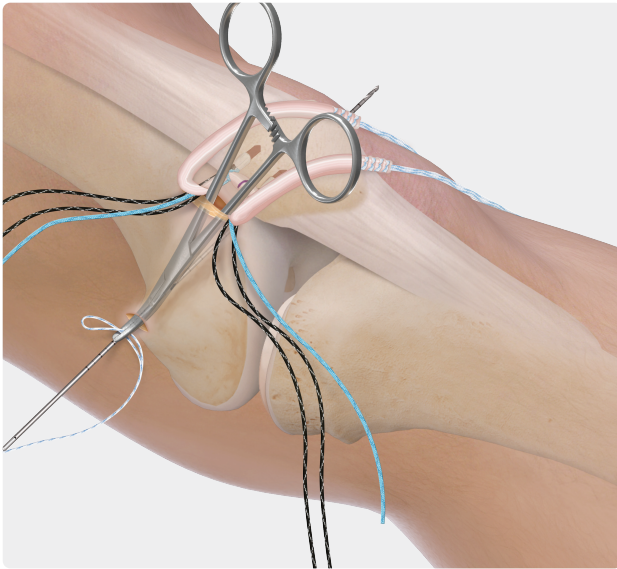
Place the template on the area of the medial epicondyle on the distal femur and, under fluoroscopic guidance, drill a 2.4 mm zebra pin across the femur and out through the lateral epicondyle. The pin should be aimed slightly proximal and anterior to avoid the intercondylar notch.

Note: Before drilling the socket, the isometry of the MPFL may be provisionally evaluated. Wrap the graft around the 2.4 mm zebra pin with adequate tension on the graft and cycle the knee through the ROM. If isometry is not adequate, change the pin location before drilling with the 7 mm reamer.



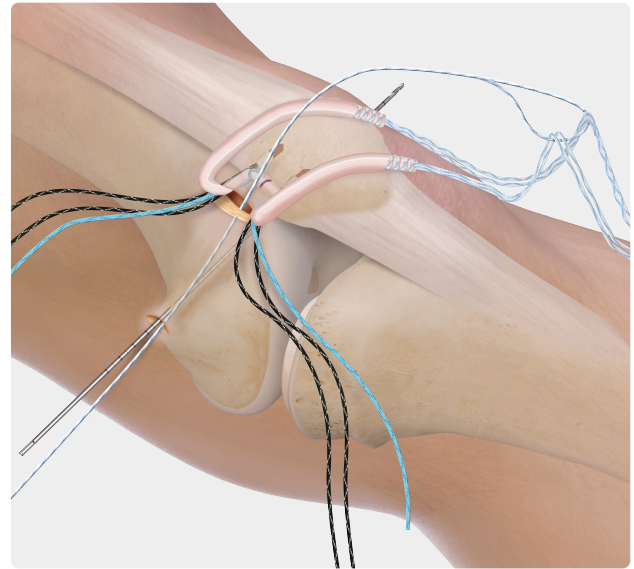
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Use a 7 mm low-profile reamer to create a socket extending to, but not through, the far cortex. Maintain the 2.4 zebra pin in the femur as it will be used to pass the graft shuttling suture through the femur.



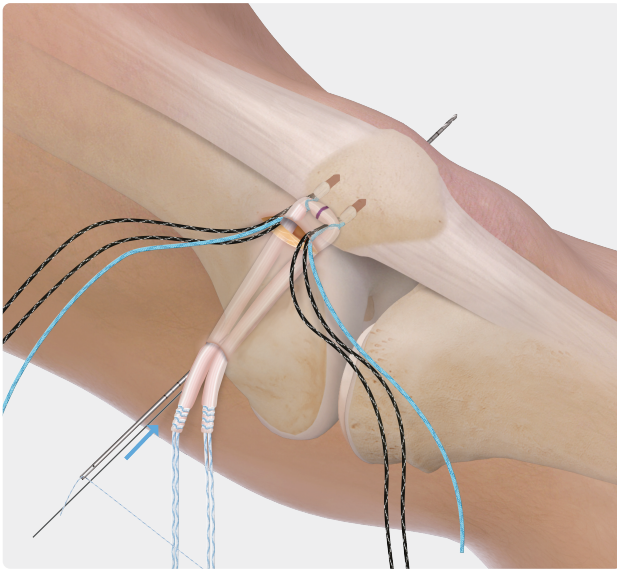
03a

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 curved hemostat into the prepared layer down to the medial epicondyle and turn the tip of the clamp toward the skin.



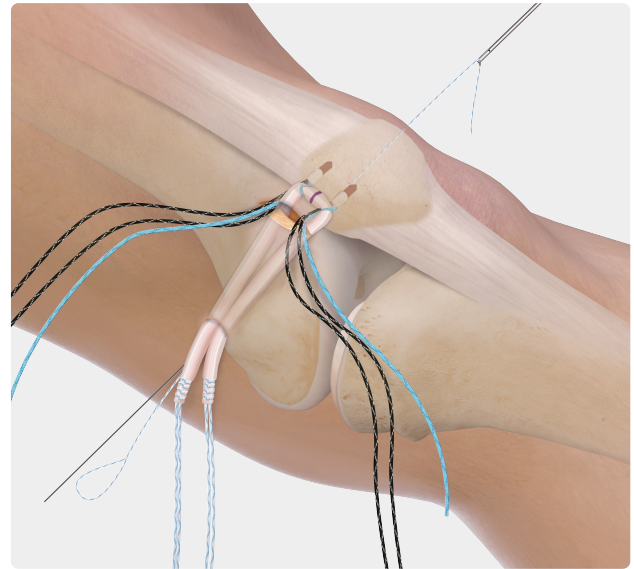
03b

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.

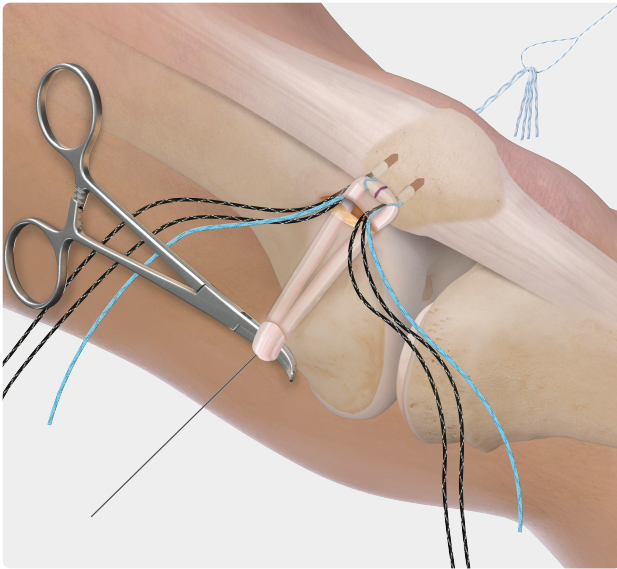


04a

Place a 1.1 mm nitinol guide wire into the drill hole next to the femoral zebra pin to facilitate insertion of the 7 mm × 20 mm BioComposite FastThread™ interference screw. Place the single end of a FiberSnare suture onto the eyelet of the zebra pin and deliver out of the lateral femur.

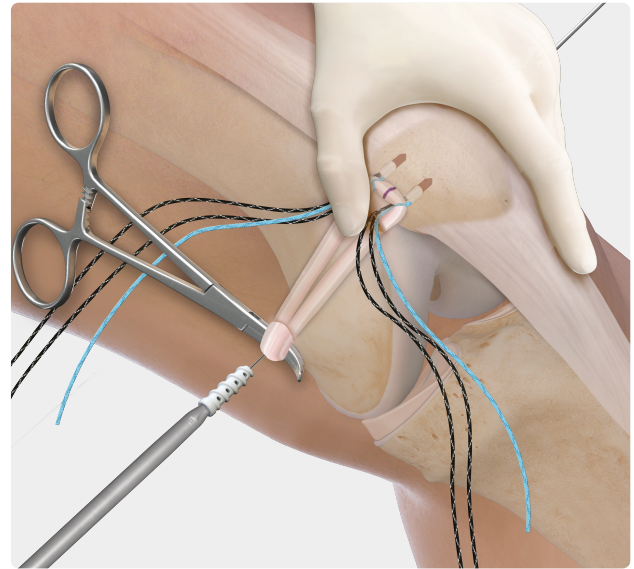


04b



05

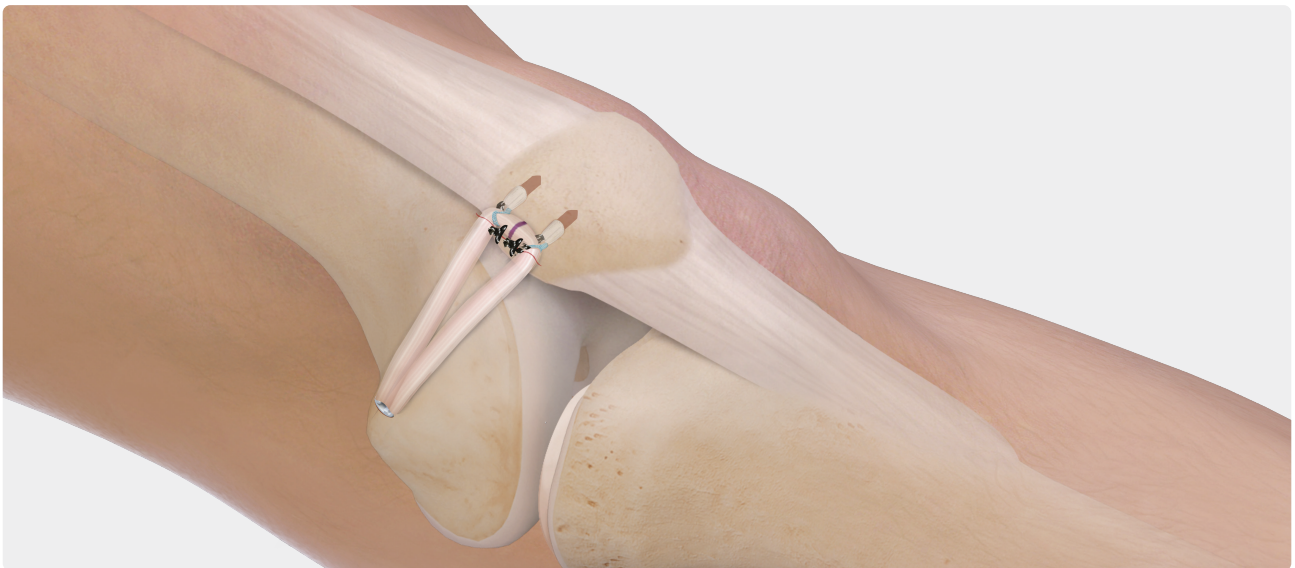
Load the whipstitch sutures from both ends of the graft into the loop of the FiberSnare® suture and shuttle the suture tails out of the lateral femur. Using a curved hemostat as a pulley, pretension the graft and insert it into the socket.



06

With the knee at 30° of flexion, manually fixate the lateral patellar facet flush with the lateral femoral condyle. While maintaining tension on the graft, insert the 6 mm × 20 mm screw into the femur.

Note: Evaluate the tracking and laxity of the patella throughout the knee ROM. If any adjustments need to be made, back out of the femoral screw, make any tension or positioning adjustments, and reinsert the screw.



07

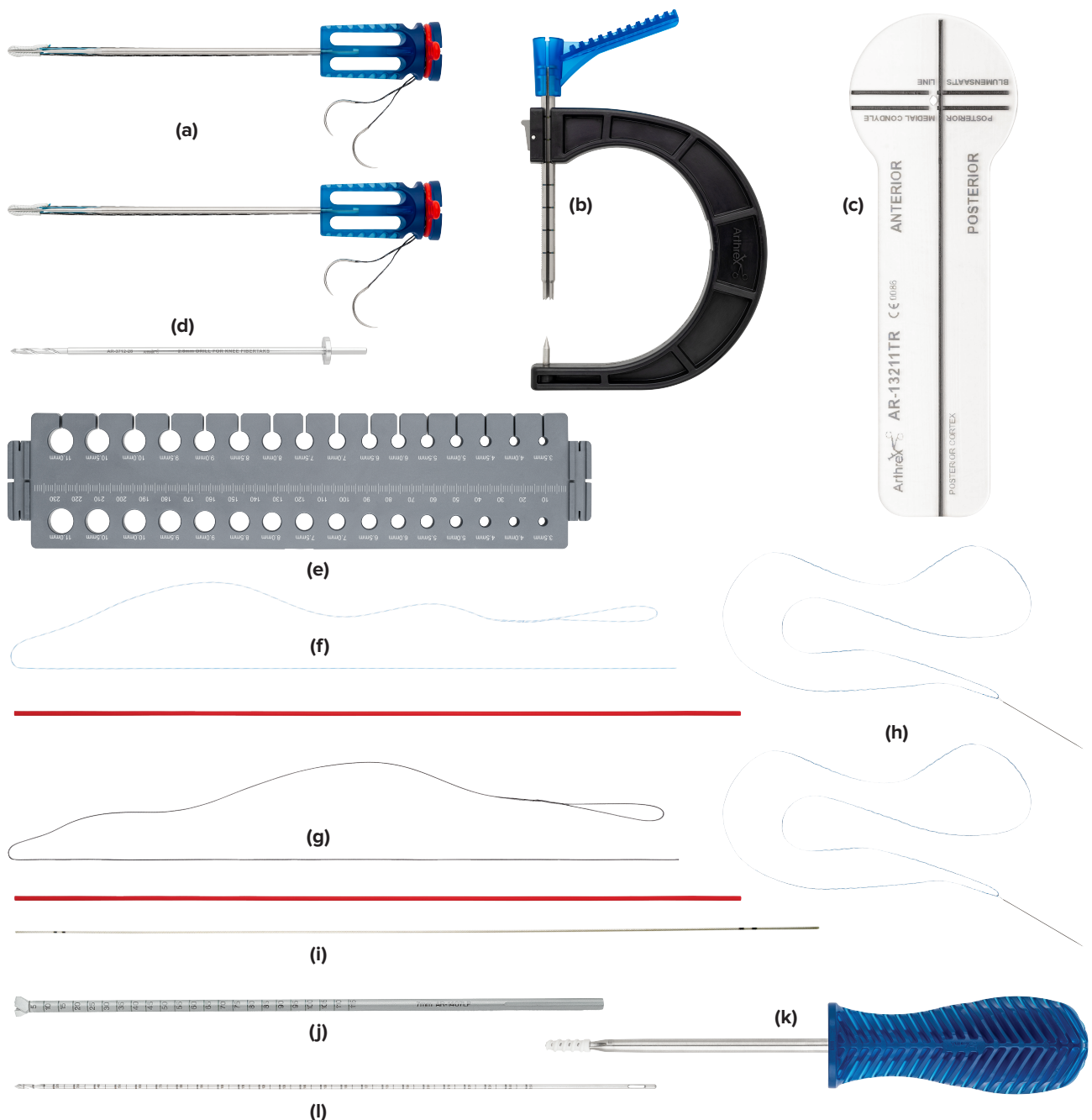
Following final fixation, the black sliding 1.3 mm SutureTape limbs can be used to augment fixation or aid in retinacular closure or imbrication as needed.

Ordering Information

MPFL Onlay Implant System, 6 mm FastThread™ Femoral Fixation (AR-1360FT-KFT)

- Hybrid Knee FiberTak® anchor, non-self-punching, qty 2 **(a)**
- Knee FiberTak ratcheting guide **(b)**
- MPFL template **(c)**
- 2.8 mm Knee FiberTak drill **(d)**
- Graft sizer / prep board **(e)**
- FiberSnare® suture, white/blue **(f)**
- FiberSnare suture, black/white **(g)**
- 0.9 mm SutureTape FiberLoop® suture, 20 in, white/blue, qty. 2 **(h)**
- Nitinol guidewire, 1.1 mm **(i)**
- 7 mm low-profile reamer **(j)**
- Biocomposite FastThread interference screw, 6 mm × 20 mm, w/ disposable FastThread trilobe driver **(k)**
- Zebra pin, 2.4 mm **(l)**

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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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