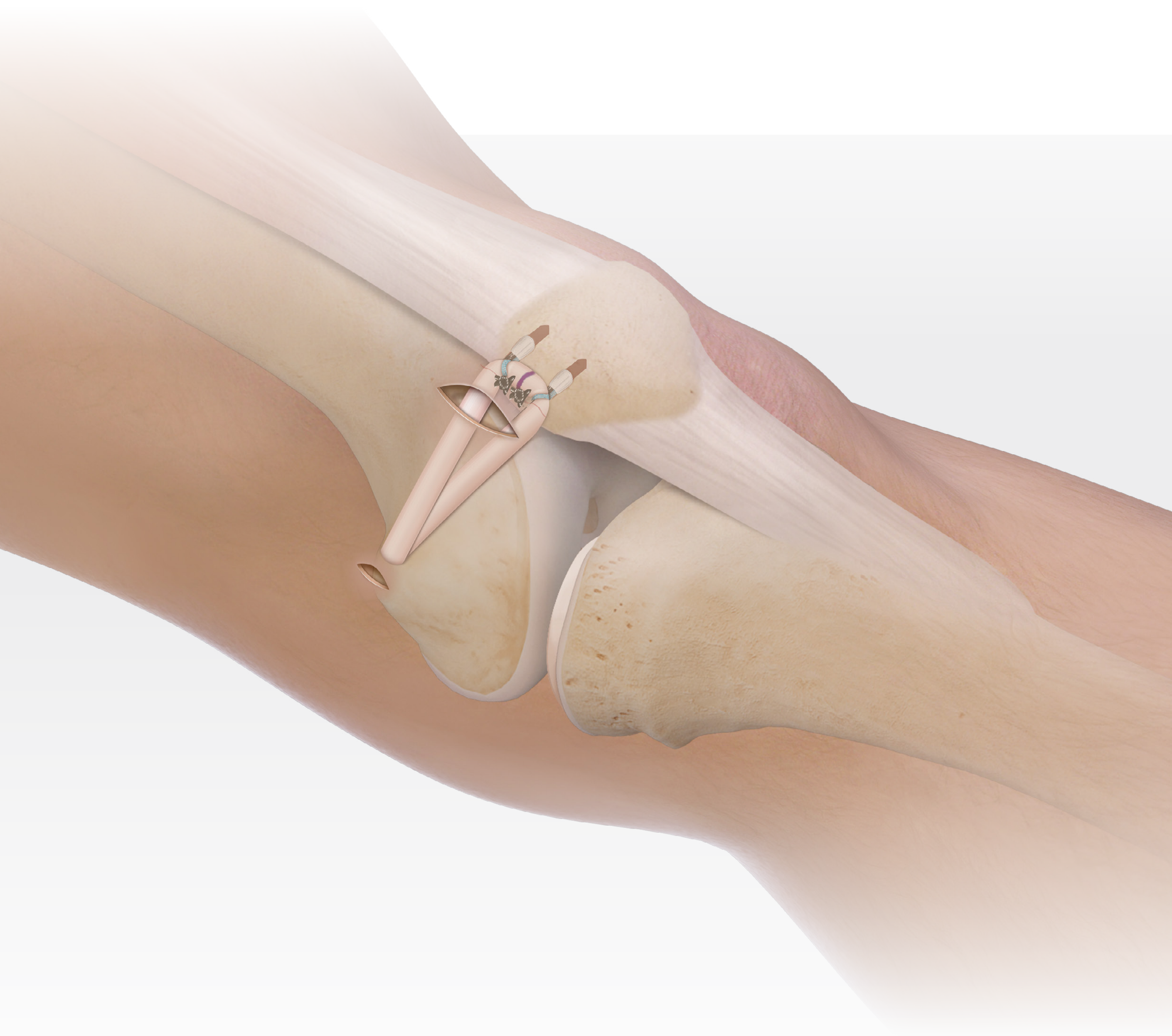
MPFL Reconstruction With Knee FiberTak® Anchors and FiberTag® TightRope® II PF Implant

Surgical Technique



Arthrex®

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 dislocation[1] 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 radiologic[5] 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.

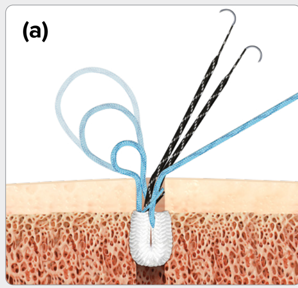
At about 20° of flexion, the patella should engage into the trochlear groove, where the lateral trochlear facet is providing the static stabilization against patellar lateralization. The trochlea provides stability up to 60° to 70° of flexion, where the patella begins engaging into the notch. In cases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

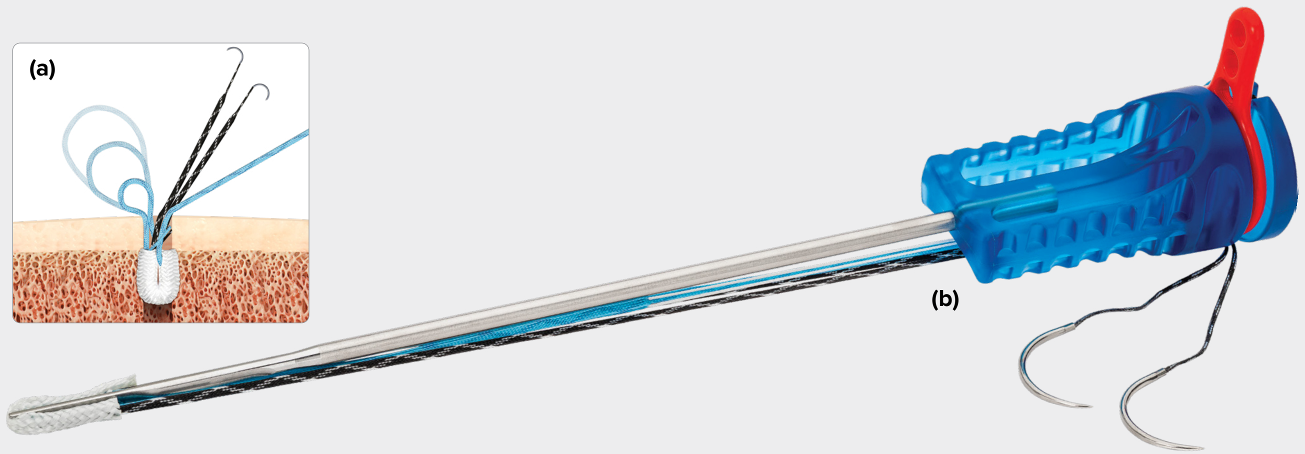
Very seldom, there are cases in which the patella does not engage the notch in greater than 70° of flexion, and instability occurs. This can happen in cases of a valgus deformity or internal rotation of the distal femur where the trochlear groove and the notch are positioned medially and the patella 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.

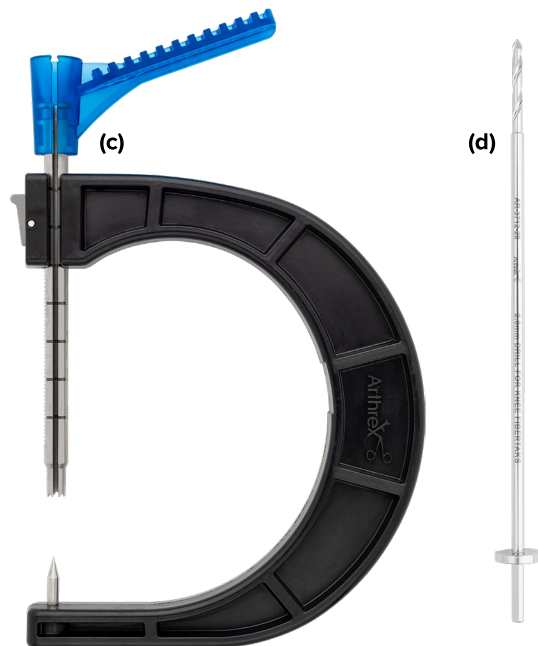
In almost all cases, the MPFL is ruptured after an acute patellar dislocation and is additionally weakened in cases of congenital trochlear dysplasia since the patella tracks improperly from early childhood. The additional stresses and tension on the medial soft-tissue complex from this maltracking can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



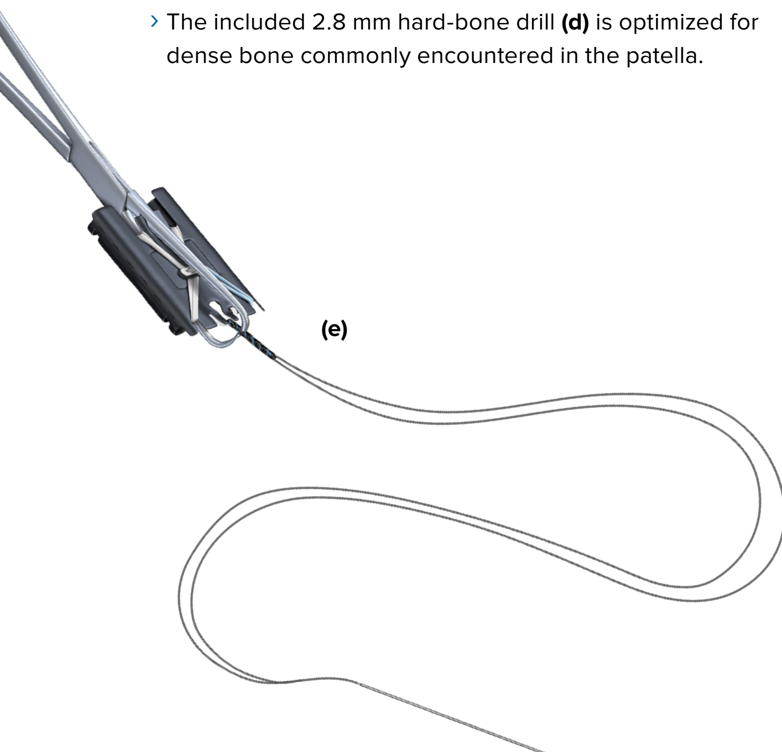


MPFL Onlay Implant System, FiberTag® TightRope® II PF Implant Femoral Fixation (AR-1360TR-KFT)

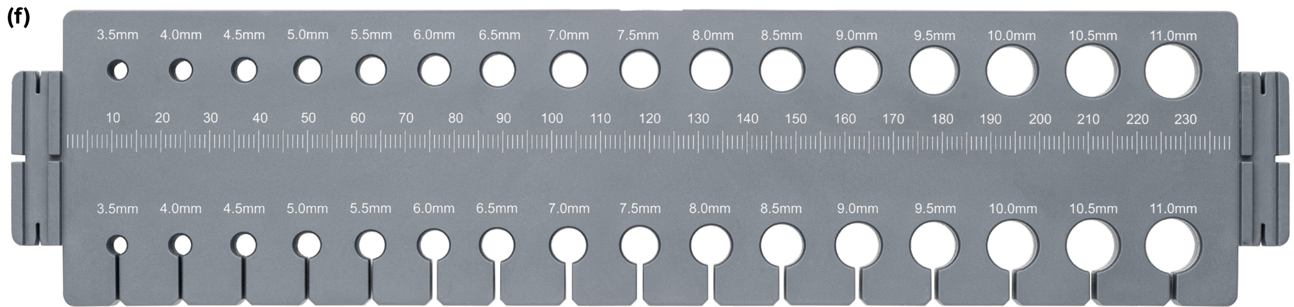


Features and Benefits

- Hybrid Knee FiberTak® anchors for patellar fixation feature 1 preconverted tensionable knotless SutureTape loop and 1 sliding 1.3 mm SutureTape with swaged needles **(a)**
- Two Hybrid Knee Fibertak anchors **(b)** are assembled on tapered, non-self-punching inserters for easier anchor implantation.
- The included Knee FiberTak ratcheting guide **(c)** stabilizes the patella during pilot hole drilling and anchor implantation, minimizing the opportunity for loss of pilot hole or trajectory.
- The drill sleeve, when removed from the C-clamp, can be used as a stand alone drill guide.
- The included 2.8 mm hard-bone drill **(d)** is optimized for dense bone commonly encountered in the patella.



- The FiberTag TightRope II PF implant **(e)** builds on the legacy of FiberTag® technology with features optimized for MPFL graft fixation, including a downsized 1.7 mm FiberTag suture, a size #0 FiberLoop® suture, and a round, tapered straight needle developed specifically for use with smaller grafts.
  - Conventional TightRope® suture configuration allows for graft tensioning from the medial side of the knee
  - 1.9 mm flat-tape TightRope braid for improved handling
  - Round, tapered straight needle for atraumatic whipstitching
  - For maximum versatility, surgeons may place the graft through the TightRope loop when the FiberTag suture is removed



- Included disposable graft sizer / prep board **(f)** can be used as a base for stripping muscle tissue from autografts as well as sizing and pretensioning 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.

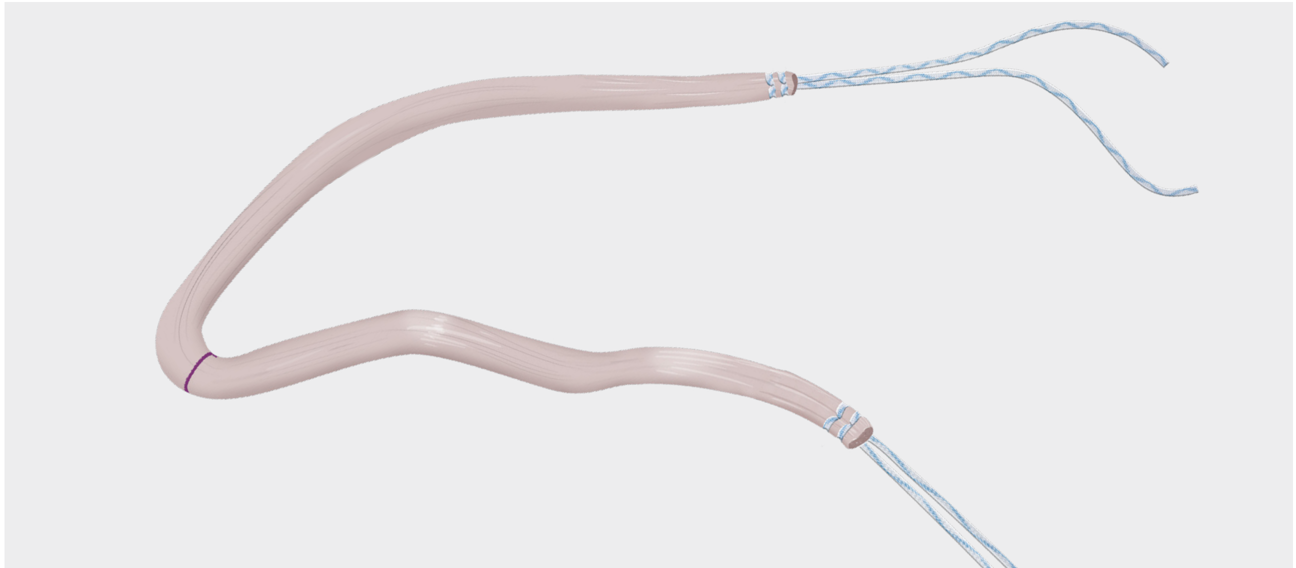
Blunt Edge:

- 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 desired

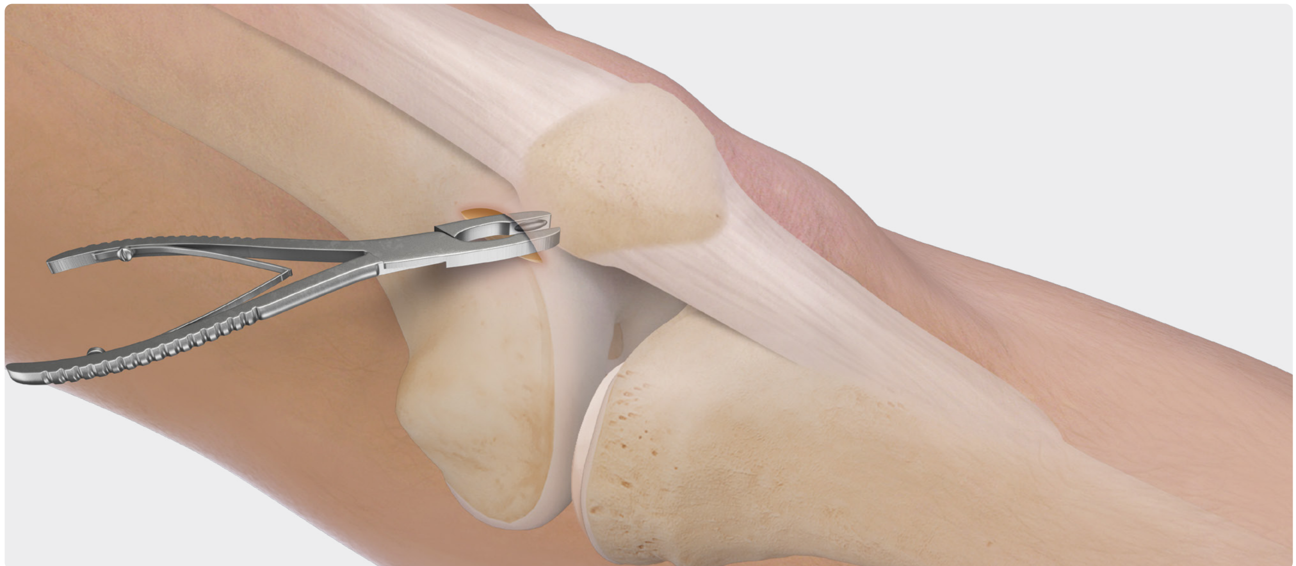
Surgical Technique



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. Place traction sutures at the ends of the graft using the 0.9 mm SutureTape FiberLoop® sutures (included in kit).

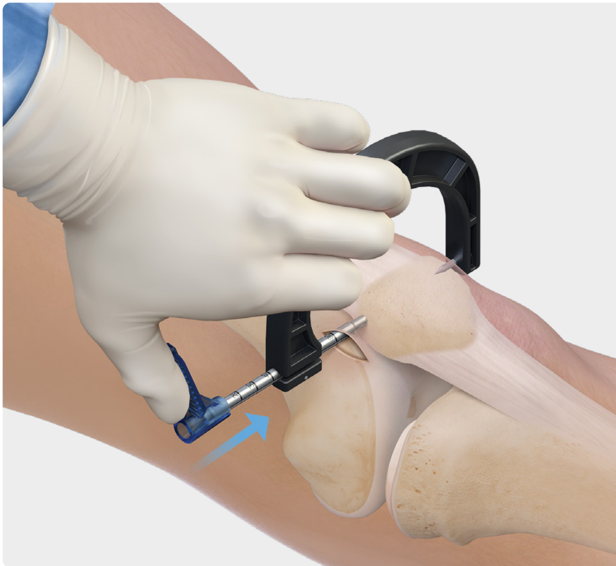
Patella Preparation



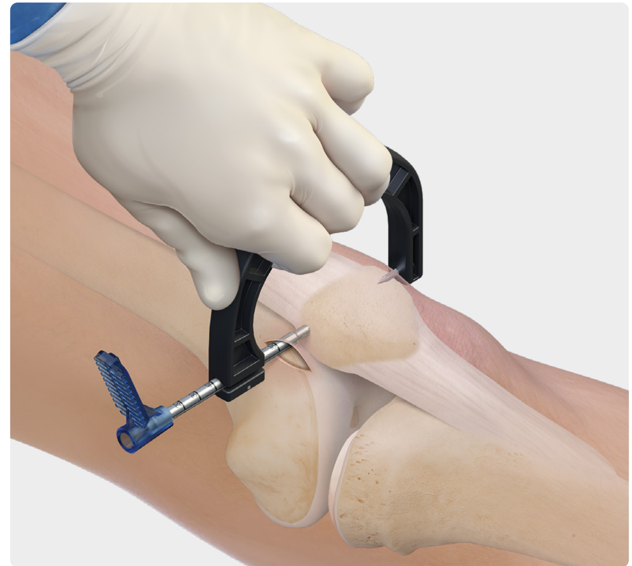
02

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.

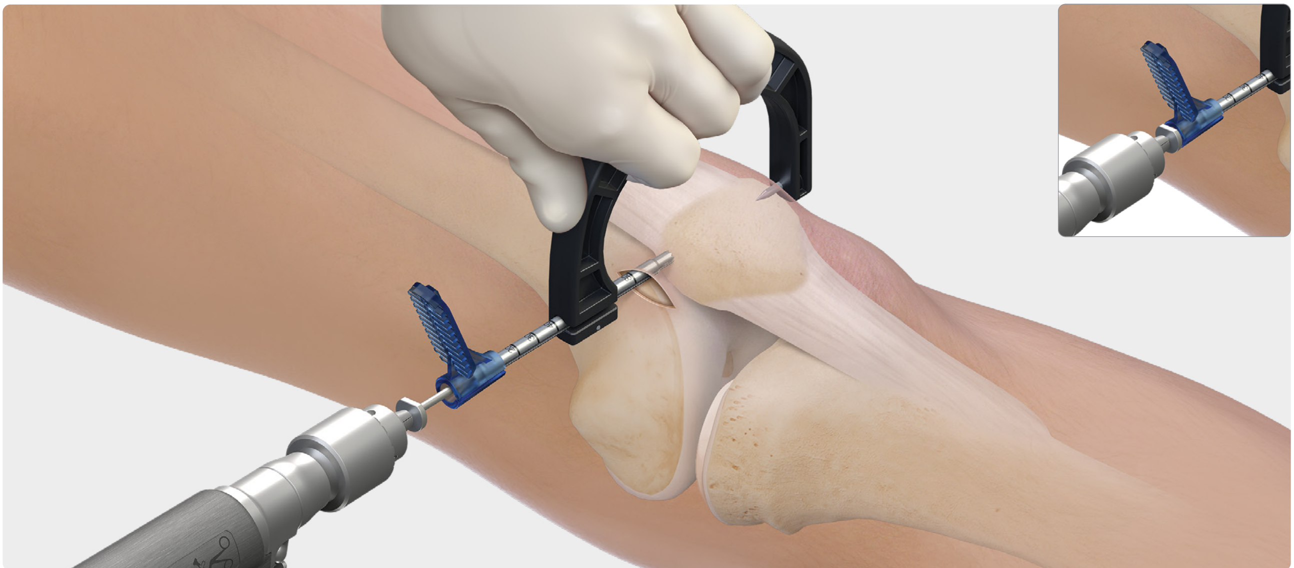


03a



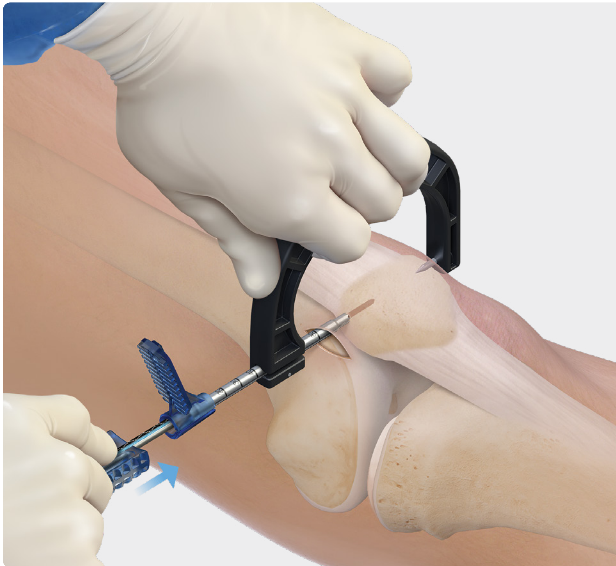
03b

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



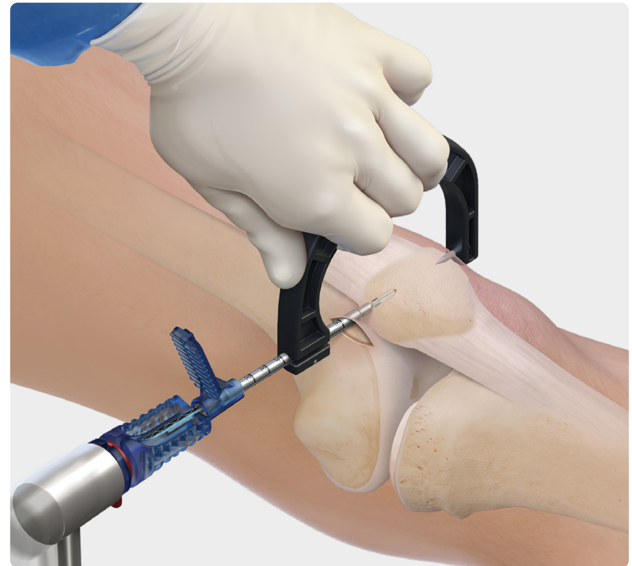
04

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.



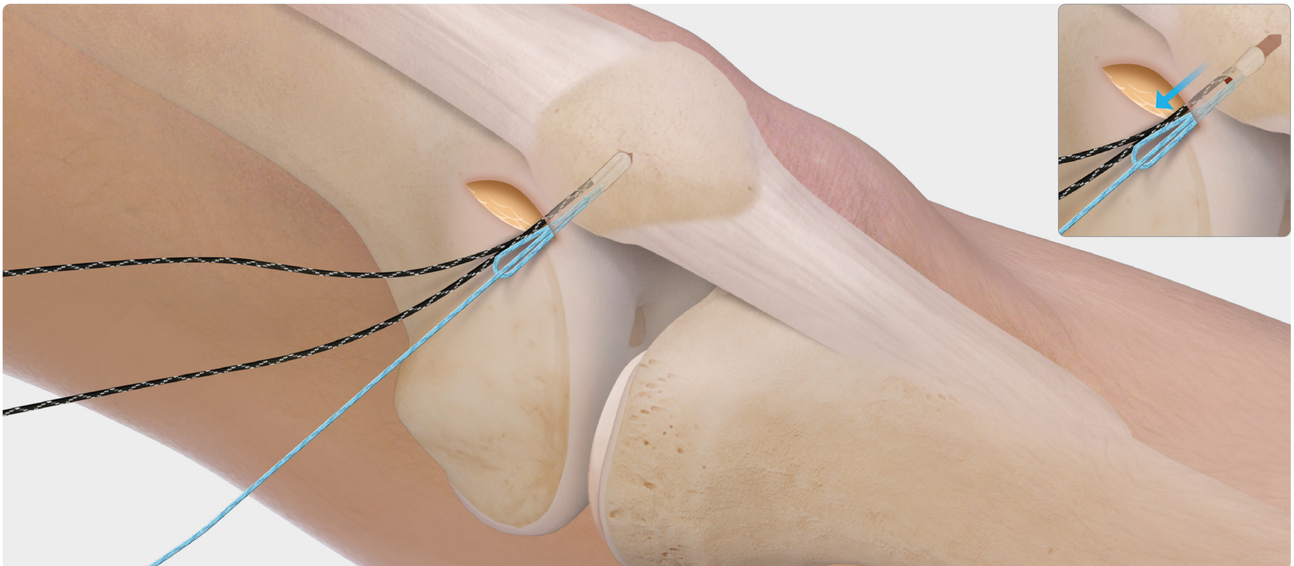
05a

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

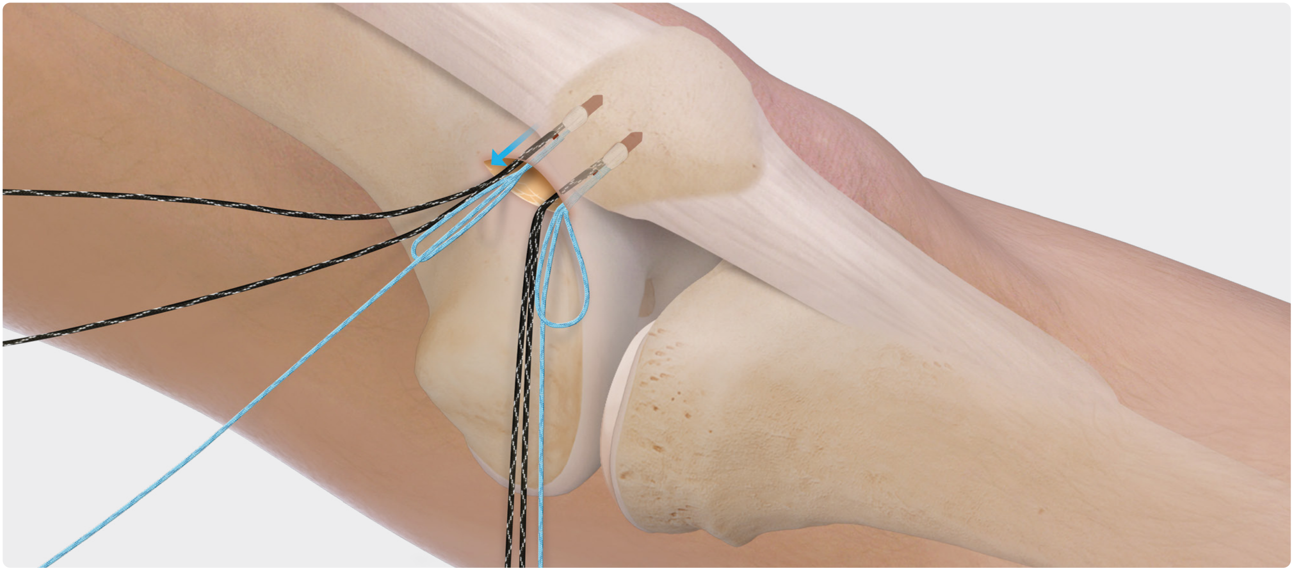
Note: Do not continue to impact the driver once the anchor inserter handle reaches the back of the guide handle. This could inadvertently advance the tip of the guide into bone, compromising the cortex and potentially impacting fixation strength.



06

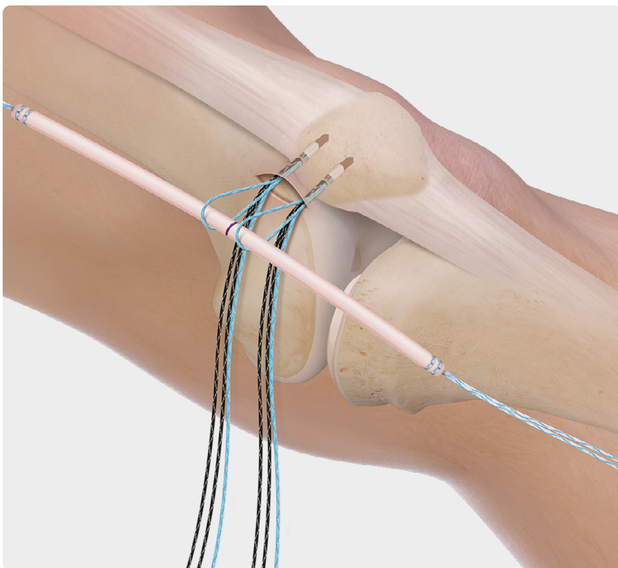
Remove the rubber suture-release tab and needle envelope from the driver handle, and remove the anchor inserter. Press the button on the black guide to disengage the ratchet and remove the guide. Gently pull the black suture limbs to set the anchor in the patella.

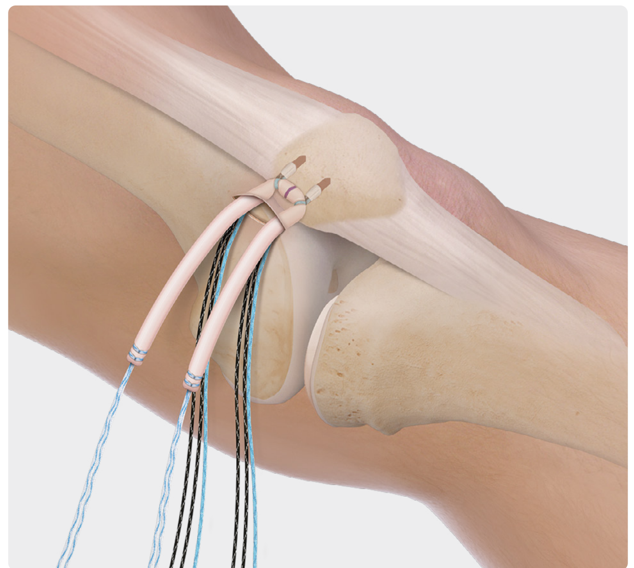
Note: Do not pull on the blue tensioning suture. Doing so will reduce the knotless loop mechanism.



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.

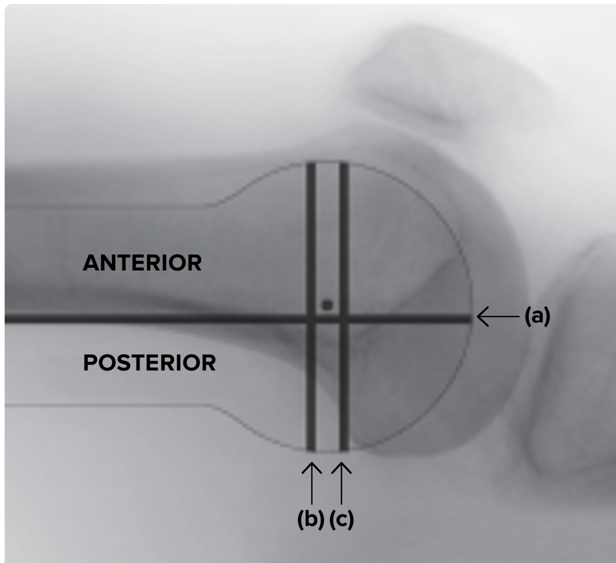




08

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.

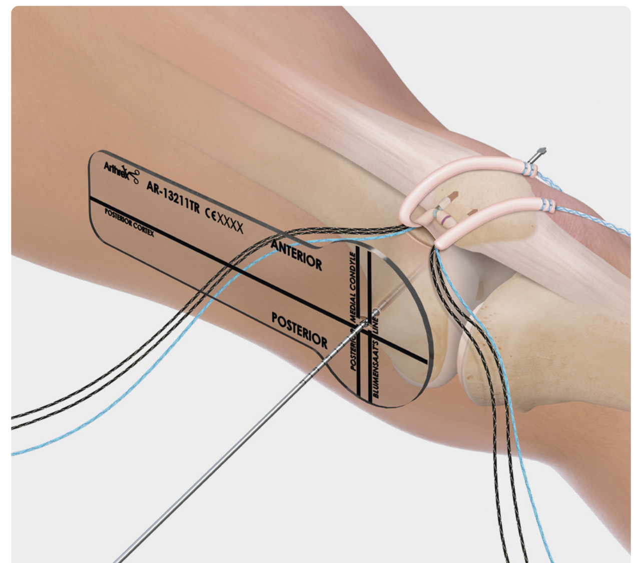
Femoral Preparation



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 guide pin.

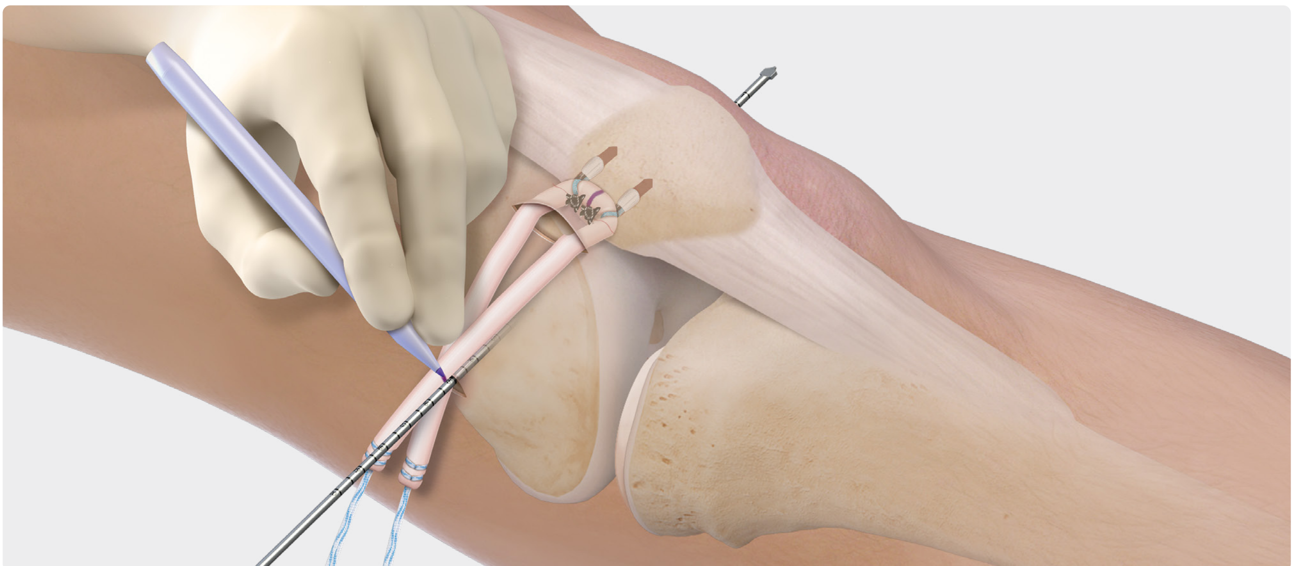
> **Note:** The insertion point is approximately **(a)** 1 mm anterior to the posterior cortex extension line, **(b)** 2.5 mm distal to the posterior articular border of the medial femoral condyle, and **(c)** proximal to the level of the posterior point of Blumensaat's line.



01b

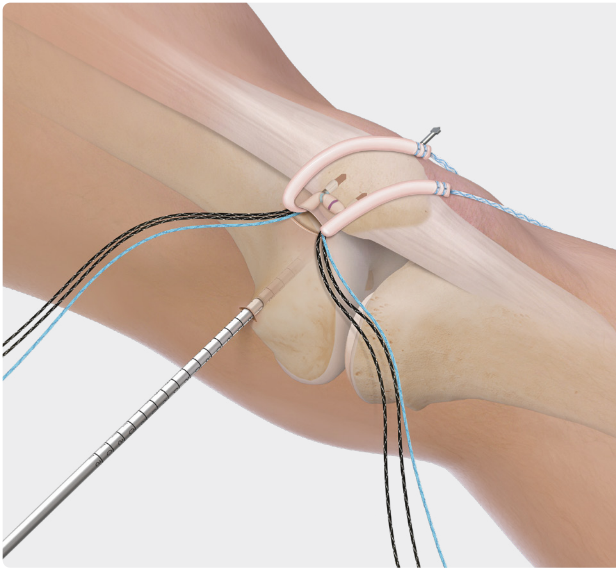
Place the template on the area of the medial epicondyle on the distal femur and, under fluoroscopic guidance, drill the 4 mm spade-tipped TightRope® pin across the femur and out through the lateral epicondyle.

> **Note:** Pull back on the TightRope pin as it exits the lateral cortex to identify intraosseous length and mark that distance on the TightRope implant. The pin should be aimed slightly proximal and anterior to avoid the intercondylar notch.



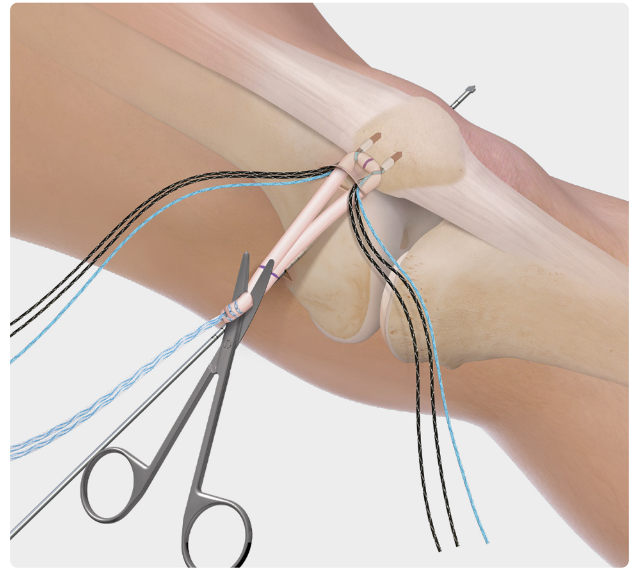
02

Before reaming a socket, the isometry of the MPFL may be provisionally evaluated. The graft is wrapped around the TightRope pin with adequate tension on the graft and the knee is cycled through the ROM and the graft limbs are marked at the appropriate length. If isometry is not adequate, change the pin location prior to reaming the socket.



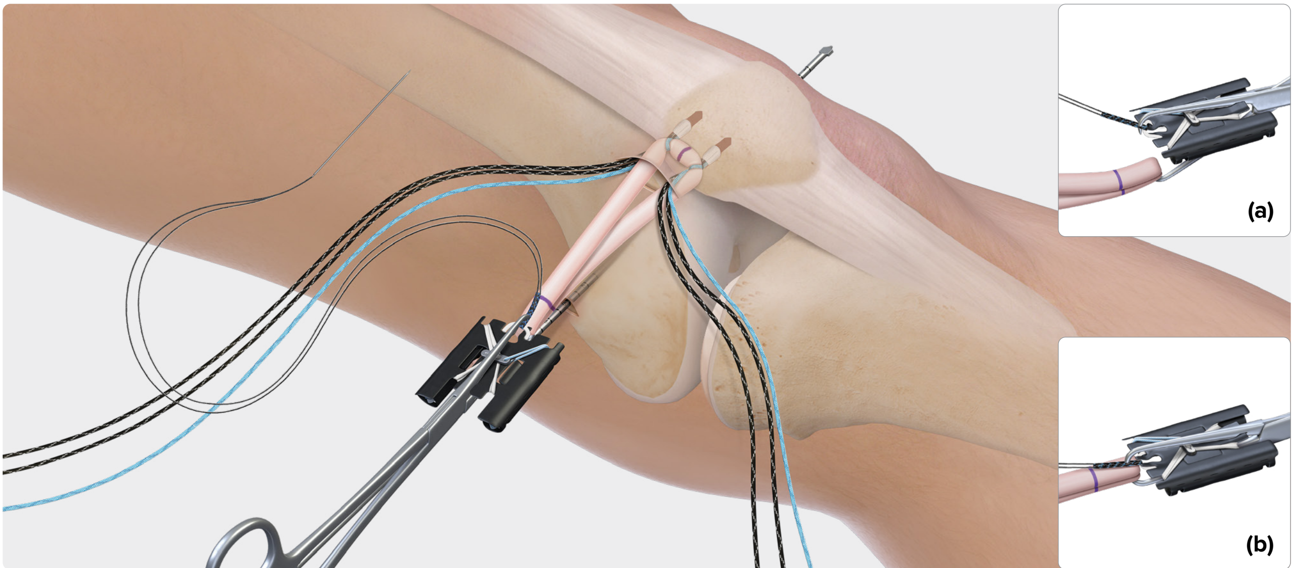
03

Use the 6 mm low-profile reamer to create a socket extending to, but not through, the far cortex. Maintain the TightRope® drill pin in the femur as it will be used to pass the graft into the femur.



04

If the graft limbs are excessively long, identify a point on the graft approximately 3 cm past the isometric length markings and trim the graft limbs, leaving two limbs of equal length.

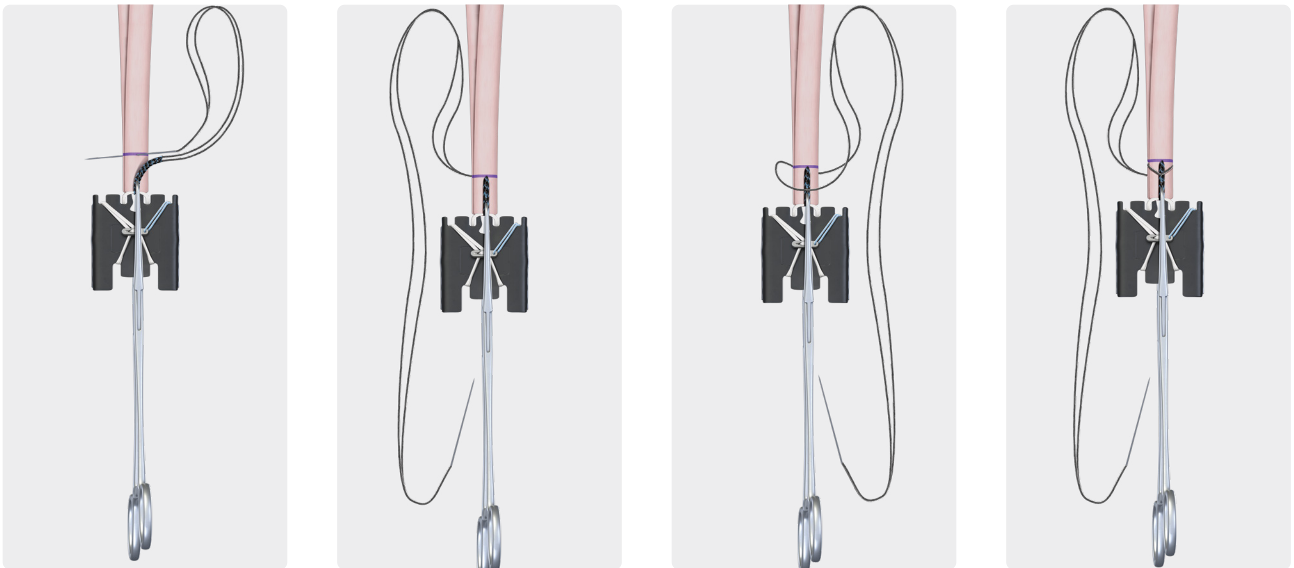


05

Remove the FiberTag® TightRope® II PF suture card from the larger packaging card. Orient the suture card with the FiberTag® suture facing the teeth of the GraftClamp instrument (AR-2386T). Then load the card into the cardholding slot of the instrument **(a)**. Use one tooth of the GraftClamp instrument to pierce the FiberTag suture **(b)**.

Note: Ensure the TightRope® implant (white loop) is not pierced by the GraftClamp instrument.

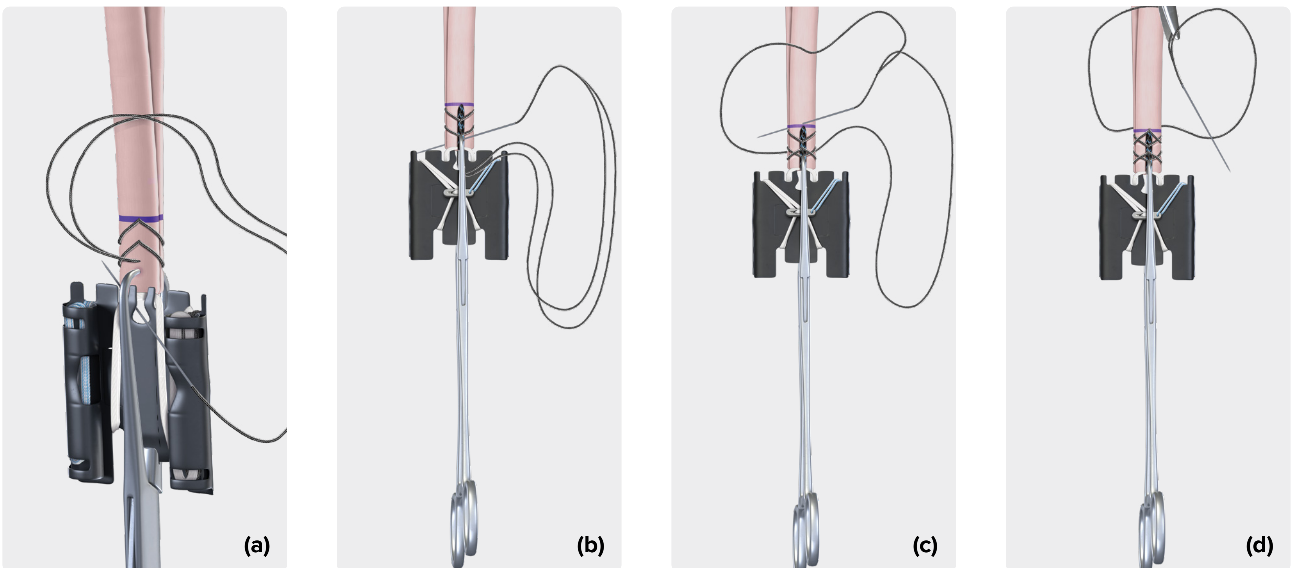
Using the GraftClamp instrument, clasp approximately 2 mm from the end of the graft limbs, being careful to ensure the tines are engaging both graft limbs. Provisionally place the FiberTag suture onto the graft to determine the appropriate positioning.



06

With the needle's initial pass through the graft, determine the position of the FiberTag® suture. This pass should occur where the FiberTag suture converts to FiberLoop® suture. Next, perform the standard SpeedWhip™ rip-stop technique, working toward the TightRope® II suture card and ensuring the FiberTag suture is captured with each needle pass.

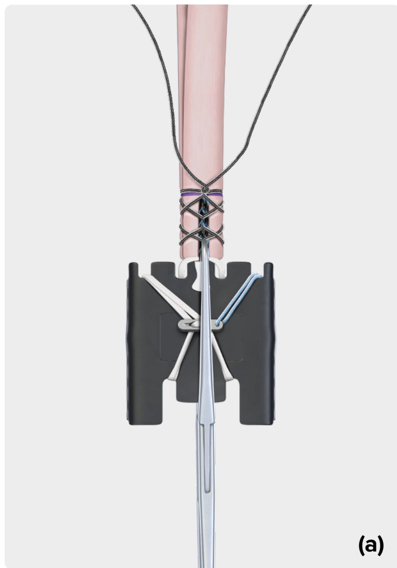
> **Note:** After passing the needle through the graft tissue, remove the slack and tension each pass by pulling on the suture rather than the needle.

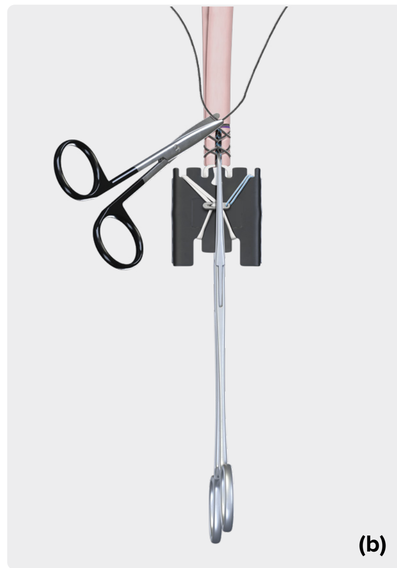


07

After placing two SpeedWhip stitches in the graft, pass the needle through the slot in the suture card, ensuring the needle passes over the TightRope implant **(a)**. Then repeat the SpeedWhip rip-stop technique with two additional passes, working away from the GraftClamp instrument and ensuring that the FiberTag suture and both graft limbs are captured with each pass **(b)**. Make a final pass at the end of the FiberTag suture **(c)**. Cut one limb of suture just below the splice of the needle **(d)**.

> **Note:** View from underside of the graft **(a)**.



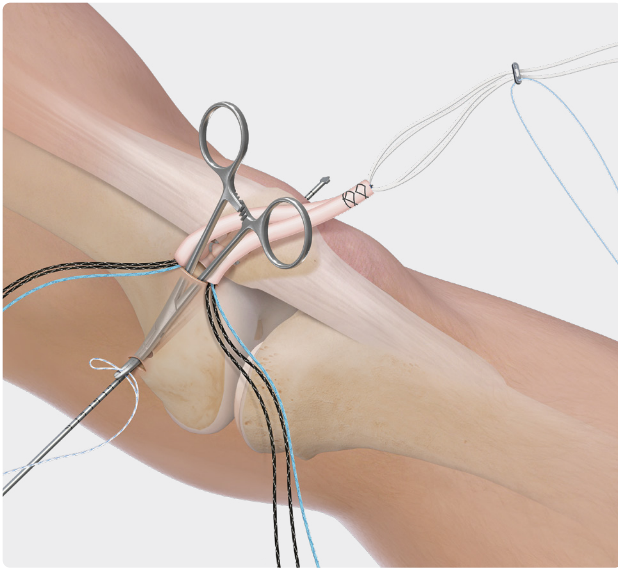


08

Wrap the suture limbs around the graft and tie the knot to secure the construct **(a)**. Cut the suture limb without the needle just above the knot **(b)**. Pierce the needle through the graft on the knot side **(c)**. Pull the needle and suture completely through the graft and apply tension to bury the knot in the graft. Cut the suture limb flush to the graft.

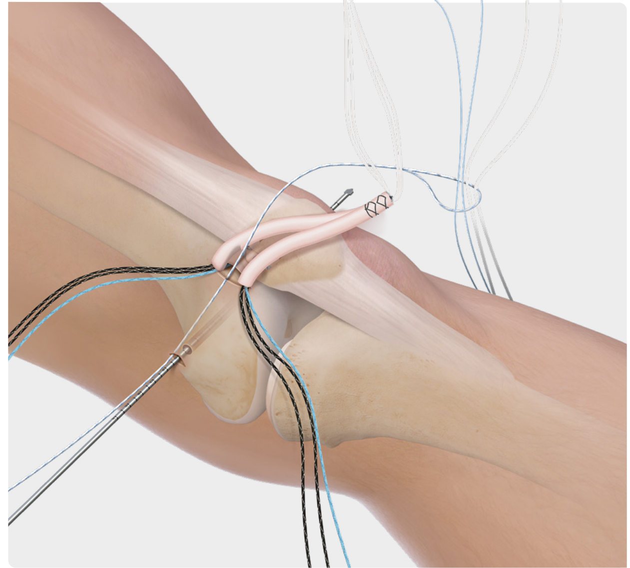
09

Remove the FiberTag® TightRope® suture card from the GraftClamp instrument. Unwrap the sutures from the suture-card cleat and remove the TightRope implant loops from the retaining slots in the card.



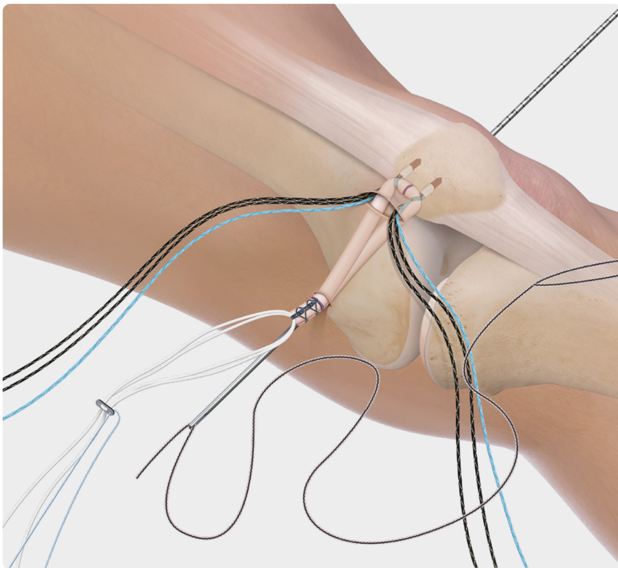
10a

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 out of the femoral socket incision.

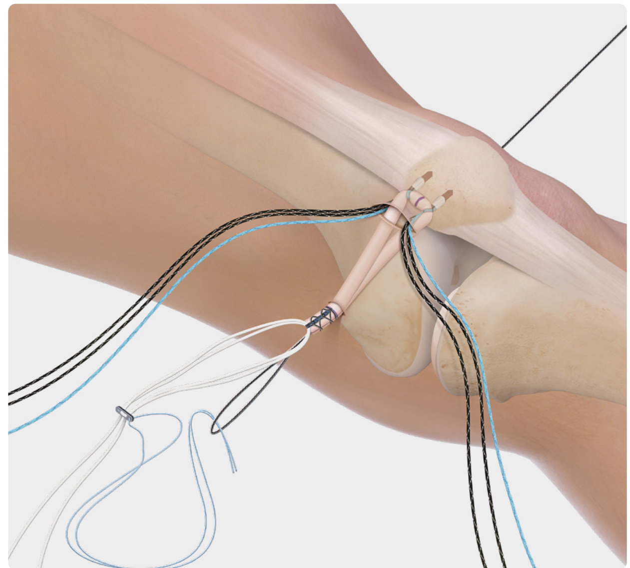


10b

Using the hemostat, pass the looped end of a FiberSnare® suture back to the patellar insertion area. Load the blue passing sutures and white tensioning tails of the FiberTag® TightRope® II PF implant 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 TightRope implant and graft out of the medial incision and pull the graft down to the medial epicondyle to ensure slack has been removed.



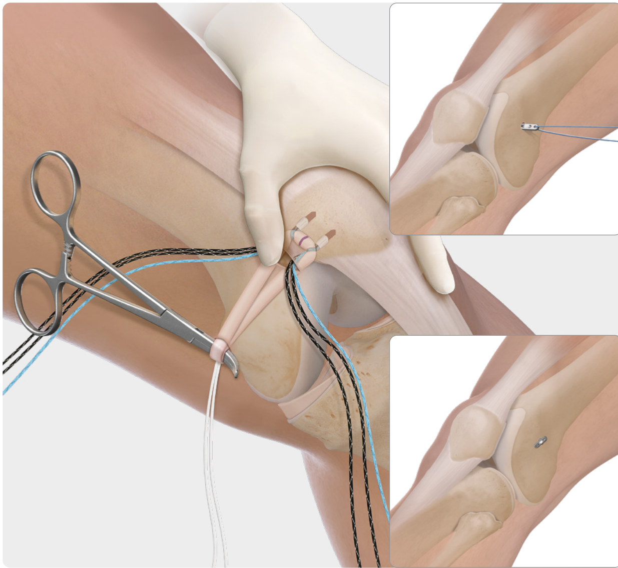
11a



11b

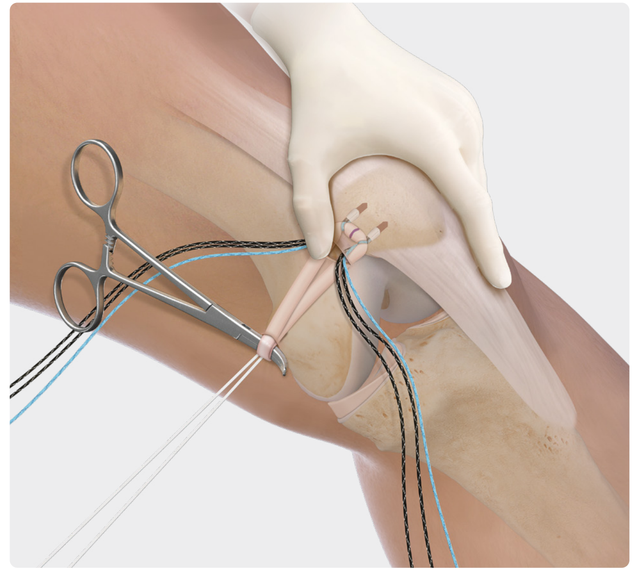
Load the single end of a FiberSnare suture in the eyelet of the TightRope pin and shuttle it across the femur, leaving the looped end out of the socket on the medial side. Load the blue passing sutures of the FiberTag TightRope II PF implant in the loop of the FiberSnare suture and deliver them out of the lateral femur.

> **Note:** Lengthening the loops of the TightRope implant prior to shuttling can ease passage and confirmation of button deployment on the lateral femoral cortex.



12

Using a curved hemostat under both graft limbs as a pulley to manage countertension, pull the blue TightRope® passing suture from the lateral side to deliver the button through the lateral femoral cortex.

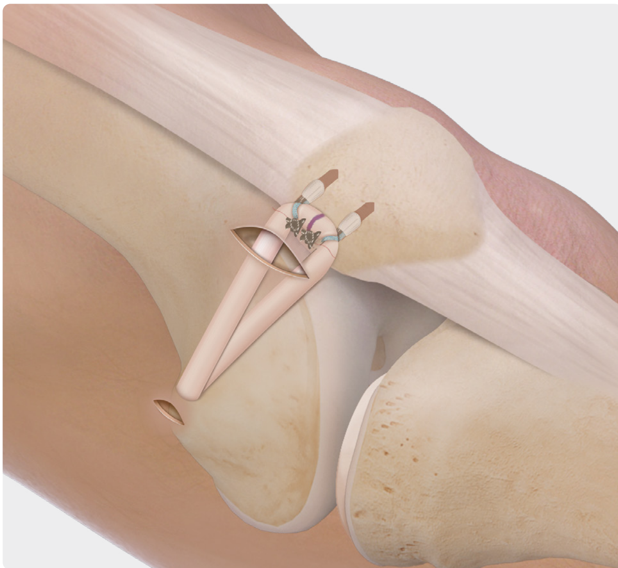


13

With the knee at 30° of flexion, manually fixate the lateral patellar facet flush with the lateral femoral condyle. Final fixation can be accomplished by pulling the TightRope implant's tightening sutures on the medial side, alternating tension on each strand.

It is crucial that the tensioning sutures are not overtightened while holding the patella in the middle of the trochlear groove. Once the construct is tensioned completely, the TightRope implant cannot be loosened. Overtightening the TightRope implant could result in overconstraint of the patella to the medial side.

Note: Evaluate the tracking and tension of the patella throughout the knee ROM. If more tension is required, continue to tension the TightRope implant until adequate fixation is achieved. If the patella is overconstrained, the TightRope implant can be cut out and replaced with a TightRope II BTB implant (AR-1588BTB-2J) or a BioComposite FastThread™ interference screw (AR-4020C-06) can be used for final femoral fixation.



14

Final fixation.

Ordering Information

MPFL Onlay Implant System, FiberTag® TightRope® II PF Implant Femoral Fixation (AR-1360TR-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)**
- 6 mm low-profile reamer **(i)**
- FiberTag TightRope II PF implant **(j)**
- TightRope drill pin, 4 mm **(k)**

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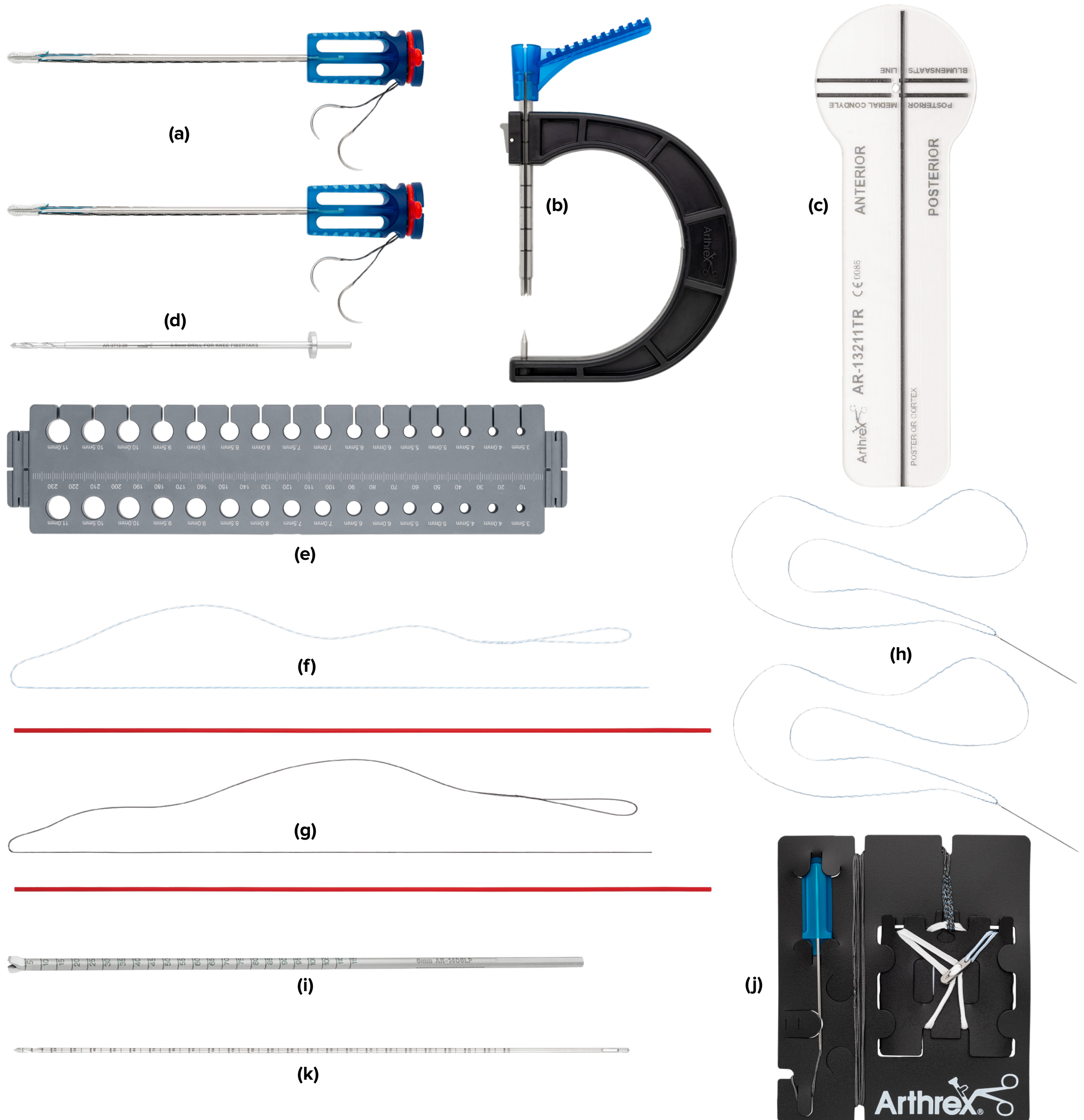

References

1. Desio SM, Burks RT, Bachus KN. Soft tissue restraints to lateral patellar translation in the human knee. *Am J Sports Med.* 1998;26(1):59-65. doi:10.1177/03635465980260012701
2. Nomura E, Inoue M. Surgical technique and rationale for medial patellofemoral ligament reconstruction for recurrent patellar dislocation. *Arthroscopy.* 2003;19(5):E47. doi:10.1053/jars.2003.50167
3. Amis AA, Firer P, Mountney J, Senavongse W, Thomas NP. Anatomy and biomechanics of the medial patellofemoral ligament. *Knee*. 2003;10(3):215-220. doi:10.1016/s0968-0160(03)00006-1
4. Schöttle P, Schmeling A, Romero J, Weiler A. Anatomical reconstruction of the medial patellofemoral ligament using a free gracilis autograft. *Arch Orthop Trauma Surg*. 2009;129(3):305-309. doi:10.1007/s00402-008-0712-9
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
6. Schöttle PB, Hensler D, Imhoff AB. Anatomical double-bundle MPFL reconstruction with an aperture fixation. *Knee Surg Sports Traumatol Arthrosc*. 2010;18(2):147-151. doi:10.1007/s00167-009-0868-z
7. Smith BL, Bedi A, Hauck OL, Wijdicks CA, Riboh JC. All-suture anchor onlay fixation for medial patellofemoral ligament reconstruction: a biomechanical comparison of fixation constructs. *Orthop J Sports Med.* 2024;12(11):23259671241294011. doi:10.1177/23259671241294011
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

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

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