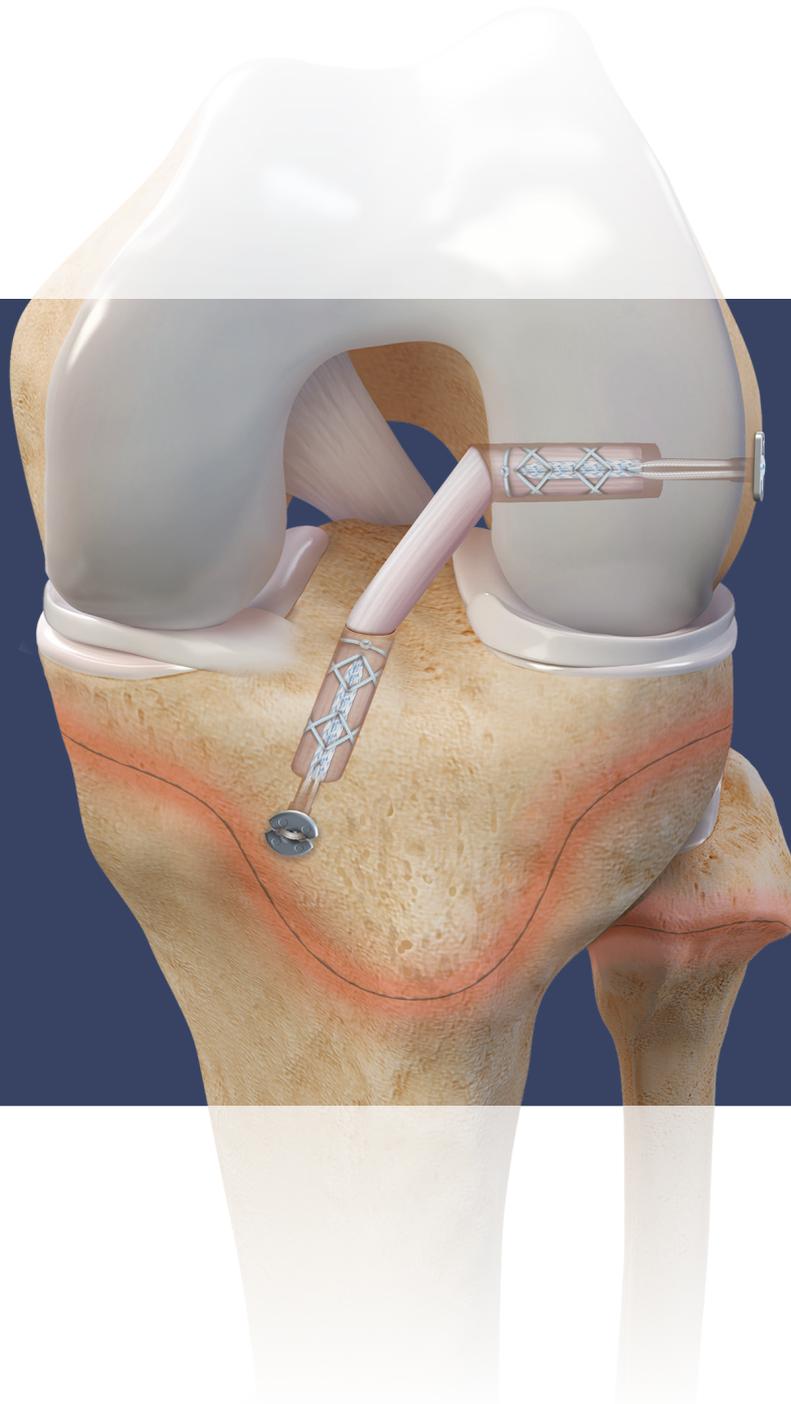


QuadLink™ All-Epiphyseal, All-Inside ACL Reconstruction Using the FiberTag® TightRope® Implant

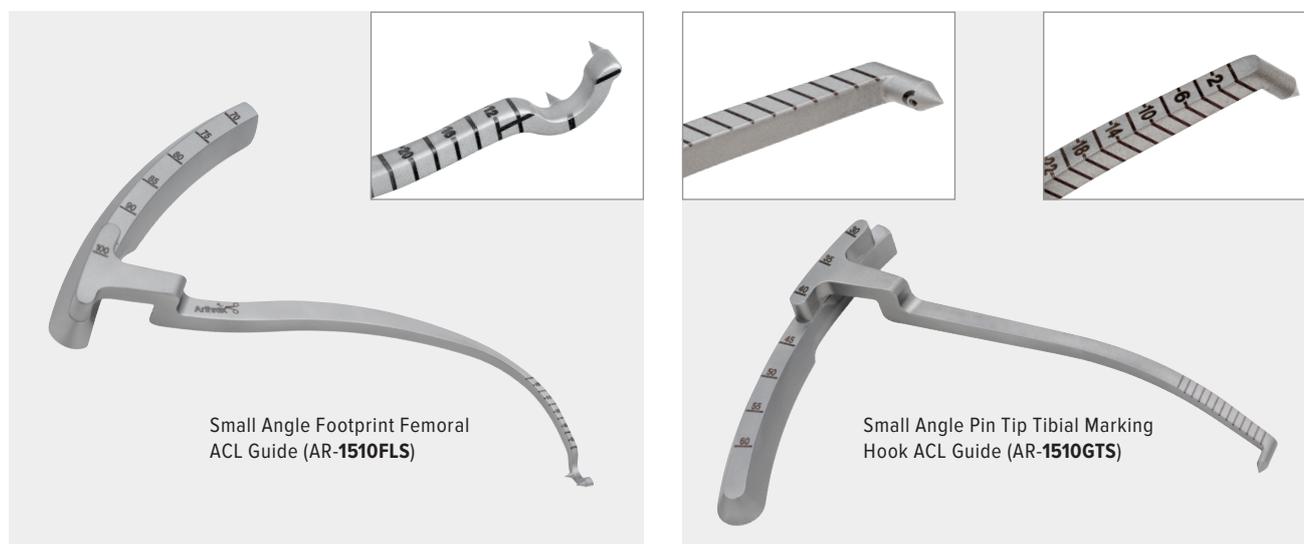
Surgical Technique



Arthrex® 

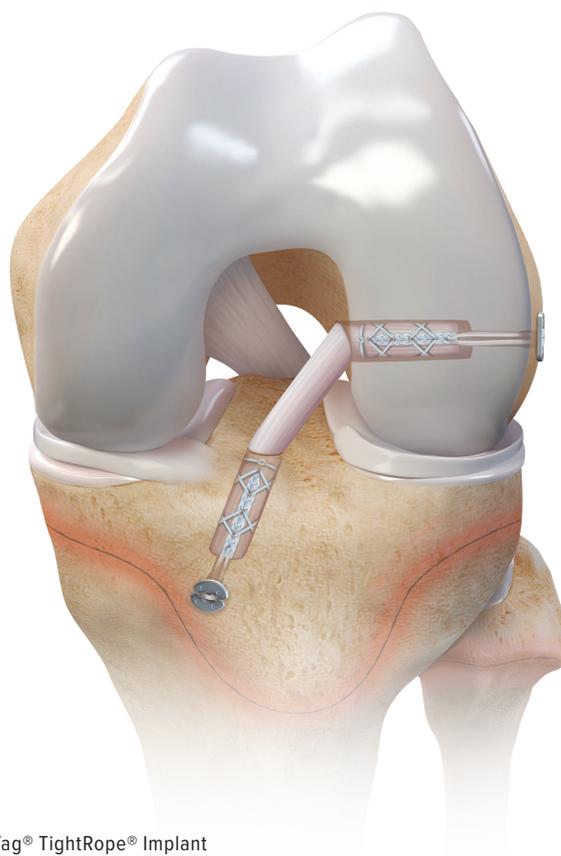
QuadLink™ All-Epiphyseal, All-Inside ACL Reconstruction Using the FiberTag® TightRope® Implant

Introduction



Staying true to the RetroConstruction™ product line, these unique small angle marking hooks allow surgeons to perform the most anatomic, minimally invasive, and reproducible all-inside, all-epiphyseal ACL reconstruction using the QuadLink technique in skeletally immature patients.

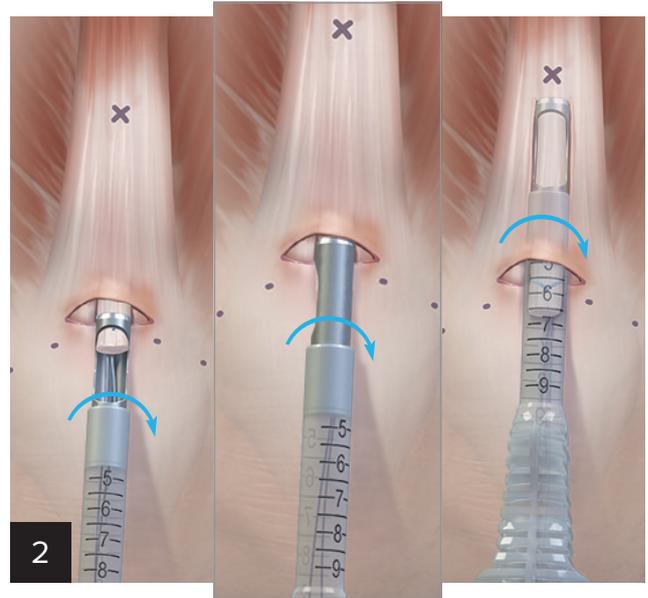
- **Anatomic:** Independent tibial and femoral socket preparation with FlipCutter® III drill facilitates unconstrained placement of the ACL graft within the epiphyses, while avoiding the physis. Femoral small angle guides are available either right (AR-1510FRS) or left (AR-1510FLS).
- **Minimally Invasive:** Quadriceps harvest decreases morbidity and loss of strength.¹ Socket preparation with the FlipCutter III drill limits soft-tissue dissection and preserves bone and periosteum.
- **Reproducible:** The GraftPro® workstation simplifies graft preparation. The tapered graft and adjustable femoral and tibial ACL TightRope buttons facilitate graft passing, fine tuning of graft depth, and graft tensioning from the femoral and tibial sides.



Graft Harvest



Use a FiberLoop® SutureTape or FiberLoop suture to place 2 SpeedWhip™ sutures 1 cm from the end of the graft. This suture functions as a tagging suture and is used to maintain tension on the graft during tendon harvesting. Use the weight of the FiberLoop needle to pull sutures through the cannulation of the QuadPro™ tendon harvester. With the knee held between 45° and 90° of flexion, keep steady tension and advance the QuadPro harvester up to the tendon.



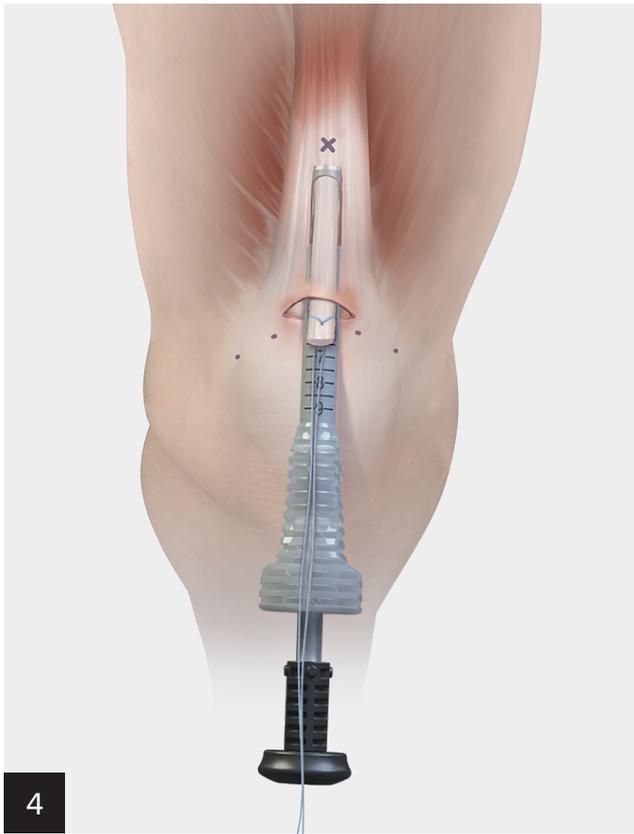
Pull the tendon into the tip of the harvester, ensuring the tagging suture is not cut by the tip of the harvester. Keep steady tension on the suture and begin rotating the QuadPro harvester in one direction using slow quarter-turn rotations while advancing up the tendon, directing the harvester toward the proximal mark on the skin.

Note: Compared to a pushing technique, rotating the harvester during the stripping process allows the device to advance with greater ease.

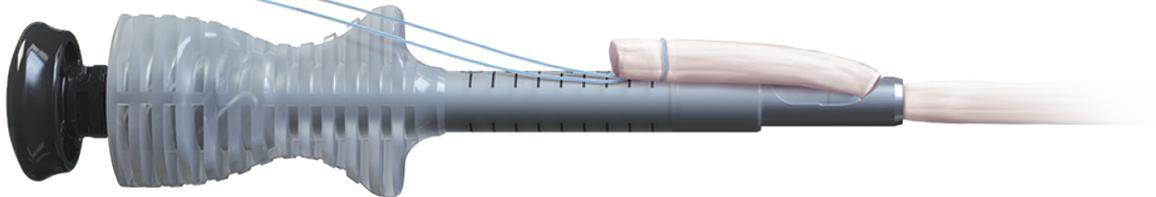
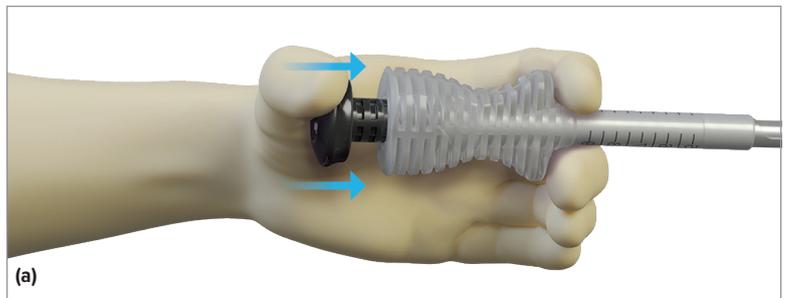
Graft Amputation



Once the desired graft length has been stripped, withdraw the QuadPro tendon harvester from the incision, and retrieve the graft through the graft amputation window by grasping the tagging sutures.



Advance the QuadPro™ tendon harvester back into the incision. When the appropriate graft length is reached, insert the push rod into the harvester. Keep tension on the tagging suture while maintaining the position of the harvester.



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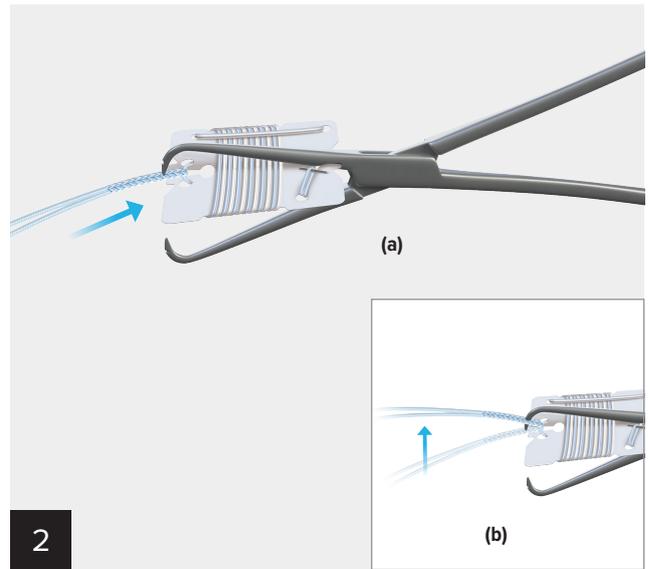
Advance the push rod forward to amputate the graft. Deploying the push rod into the handle using a syringe-type motion will allow for an easy amputation (a).

Note: During graft amputation, it is important to maintain visualization of the harvested length to ensure the graft is not cut short.

Graft Prep

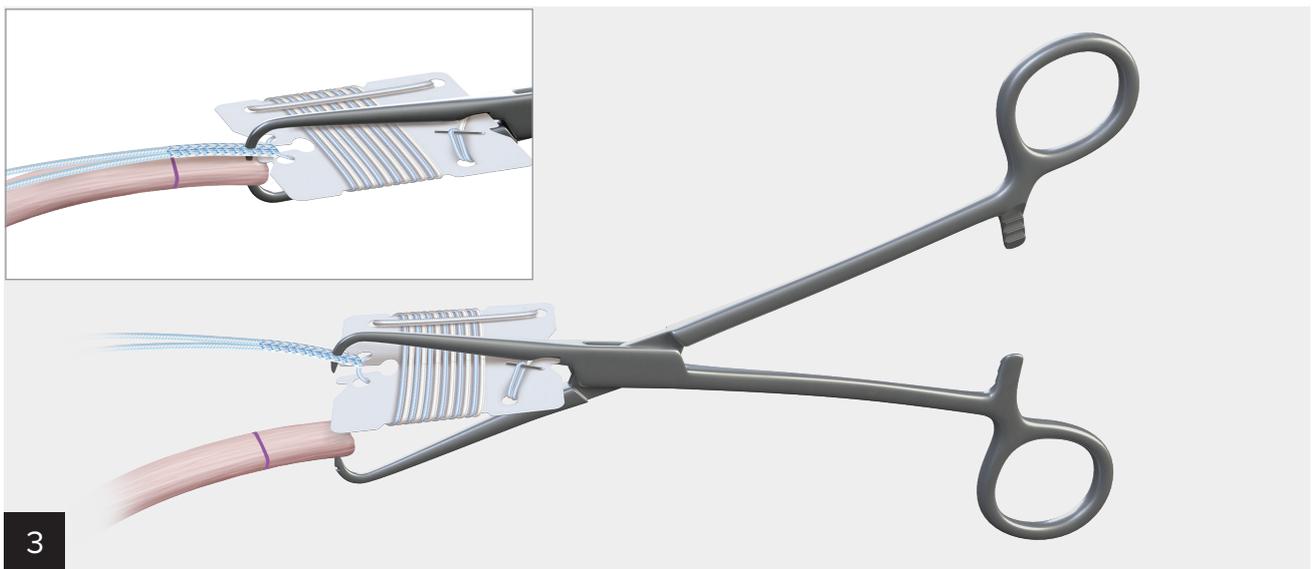


Mark the tendon at 20 mm from the end of usable graft.

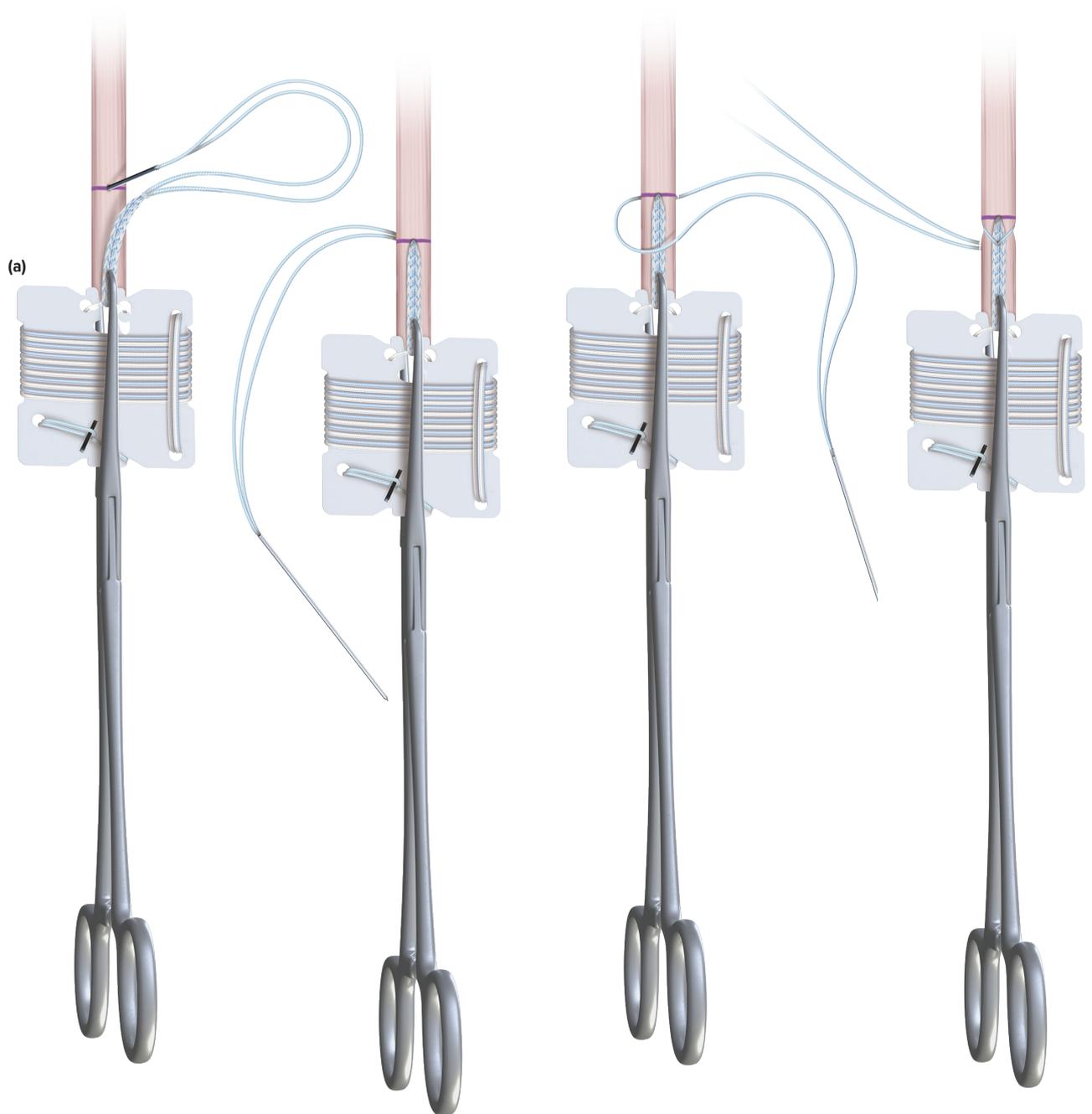


Remove the TightRope® suture card from the larger packaging card. Orient the suture card with the FiberTag® suture facing the teeth of the GraftClamp instrument (AR-2386T). Then load the card into the card-holding slot of the instrument **(a)**. Use one tooth of the GraftClamp instrument to pierce the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

Note: Ensure the TightRope implant is not pierced by the GraftClamp instrument.



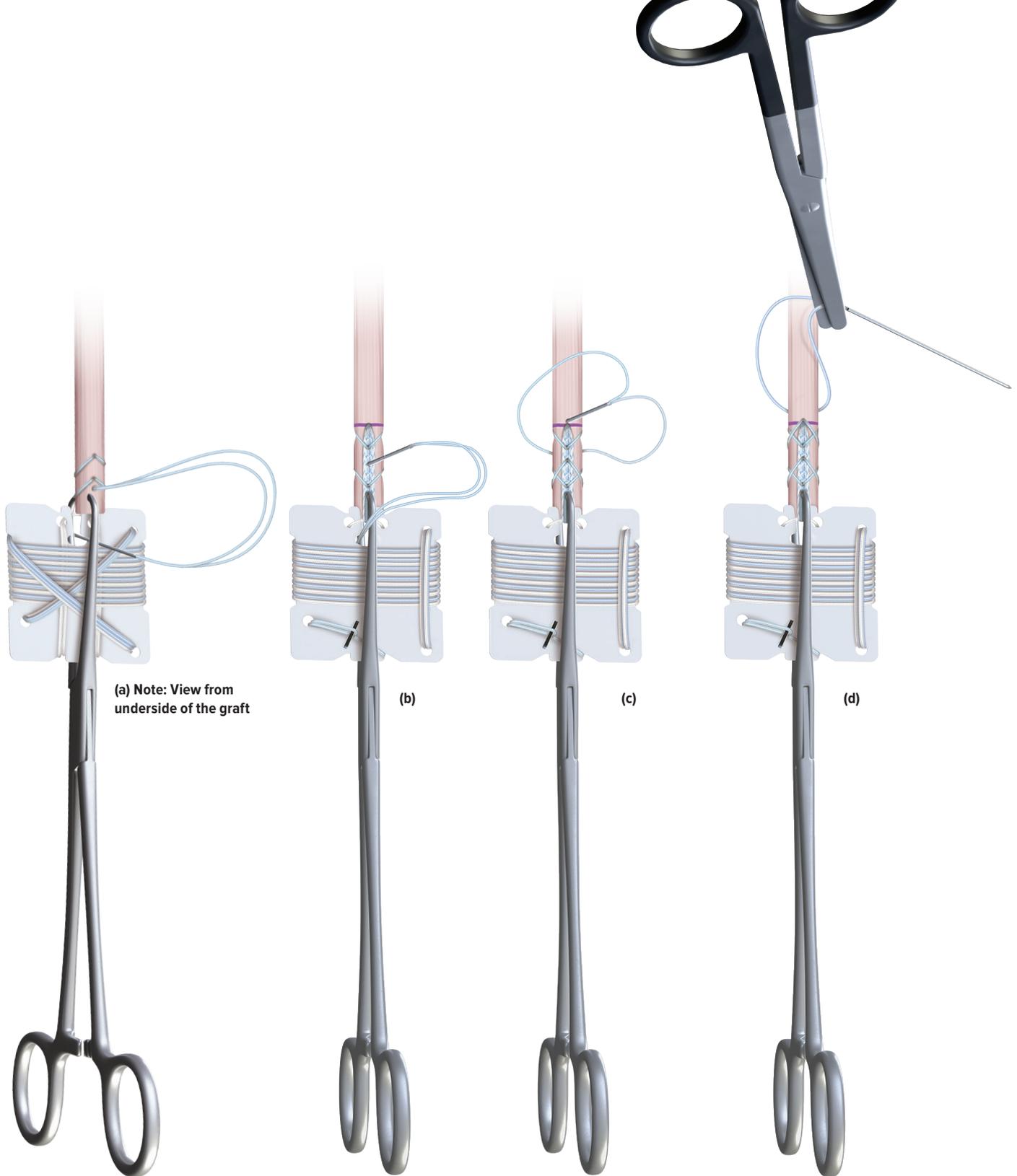
Clamp the GraftClamp instrument approximately 2 mm from the end of the graft. Provisionally place the FiberTag suture on the graft to determine the appropriate positioning.



4

Determine the position of the FiberTag® suture using the initial needle pass through the graft **(a)**. This pass should occur where the FiberTag suture converts to FiberLoop® suture. After this initial pass through the graft, perform the standard SpeedWhip™ rip-stop technique, working toward the TightRope® implant and ensuring the FiberTag suture is captured with each needle pass.

Note: Perform two passes, making sure each suture is pulled taut following each pass through the tendon.

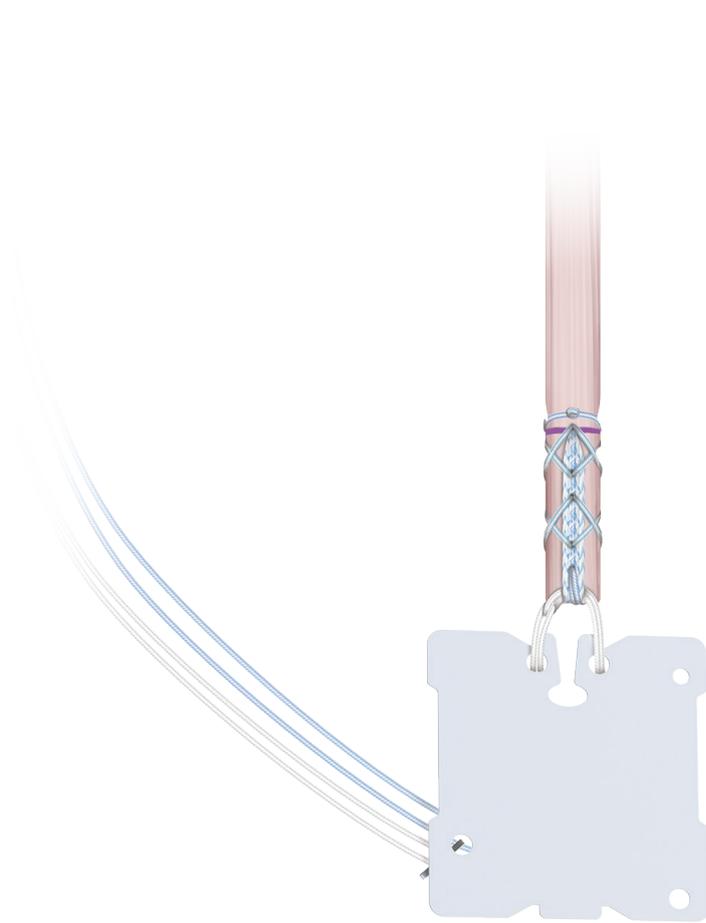


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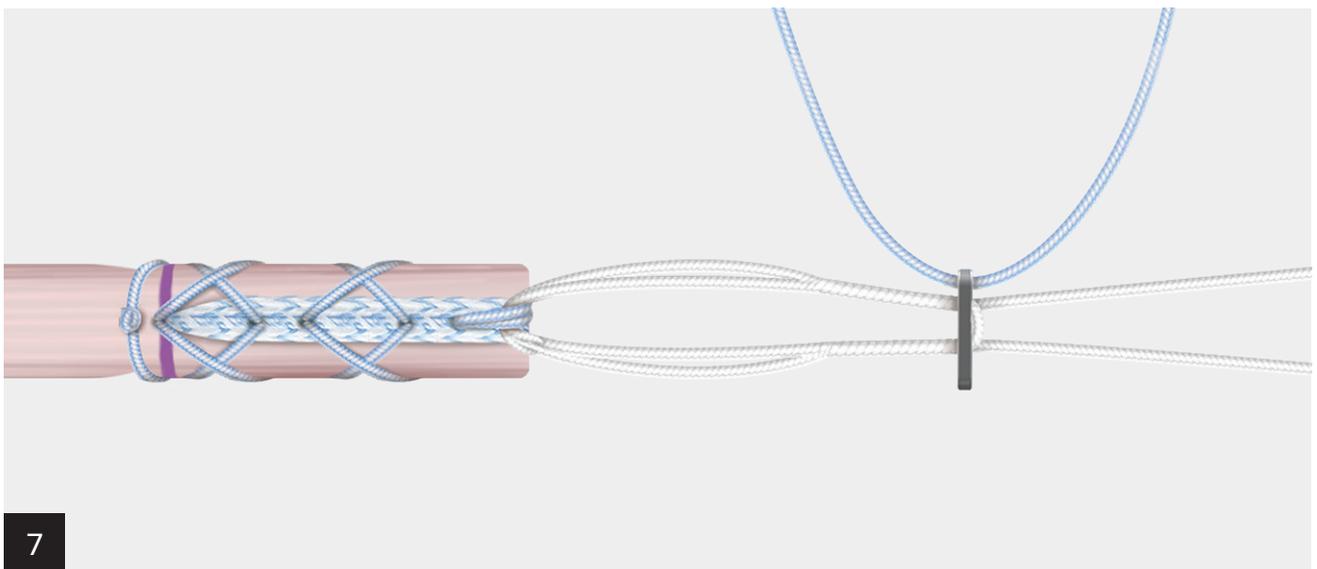
After placing 2 SpeedWhip™ stitches in the graft, pass the needle through the slot in the suture card, ensuring the needle passes over the TightRope® implant **(a)**. Then repeat the SpeedWhip rip-stop technique in two additional passes, working away from the GraftClamp and ensuring that the FiberTag® suture is 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)**. Wrap the suture limbs around the graft and tie the knot to secure the construct using a buried knot-stack technique and cut the suture flush.



6

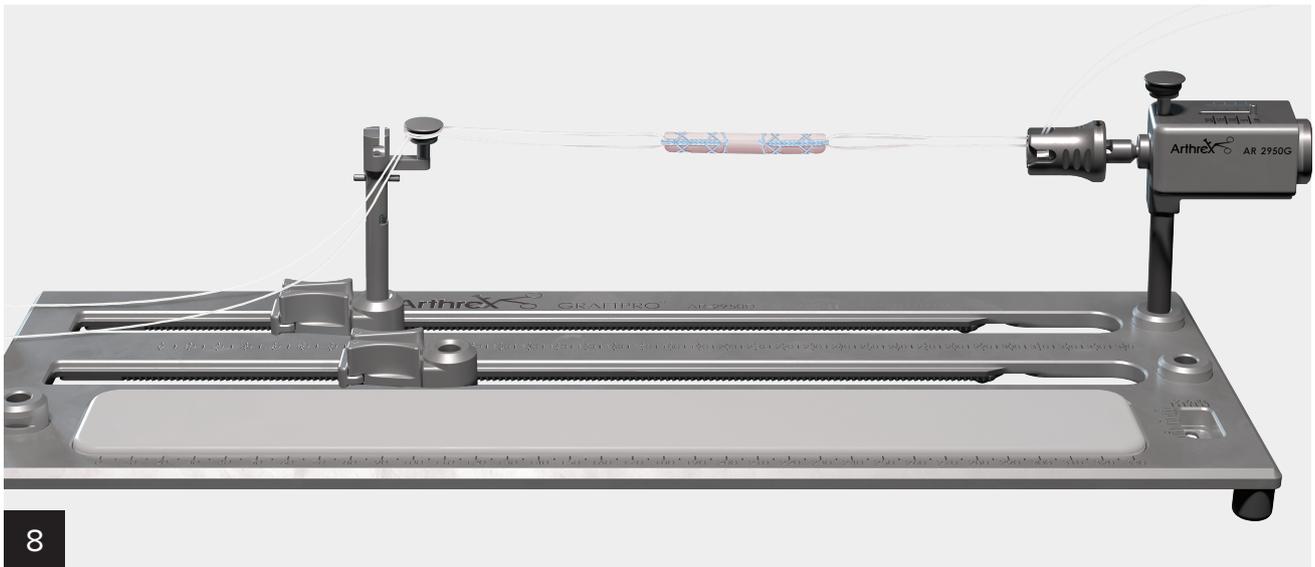


Remove the FiberTag® TightRope® suture card from the GraftClamp instrument. Unwrap the sutures from the suture card cleat and remove the TightRope implant loops from the retaining slots in the card.



7

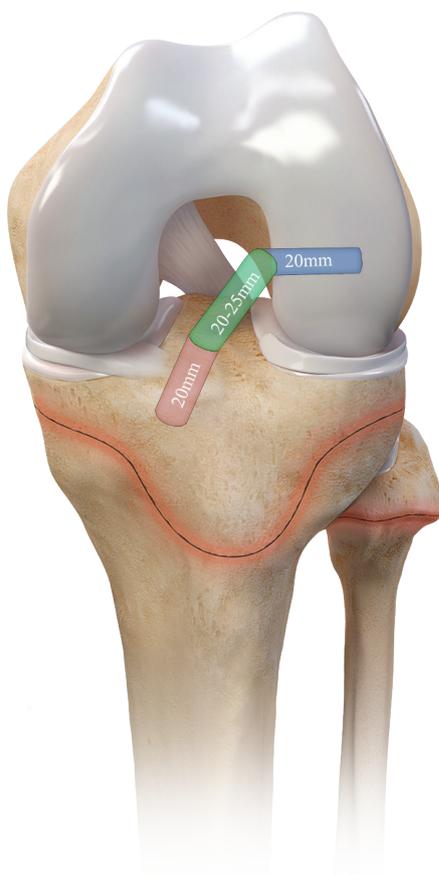
FiberTag TightRope graft preparation is now complete and the opposite end of the graft can be prepared in the desired manner.



8

Use the QuadLink™ graft prep attachments for tensioning by simply pulling on one side until the desired tension is obtained as read on the tensiometer.

Graft Sizing and Socket Creation



Arthrex graft tubes are ideal for sizing and compressing QuadLink and GraftLink® constructs. These full-length, clear tubes facilitate graft compression, sizing, and preparation.

Graft Sizing

Measure the graft length and diameter. Pass both the femoral and tibial ends of the graft into the graft tubes to measure diameter for socket drilling.

Socket Creation

The length from the end of the femoral socket to the end of the tibial socket should be at least 10 mm longer than the graft to ensure the graft can be tensioned fully.

Example: 50 mm to 55 mm QuadLink graft length



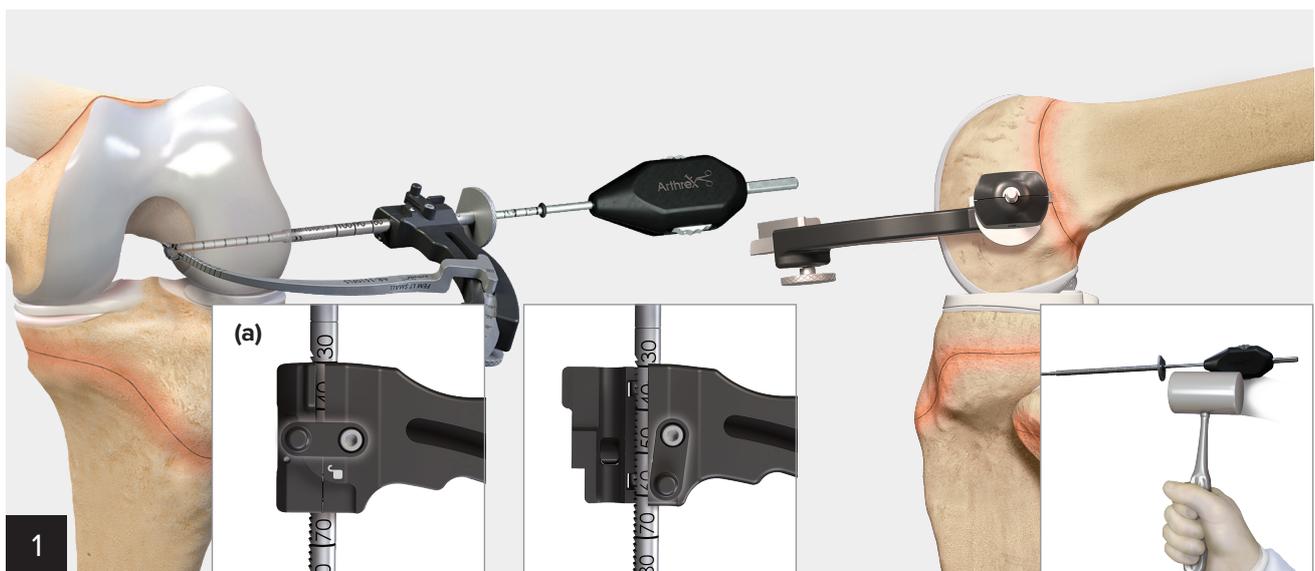
Assuming a maximum intra-articular length of 20 mm to 25 mm, there will be approximately 15 mm to 20 mm of graft in the femoral and tibial socket. Drill the femur 20 mm deep and the tibia approximately 20 mm deep to allow an extra 10 mm for tensioning.

FlipCutter® III Drill Features and Benefits

- **Adjustable, Variable Size:** Designed for the ultimate in convenience and utility, the FlipCutter III drill helps reduce inventory and minimize the costs associated with opening multiple drills during a procedure.
- **Dual Cutting Edge:** The FlipCutter III drill's unique design includes two cutting edges for improved performance—a distal edge for drilling and a proximal edge for retrograde reaming.

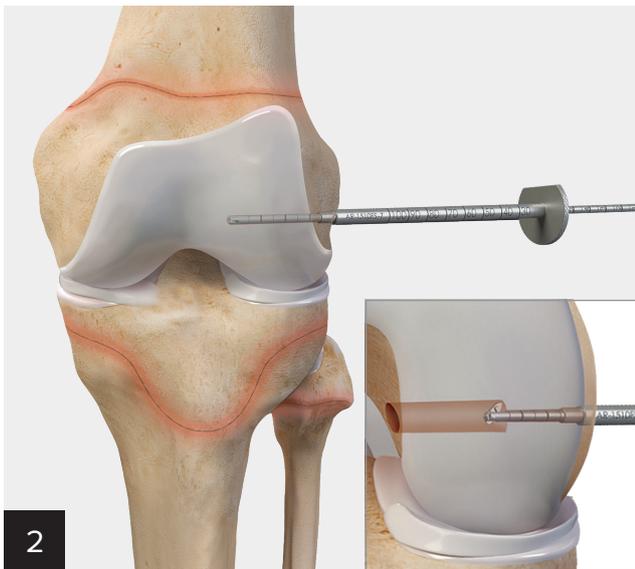


All-Epiphyseal Femoral Socket Preparation Using the FlipCutter Drill

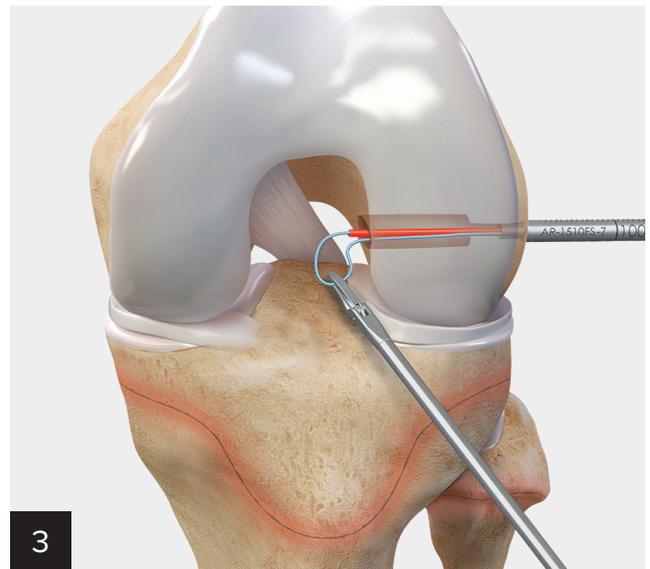


Using the side-specific small angle femoral marking hook and stepped drill sleeve, the intra-articular and extra-articular landmarks are identified and confirmed.²

Note the intraosseous length on the drill sleeve when pushed down to bone (a).

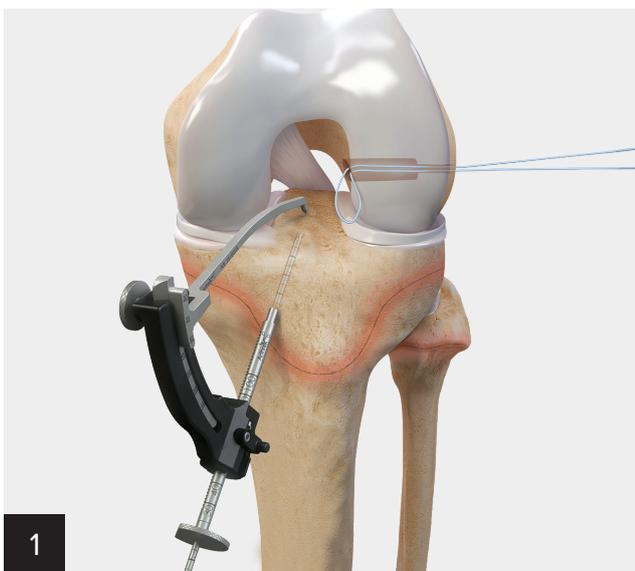


Drill the appropriate size FlipCutter® III drill through the stepped drill sleeve into the joint. Verify adequate distance and positioning distal to the physis using fluoroscopy. Once the position is confirmed, deploy the tip of the FlipCutter III to the appropriate size, then create the femoral socket with the FlipCutter III drill.³

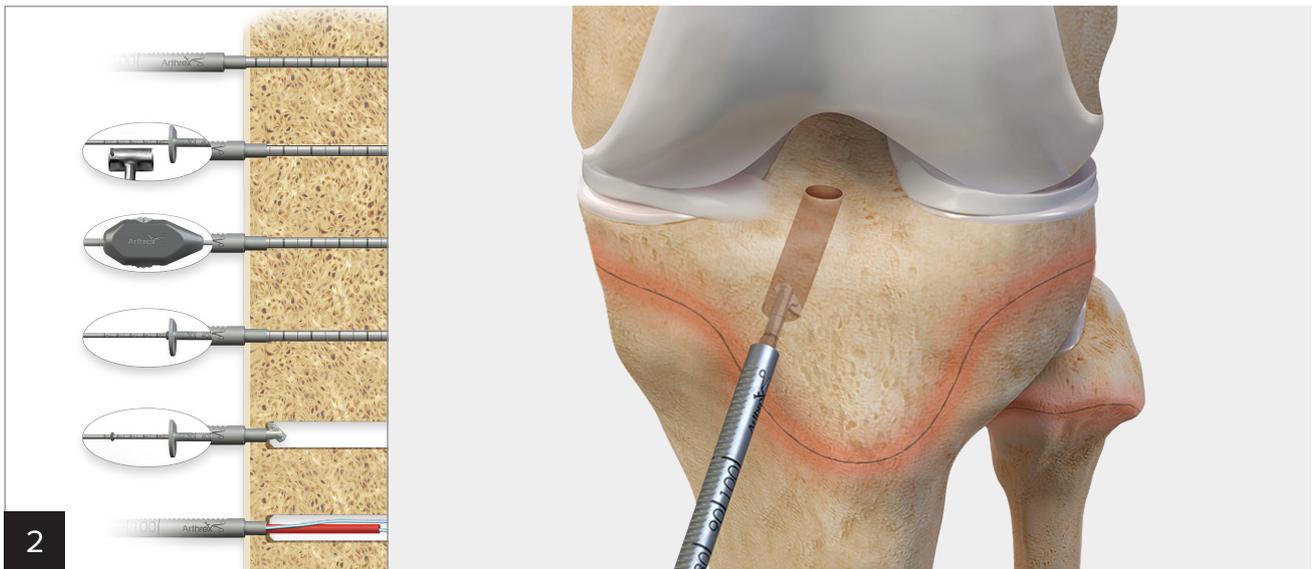


After “flipcutting,” pass a FiberStick™ suture through the stepped drill sleeve and dock for later graft passing.

Tibial Socket Preparation

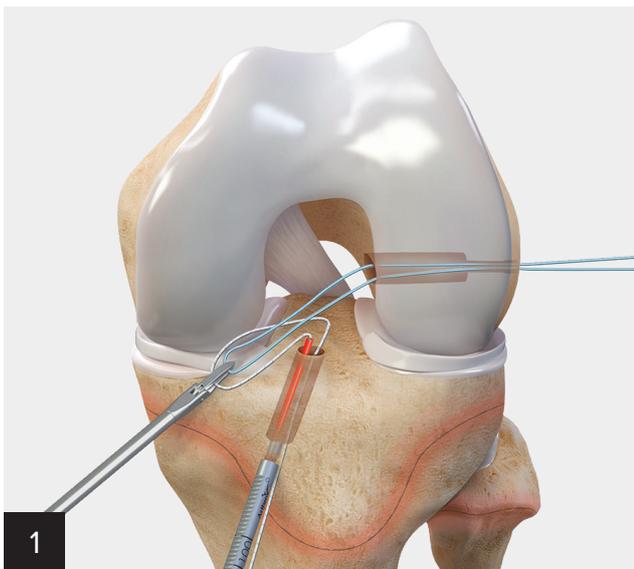


Using the small angle tibial marking hook and stepped drill sleeve, identify and confirm the intra-articular and extra-articular landmarks. Drill the FlipCutter III drill through the stepped drill sleeve into the joint. Verify adequate distance and positioning proximal to the physis using fluoroscopy.



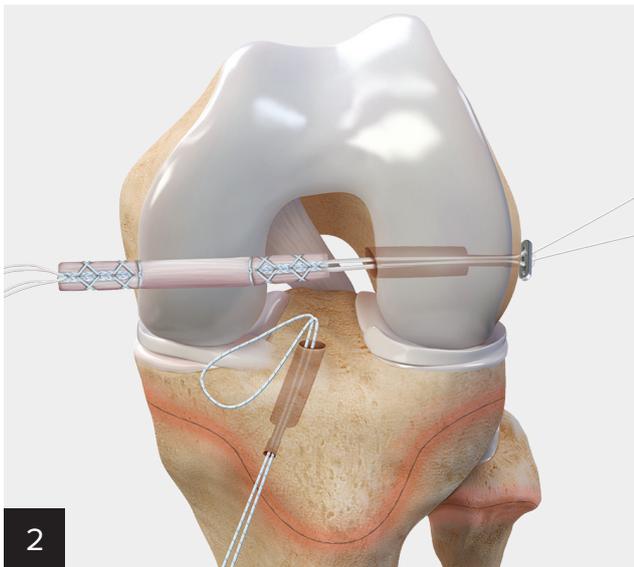
Flip the cutting tip into reaming position by rotating the sizing wheel to the predetermined socket diameter. Drill on forward with distal traction to cut the socket. Use the rubber ring and 5 mm markings on the FlipCutter® III drill to measure socket depth (inset).

Graft Passing

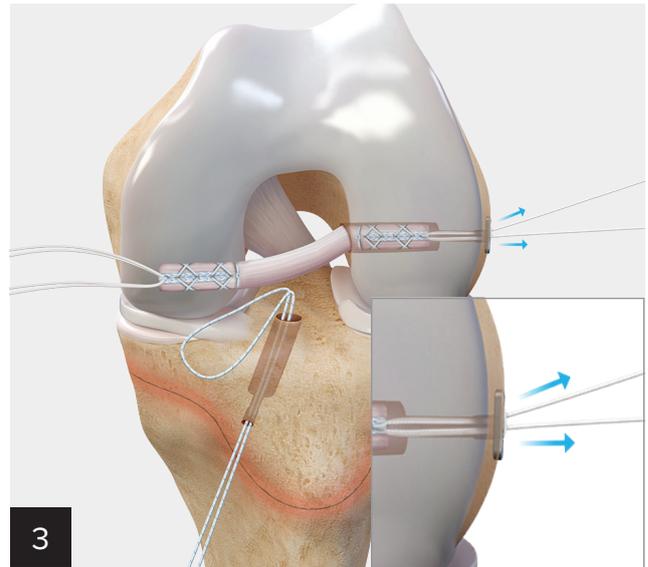


Straighten the FlipCutter III blade and remove from the joint. Pass a TigerStick® suture into the joint and retrieve both the tibial TigerStick and the femoral FiberStick™ sutures out of the medial portal together with an open suture retriever. Retrieving both sutures at the same time will help avoid tissue interposition that can complicate graft passing.

Note: A PassPort Button™ cannula may also be used in the medial portal to prevent tangling.

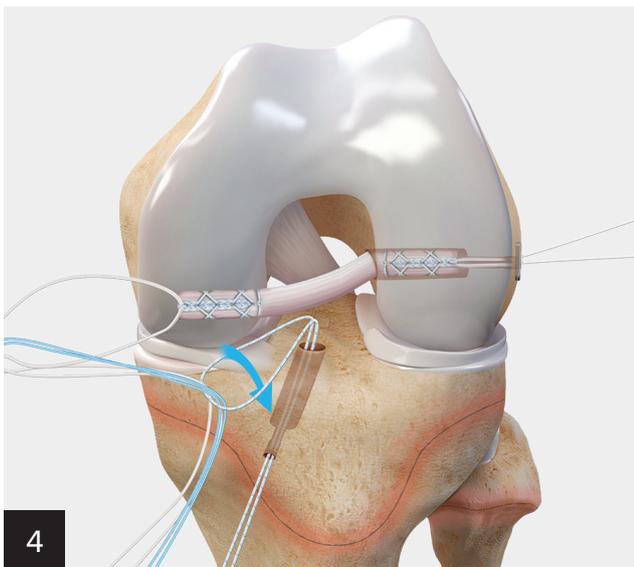


Pass the blue FiberWire® passing suture and the TightRope® implant shortening strands through the femur. Remove slack from sutures and ensure equal tension. Clamp or hold both blue and white sutures together and pull them together to advance the button out of the femur. Use markings on the loop and arthroscopic visualization of the button to confirm exit from the femoral cortex. Pull back on the graft to confirm the button is seated.

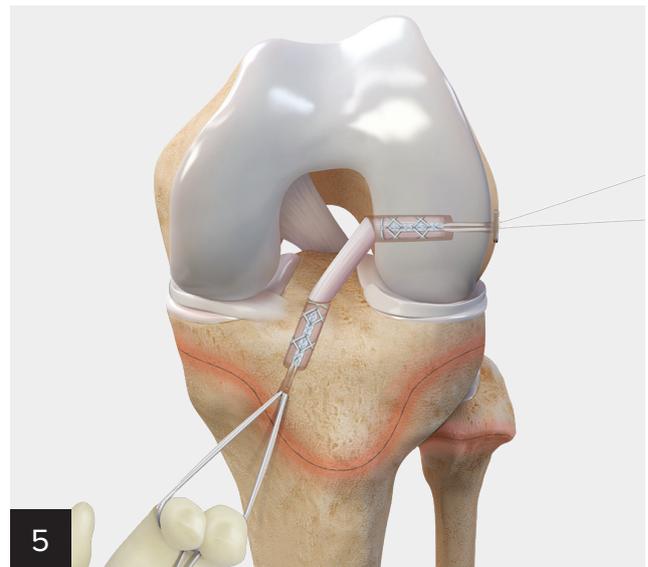


While holding slight tension on the graft, pull the shortening strands proximally one at a time to advance the graft. Pull on each strand in 2 cm increments.

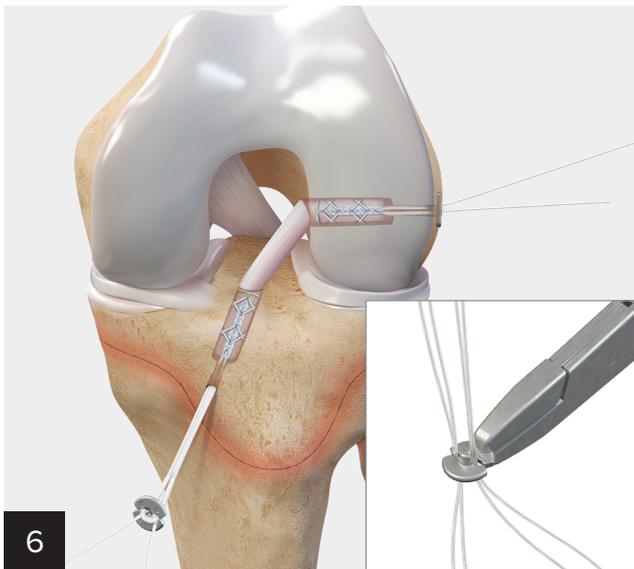
Note: The graft can be fully seated into the femur or left partially inserted until tibial passing is complete. The latter option allows fine tuning of graft depth in each socket.



Cinch a suture around the end of the FiberTag® TightRope® ABS loop to use for passing. Load the cinch suture into the tibial passing suture. Pull distally on the tibial passing suture to deliver the FiberTag TightRope ABS loop out of the tibia.



Advance the graft into the tibia by pulling on the inside of the ABS loop.



6 Load the TightRope® ABS button onto the loop. Pull on the white shortening strands to advance the button to bone and tension graft in full extension.

Note: Ensure the button has a clear path to bone so as to not entrap soft tissue under the button.



7 After the knee is cycled several times, the FiberTag® TightRope sutures can be tensioned again with the knee in extension and the tensioning sutures can be cut flush.

References

1. Arthrex, Inc. Data on file (LA1-00100-EN_K). Naples, FL; 2021.
2. Xerogeanes JW, Hammond KE, Todd DC. Anatomic landmarks utilized for physseal-sparing, anatomic anterior cruciate ligament reconstruction: an MRI-based study. *J Bone Joint Surg Am.* 2012;94(3):268-276. doi:10.2106/JBJS.J.01813
3. McCarthy MM, Graziano J, Green DW, Cordasco FA. All-epiphyseal, all-inside anterior cruciate ligament reconstruction technique for skeletally immature patients. *Arthrosc Tech.* 2012;1(2):e231-e239. doi:10.1016/j.eats.2012.08.005

Ordering Information

Implants

Product Description	Item Number
FiberTag® TightRope® Implant	AR-1588RTT
FiberTag TightRope ABS Implant	AR-1588TNT
TightRope II BTB Implant, with additional flipping suture	AR-1588BTB-2J
TightRope II BTB Implant, with FiberTape® suture for <i>Internal/Brace</i> ™ technique	AR-1588BTB-IB
TightRope II ABS Implant, open	AR-1588TN-21
TightRope ABS Button, round, concave 11 mm	AR-1588TB-3
TightRope ABS Button, round, concave 14 mm	AR-1588TB-4
TightRope ABS Button, round, concave 20 mm	AR-1588TB-5
TightRope Button Extender, 5 mm × 20 mm	AR-1589RT

Instruments

Product Description	Item Number
GraftClamp Graft Preparation Instrument	AR-2386T
QuadPro™ Harvester, 8 mm	AR-2386-08
QuadPro Harvester, 9 mm	AR-2386-09
QuadPro Harvester, 10 mm	AR-2386-10
QuadPro Harvester, 11 mm	AR-2386-11
FlipCutter® III Drill	AR-1204FF
RetroConstruction™ Drill Guide Set	AR-1510S
GraftPro® Graft Preparation Set	AR-2950DS
Graft Tube Set	AR-1886-S
Pin Tip Tibial Marking Hook ACL Guide, small angle	AR-1510GTS
Footprint Femoral ACL Guide, small angle, right	AR-1510FRS
Footprint Femoral ACL Guide, small angle, left	AR-1510FLS

Implant Systems

Product Description	Item Number
Implant System, FiberTag TightRope implant with attached needle, FlipCutter III drill, and FiberStick™ suture	AR-1288RTT-FC3
ACL FiberTag TightRope Implant System, 8 mm	AR-1288QT-80
ACL FiberTag TightRope Implant System, 9 mm	AR-1288QT-90
ACL FiberTag TightRope Implant System, 10 mm	AR-1288QT-100
ACL FiberTag TightRope Implant System, 11 mm	AR-1288QT-110
QuadLink™ Implant System, 8 mm	AR-1288QIS-80
QuadLink Implant System, 9 mm	AR-1288QIS-90
QuadLink Implant System, 10 mm	AR-1288QIS-100
QuadLink Implant System, 11 mm	AR-1288QIS-110
TightRope II BTB-IB Implant System, w/ FlipCutter III drill and FiberStick suture	AR-1288BTBIB-FC3
Implant System, secondary fixation w/ BioComposite SwiveLock® anchor 4.75 mm × 19.1 mm	AR-1593-BC
Implant System, secondary fixation w/ PEEK SwiveLock anchor 4.75 mm × 19.1 mm	AR-1593-P

Suture

Product Description	Item Number
FiberStick Suture and #2 FiberWire® Suture, 50 in (blue) one end stiffened	AR-7209
TigerStick® Suture and #2 TigerWire® Suture, 50 in (white/black) one end stiffened	AR-7209T
#2 FiberLoop® Suture w/ Straight Needle, 20 in (blue), 76 mm needle w/ 7 mm loop	AR-7234
#2 TigerLoop™ Suture w/ Straight Needle, 20 in w/ TigerWire suture (white/green), 76 mm needle w/ 7 mm loop	AR-7234T
0 FiberWire Suture, 38 in (blue) w/ tapered needle, 22.2 mm ½ circle	AR-7250

Accessories

Product Description	Item Number
PassPort Button™ Cannula, 8 mm I.D. x 2 cm	AR-6592-8-20
PassPort Button Cannula, 8 mm I.D. x 3 cm	AR-6592-8-30
PassPort Button Cannula, 10 mm I.D. x 2 cm	AR-6592-10-20
PassPort Button Cannula, 10 mm I.D. x 3 cm	AR-6592-10-30
Suture Retriever	AR-12540
Suture Cutter for ACL TightRope Implant	AR-4520

The *Internal/Brace* 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 *Internal/Brace* technique is for use during soft tissue-to-bone fixation procedures and is not cleared for bone-to-bone fixation.



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 and/or outcomes.

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