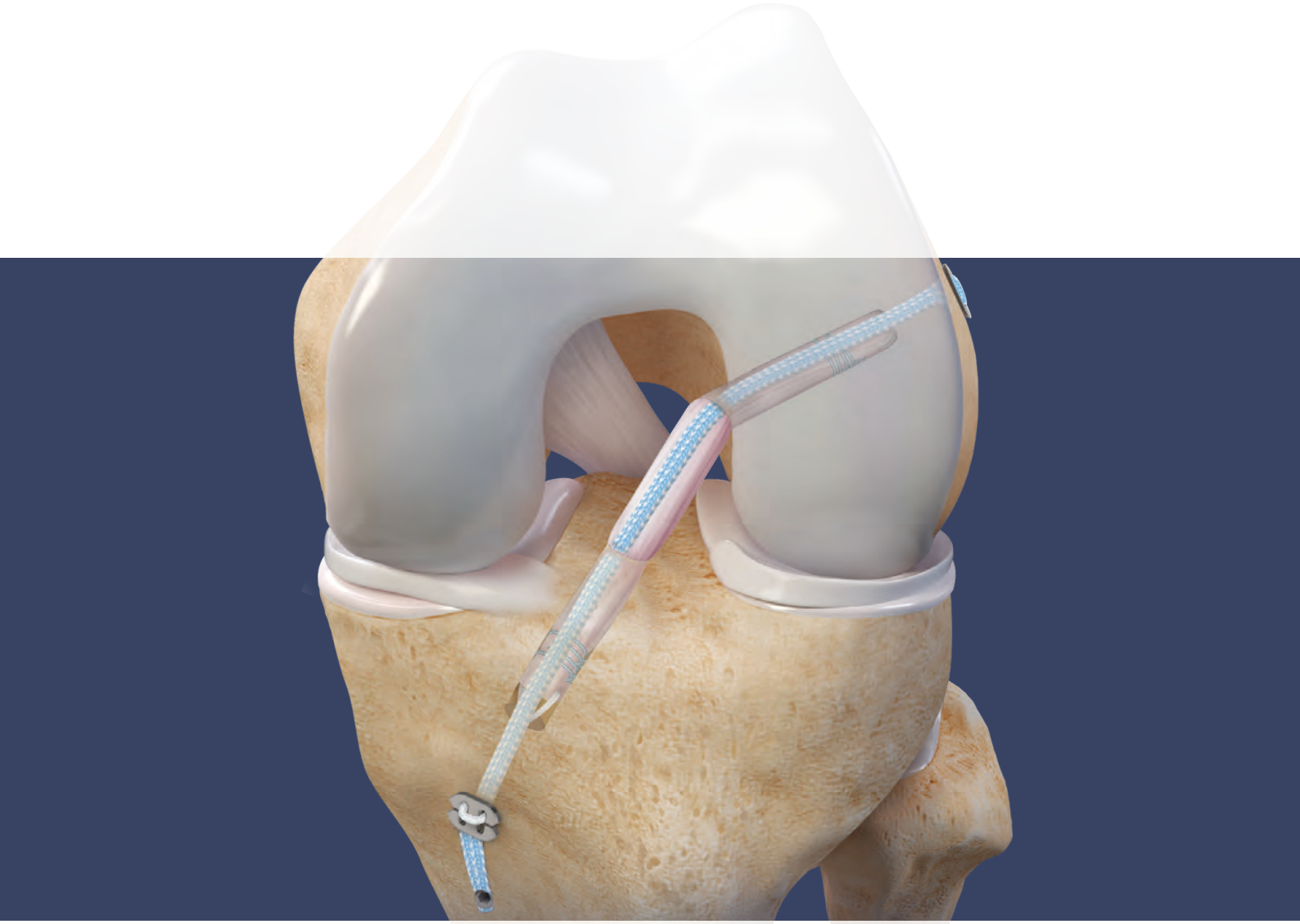
GraftLink® ACL Reconstruction With *Internal*Brace™ Ligament Augmentation

Surgical Technique



Arthrex®

Introduction

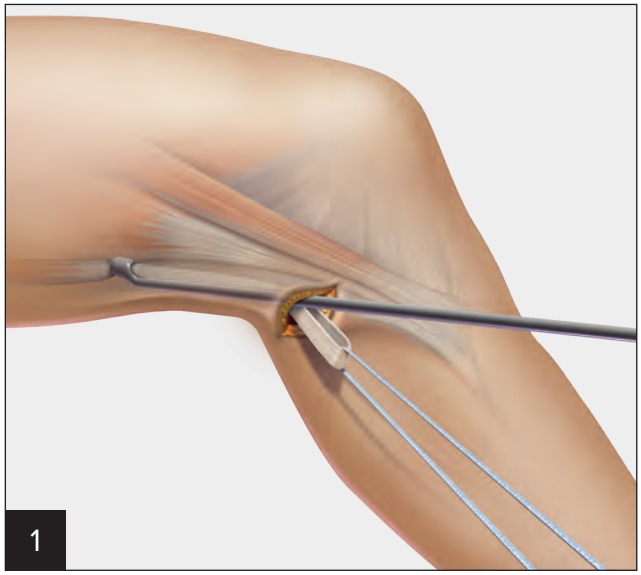
Achieve a new standard for minimally invasive ACL reconstruction by combining the long clinical history of the ACL GraftLink® technique with the *Interna*lBrace™ implant, which augments the graft during the healing process. Several biomechanical and clinical studies have shown that the GraftLink technique offers larger graft diameters, higher fixation strength, and excellent clinical outcomes when compared to traditional ACL constructs.[1-4] The *Interna*lBrace implant helps prevent excess range of motion during the healing phase and may reduce the chances of secondary injuries.[5,6]

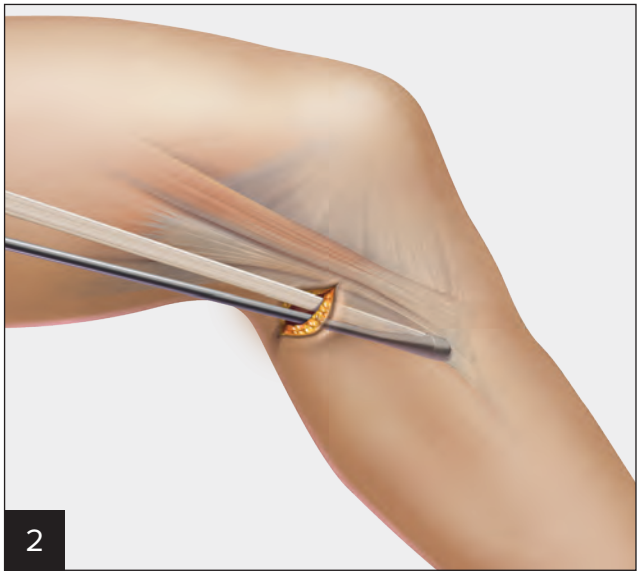
GraftLink® ACL Reconstruction With *Internal*Brace™ Repair

The ACL GraftLink technique with *Internal*Brace ligament augmentation provides the ultimate in anatomic, minimally invasive, and reproducible ACL reconstruction.

- **Anatomic** – Independent tibial and femoral socket preparation with the FlipCutter® II reamer and/or low-profile reamers facilitate unconstrained placement of the ACL graft.
- **Minimally Invasive** – Single-hamstring harvest decreases morbidity and loss of strength.[7] Socket preparation with the FlipCutter II reamer limits soft-tissue dissection and helps preserve bone and periosteum.
- **Reproducible** – The GraftPro™ graft prep system 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.

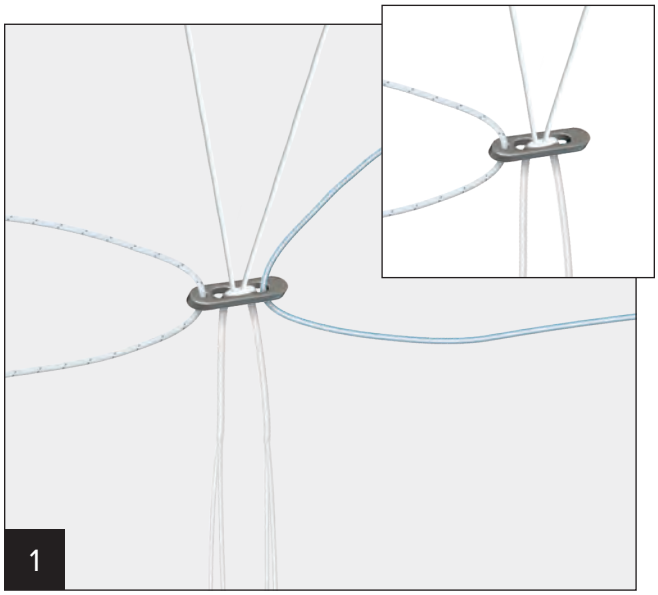
Semitendinosus Harvesting



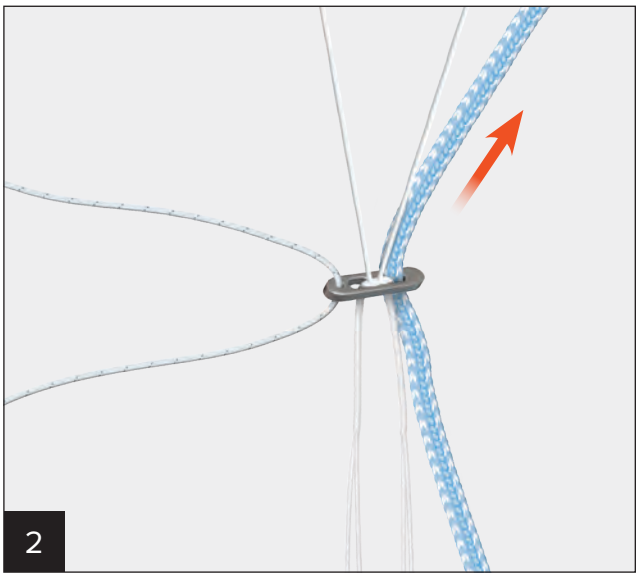


In most cases, only the semitendinosus is needed to create the GraftLink construct. ***Note: For a less invasive option, harvest the tendon using the atraumatic hamstring harvest technique and instruments described in technique guide LS1-00075-EN.***

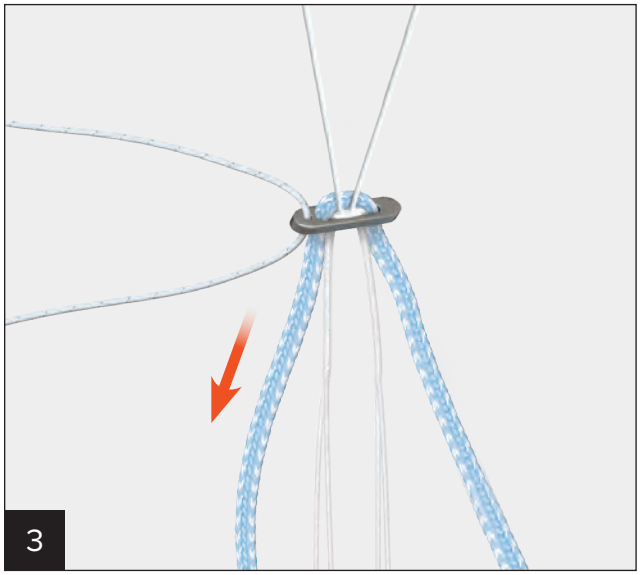
Graft Implant Preparation



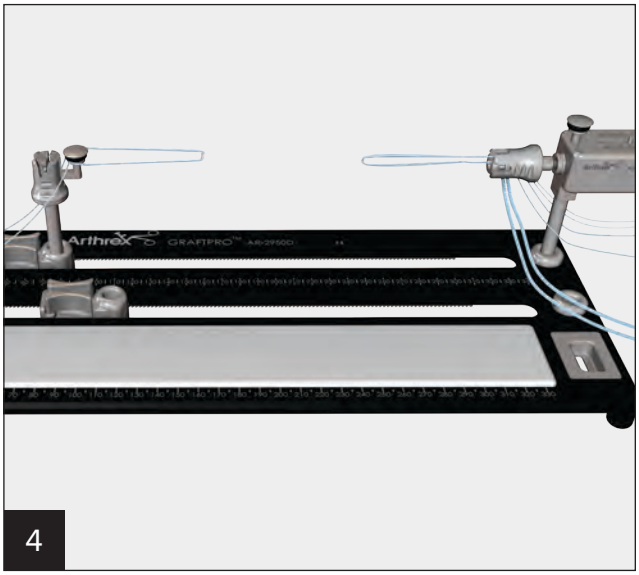
Use a TightRope® implant (AR-1588RT-J) to create the TightRope construct with *Internal*Brace™ augmentation for the femoral implant. ***Note: Remove the blue passing suture.***



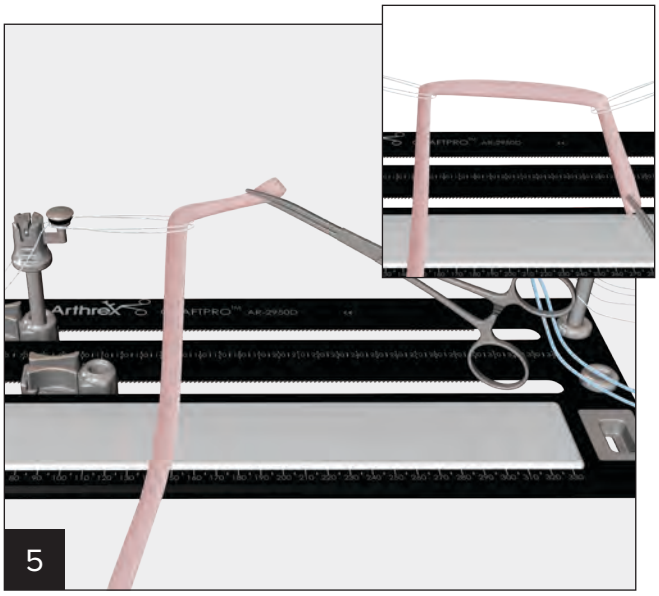
Pass one end of a FiberTape® suture (AR-7237) through the TightRope button hole that contained the blue passing suture.



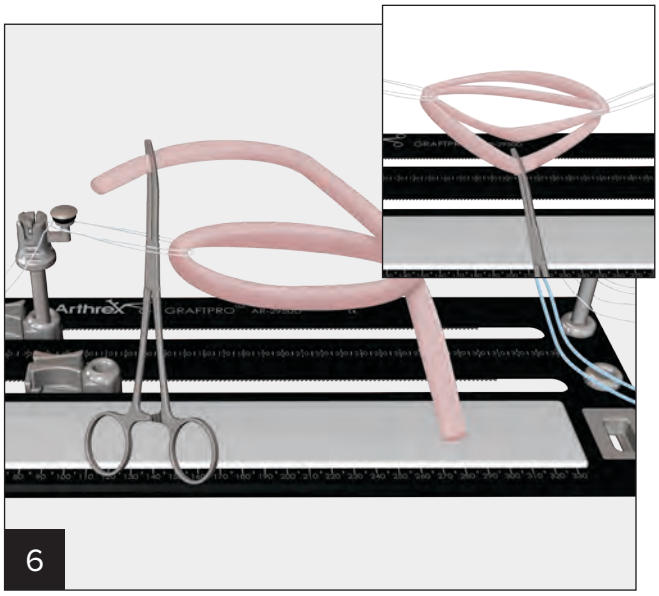
Pass the other end of the FiberTape suture through the opposite hole of the TightRope button. ***Note: The TigerWire® suture remains in place and acts as the passing suture.***



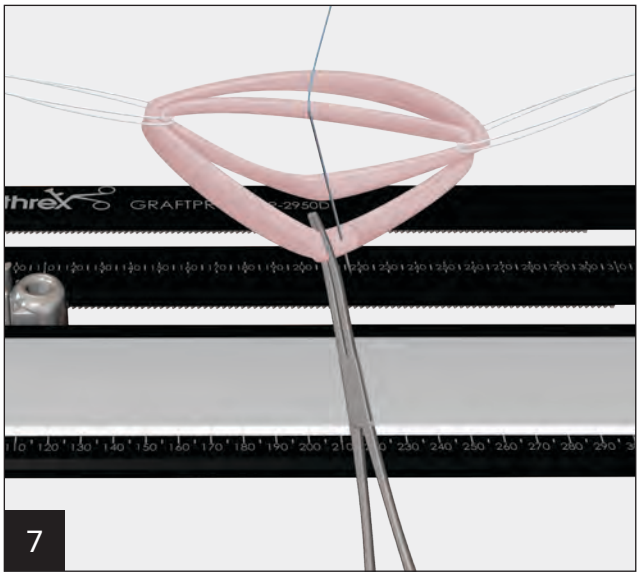
Place the ACL TightRope RT-J implant into the button holder on the GraftPro™ GraftLink® attachment with tensiometer, which will be the femoral side. Place an ACL TightRope ABS loop into the post of the other GraftLink attachment, which will be the tibial side.



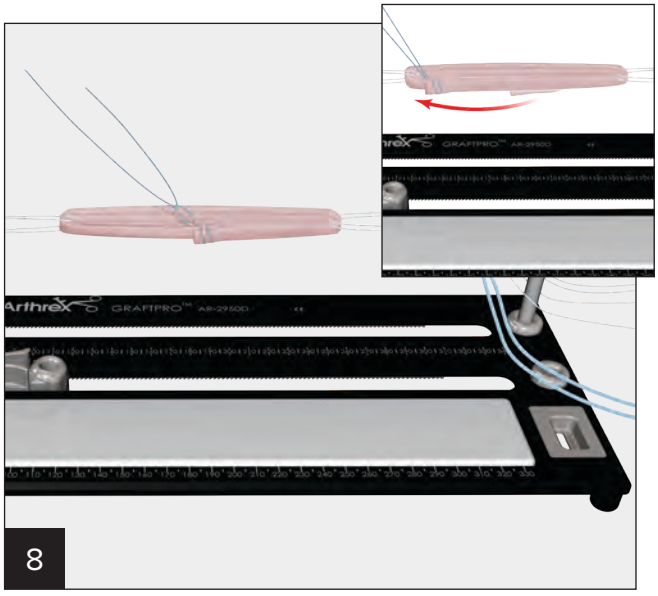
Pull one end of the graft through both TightRope® implant loops leaving one short end and one long end.



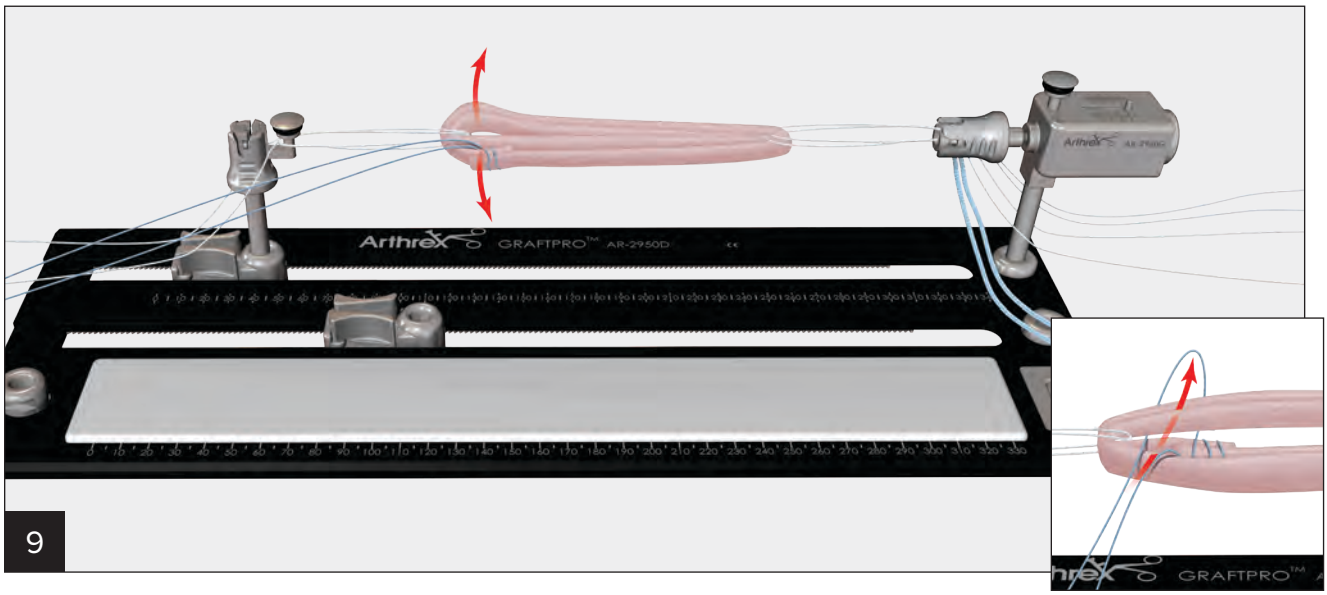
Pull the other long end of the graft through both TightRope implant loops in the opposite direction until both ends meet. Use a hemostat to clamp the ends of the graft together.



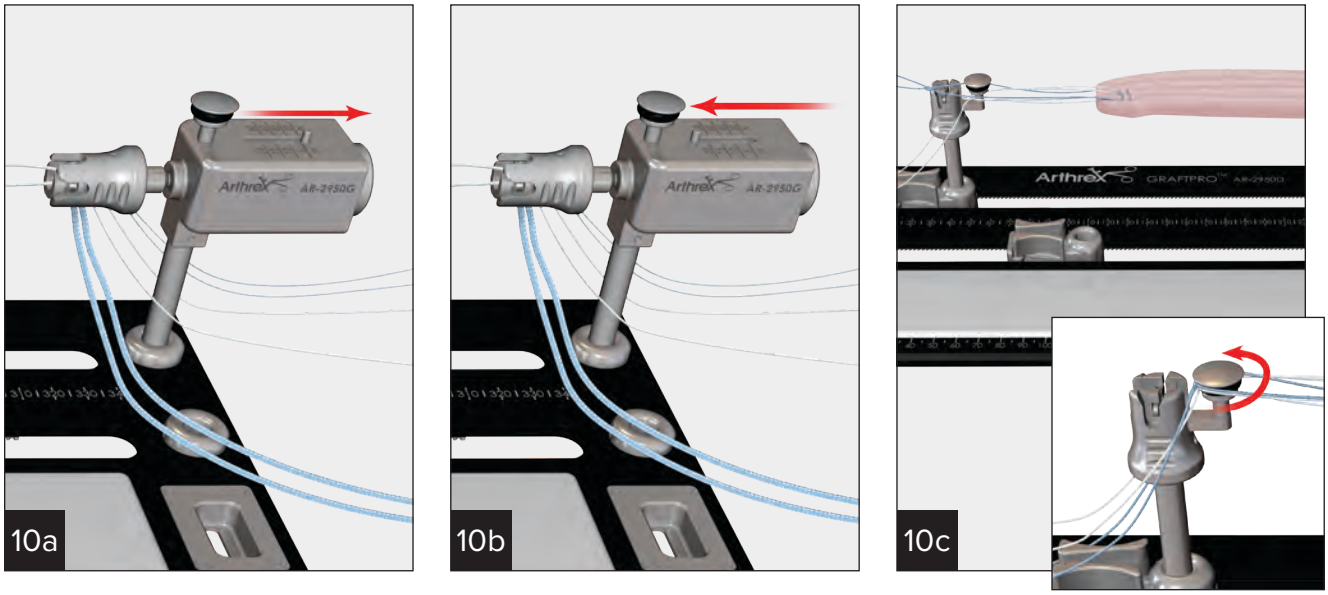
Stitch the ends of the graft together with a #2 FiberWire® suture. This can be done by overlapping the ends or by suturing them end-to-end, depending on the length of the graft.



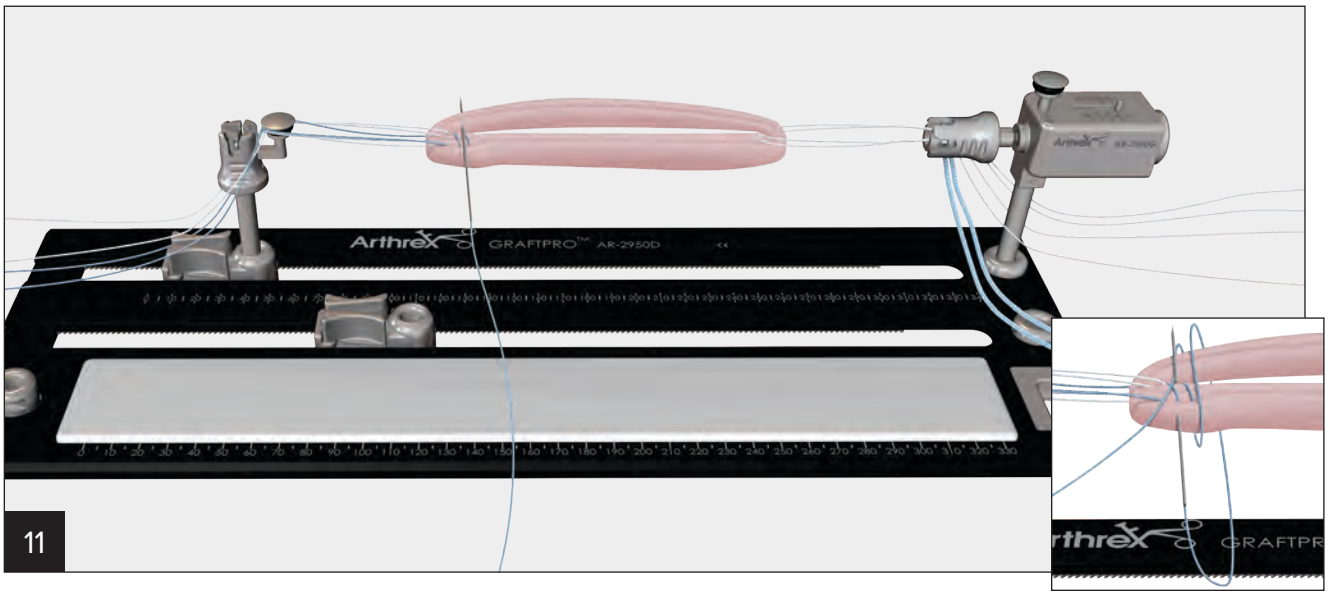
Tie the suture tails and rotate the graft so that the sutured portion is near the tibial end.



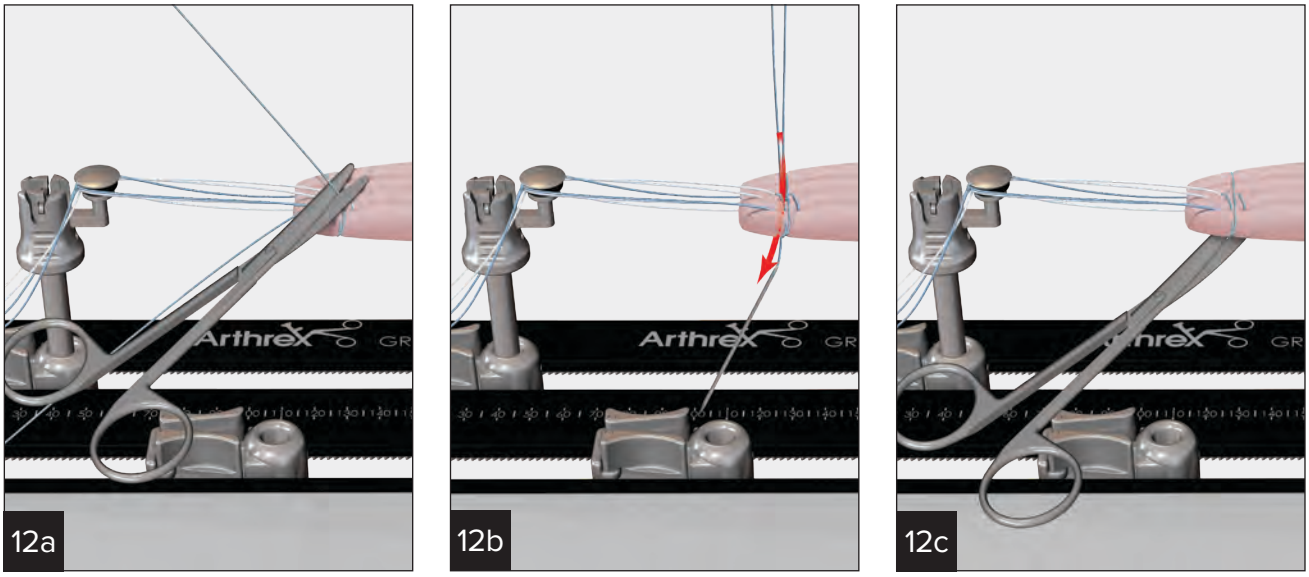
Invert the graft strands to move the sutured tendon to the inside of the construct. Pass one of the suture tails through the graft so it exits on the opposite side.



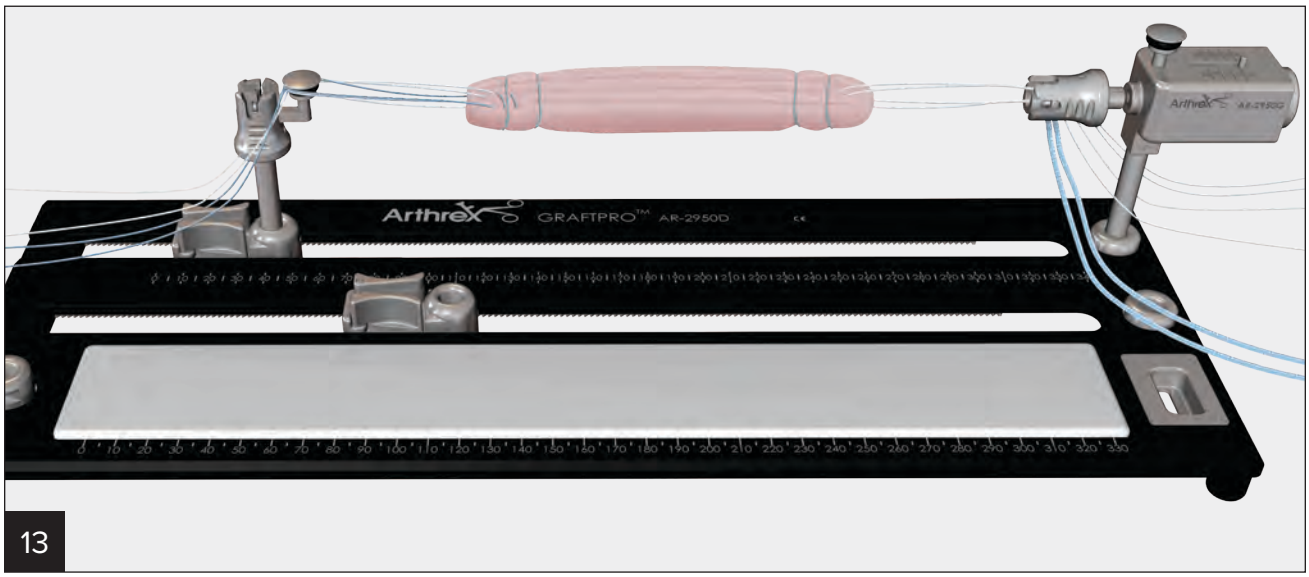
Once stitching is complete and the graft is positioned correctly, pull the GraftPro™ graft prep attachments apart to tension the graft before final stitching (10a, 10b). The graft tension can be read on the GraftLink® attachment with the tensiometer. Wrap the tails of the FiberWire® suture around the attachment post 3 to 4 times until it is captured (10c). These sutures can be used for backup fixation on the tibial side.



Using a #2 FiberWire® suture with a straight needle, pass through one inner limb and one outer limb of the graft from inside/out. Wrap the suture around the graft and pass the needle through the other 2 limbs of the graft from outside/in. This will insure that the knot is buried within the graft when tied.

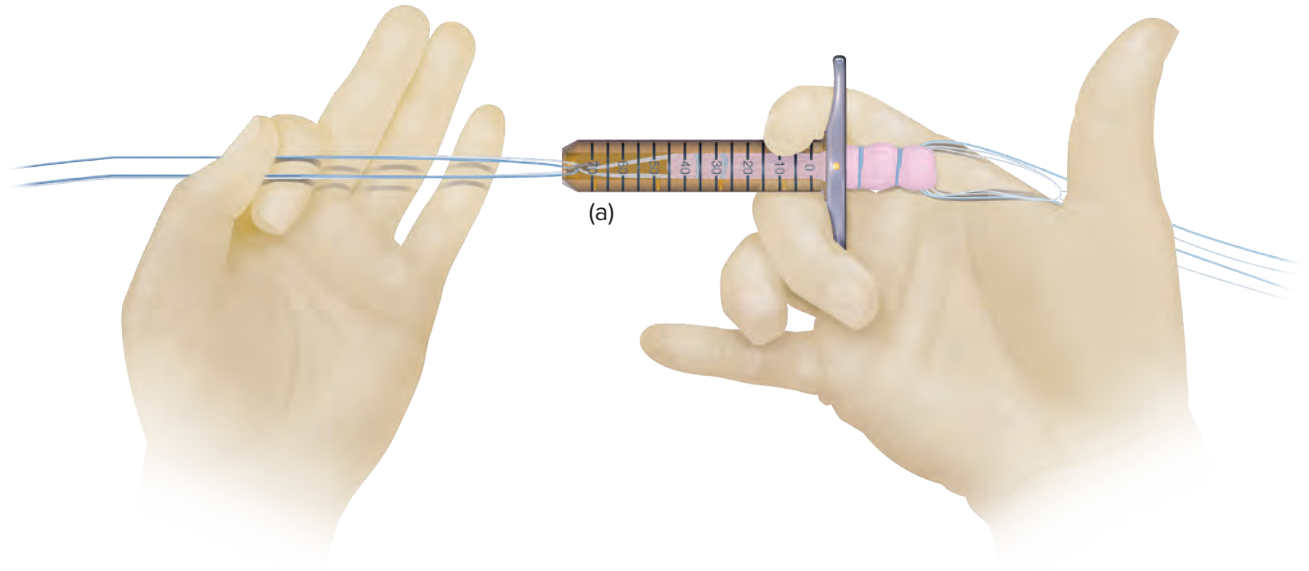


After tying a knot, cut off the suture tail without the needle (12a). Pass the needle end back through the graft and pull it until the knot is buried inside the tissue (12b, 12c). This will reduce suture bulk and facilitate graft sizing and passage.



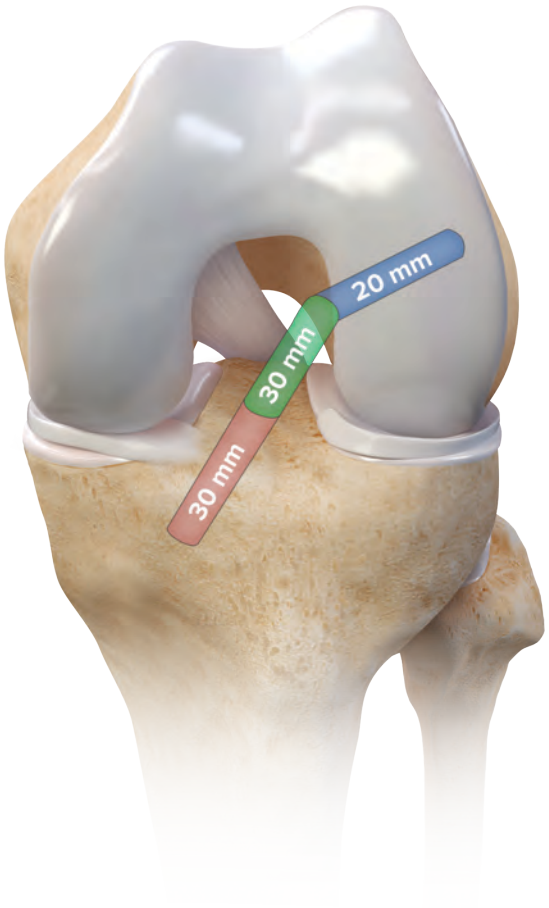
Repeat suturing, once on the tibial end and twice on the femoral end, for a total of 4 stitches. Additional tension can now be placed on the graft for conditioning.

Graft Sizing and Socket Creation



Arthrex graft tubes (a) are ideal for sizing and compression of the GraftLink® construct. These full-length, clear tubes facilitate graft compression, sizing, and preparation. The unique transparent tube, with an etched ruler, allows visualization of the graft during diameter and length sizing. A funneled entrance and attachable handle ease the entry of grafts into the sizer, allowing compression of up to 2 mm. Small holes in the graft tube allow hydration of the graft or injection of biologics along the entire length.

Socket Creation

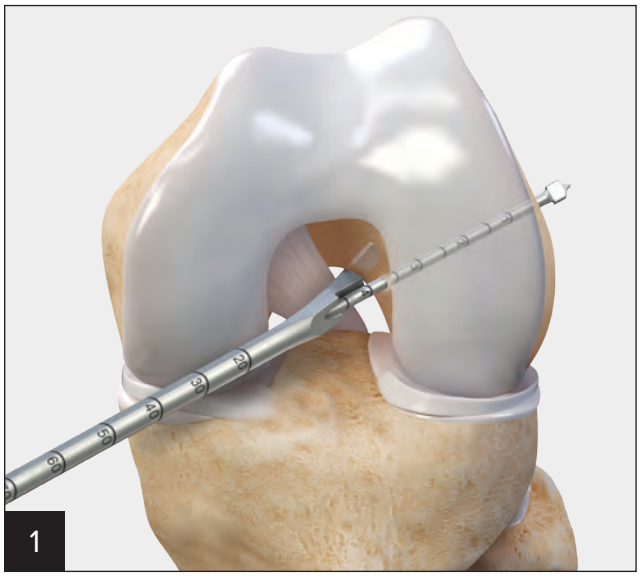


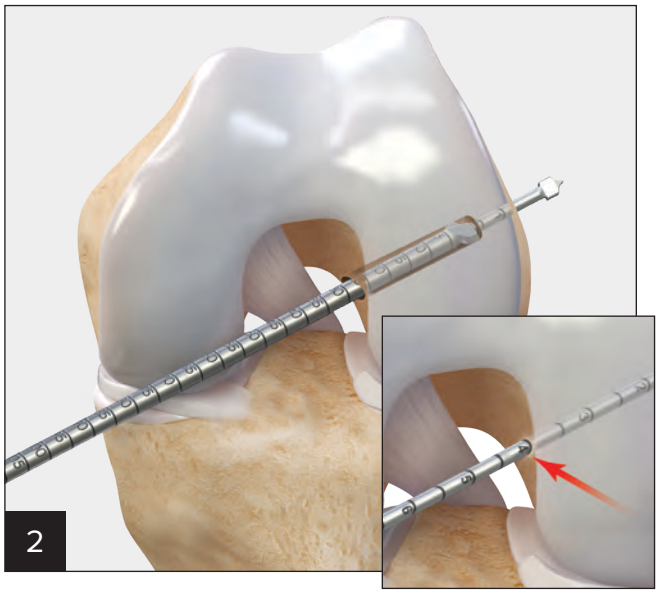
The length from the end of the femoral socket to the end of the tibial socket should be at least 10 mm longer than the graft to ensure that the graft can be tensioned fully.

Assuming a maximum intra-articular length of 30 mm, there will be approximately 20 mm of graft in the femoral and tibial socket. Drill the femur 20 mm deep and the tibia approximately 30 mm deep to allow an extra 10 mm for tensioning.

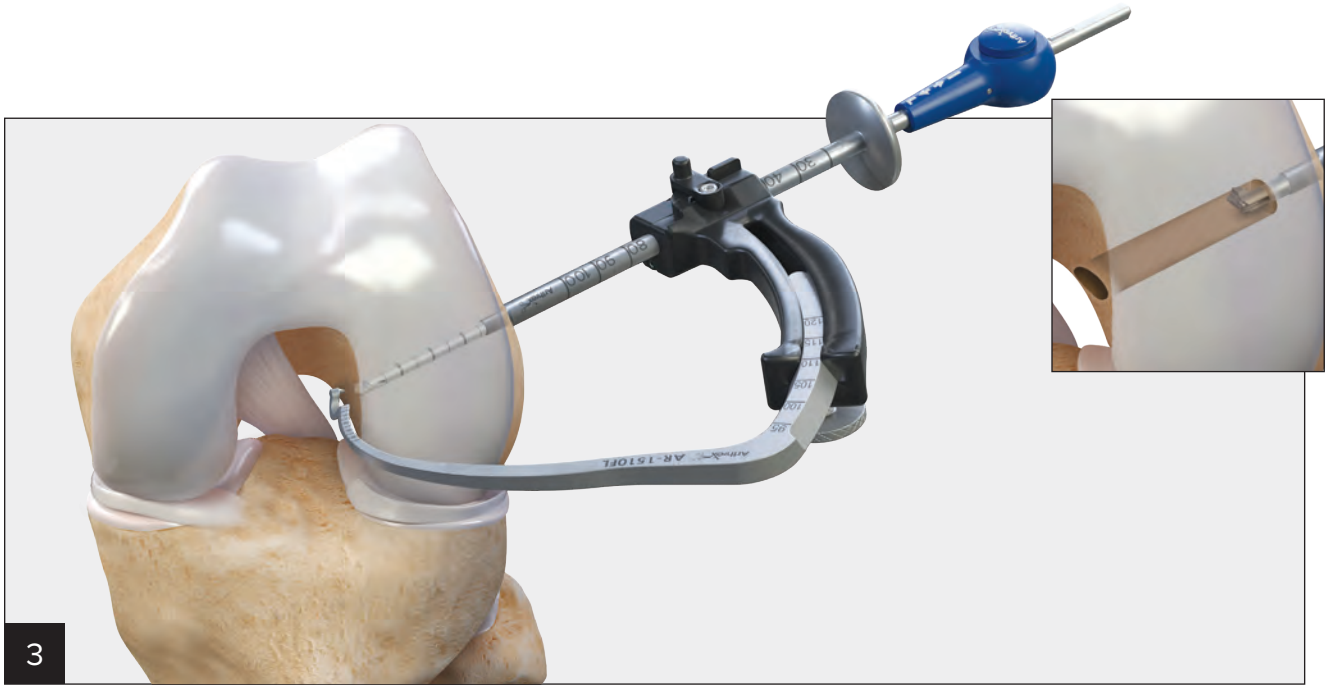
Graft Tubes (AR-1886-S)

Femoral Socket Preparation

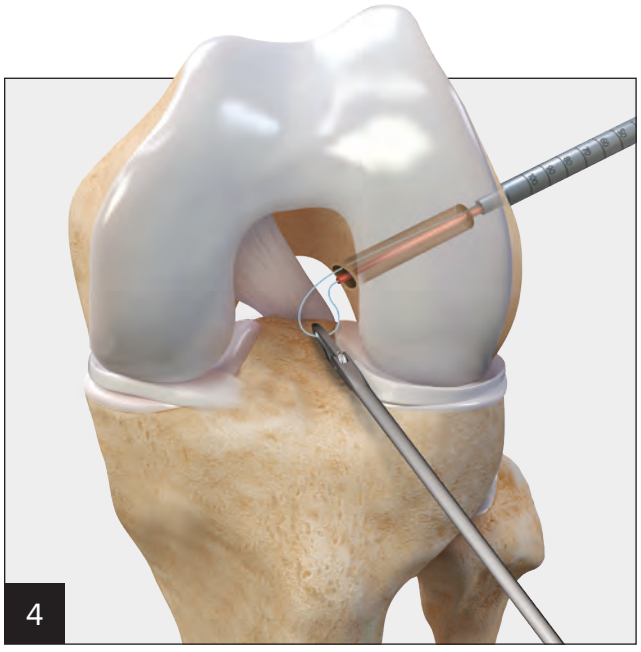




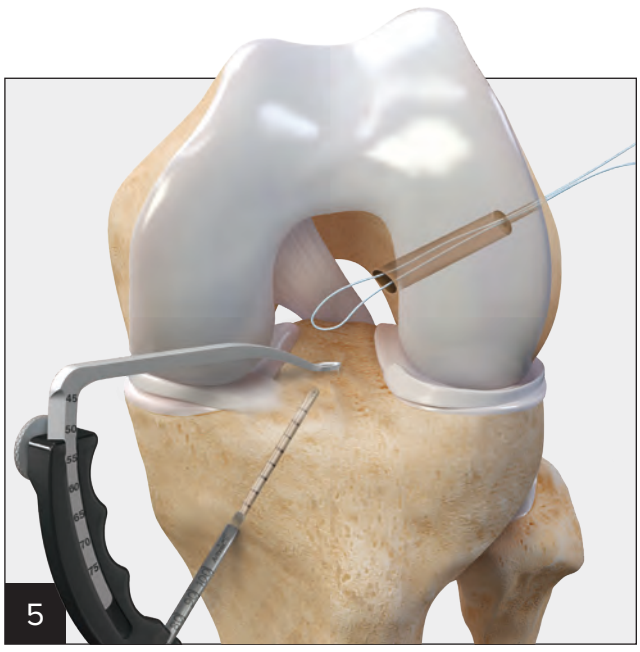
For medial portal drilling, use the TightRope® drill pin, transportal ACL guides, and low-profile reamers. ***Note the intraosseous length from the TightRope drill pin.*** After socket drilling, pass a suture with the TightRope drill pin for later graft passing.



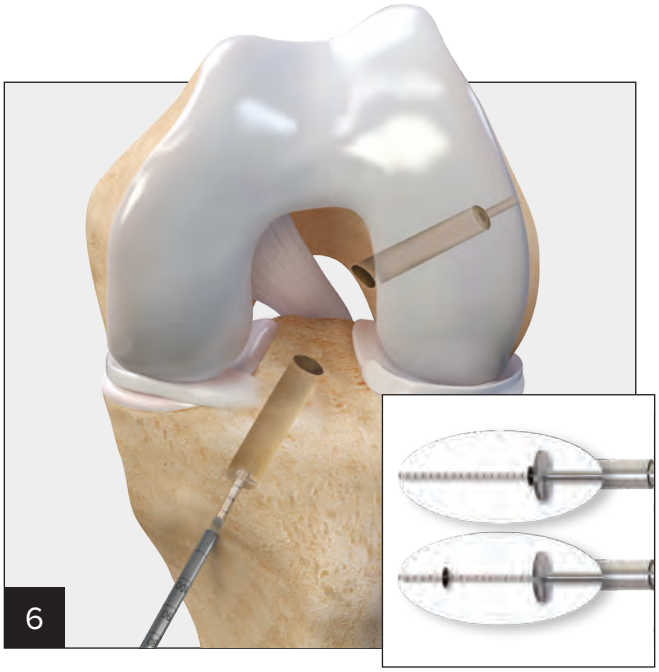
The FlipCutter® II reamer may be used to create the femoral socket. ***Note the intraosseous length on the drill sleeve when it is pushed down to bone.***



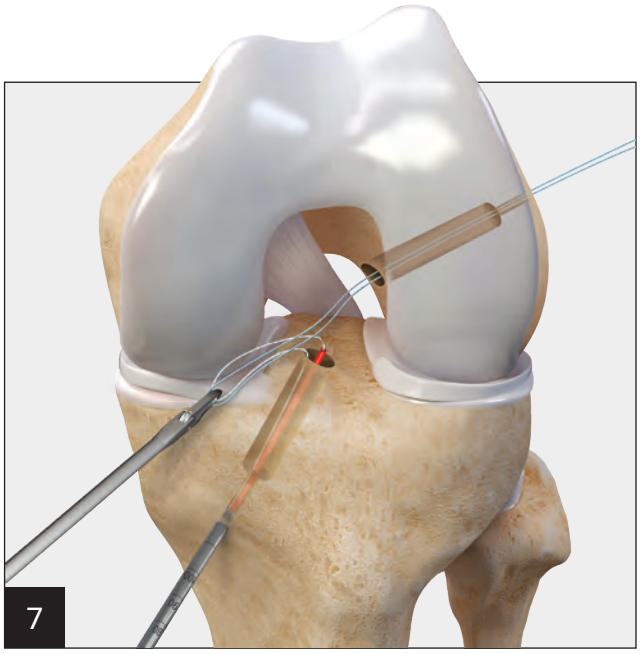
After "flipcutting," pass a FiberStick™ suture through the stepped drill sleeve and dock for later graft passing.



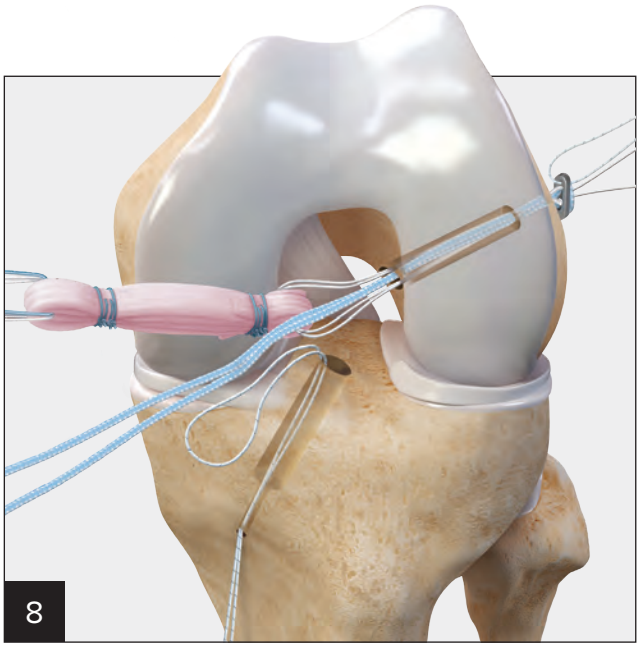
For tibial socket preparation, use the ACL tibial marking hook to drill the FlipCutter II reamer into the joint. Then remove the marking hook, leaving the stepped drill sleeve in place.



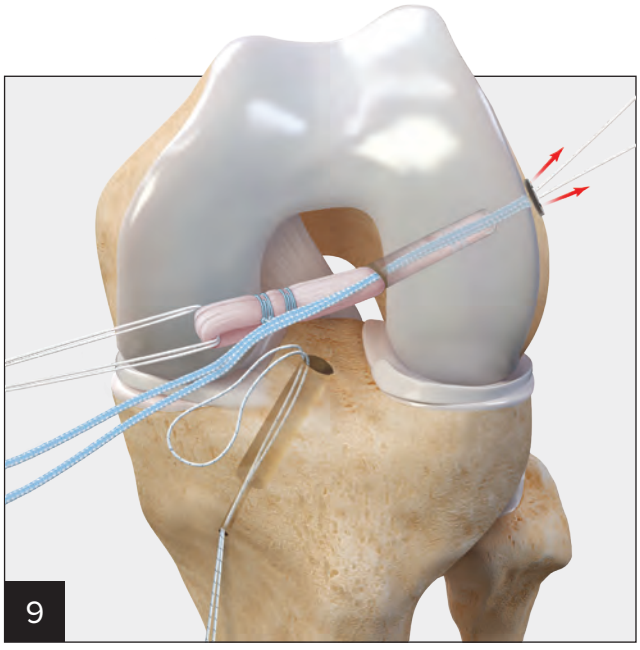
Tap in the stepped drill guide sleeve and flip the FlipCutter® II reamer blade, locking it into cutting position. Drill on forward with distal traction to ream the socket. Use the rubber ring gauge and 5 mm markings on the FlipCutter II reamer to measure socket depth (inset).



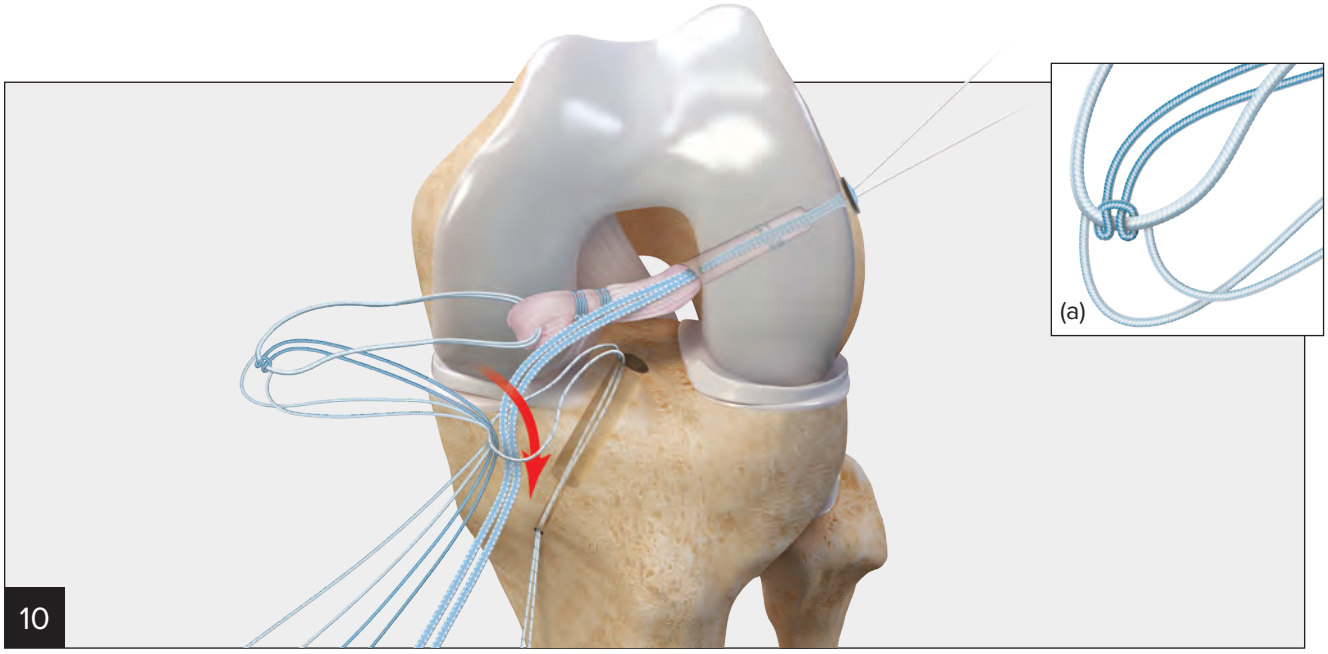
Straighten the FlipCutter II reamer's blade and remove it from the joint. Pass a TigerStick® suture into the joint. Retrieve both the tibial TigerStick suture and the femoral FiberStick™ suture from the medial portal with an open suture retriever. Retrieving both sutures at the same time will help avoid tissue interposition that can complicate graft passing. ***Note: A PassPort Button™ cannula may also be used in the medial portal to prevent tangling of sutures.***



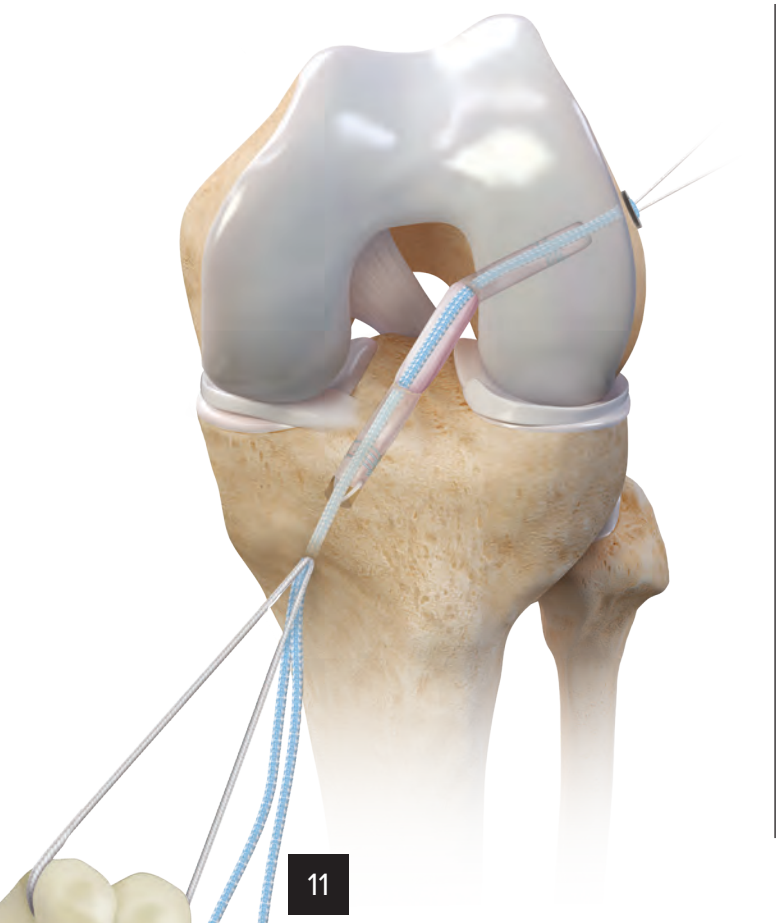
Pass the TigerWire® suture and the white shortening strands through the femur. Remove slack from the sutures and ensure equal tension. Clamp or hold both blue and white sutures together and pull them to advance the button out of the femur. Use markings on the loop and arthroscopic visualization of the button to confirm exit from the femoral cortex. Pull back on the graft to confirm that 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 TightRope® ABS implant loop to use for passing (a). Load the cinch suture and the whipstitch tails from the graft into the tibial passing suture. Pull distally on the tibial passing suture to advance both the TightRope ABS implant loop and whipstitch sutures out of the tibia distally.

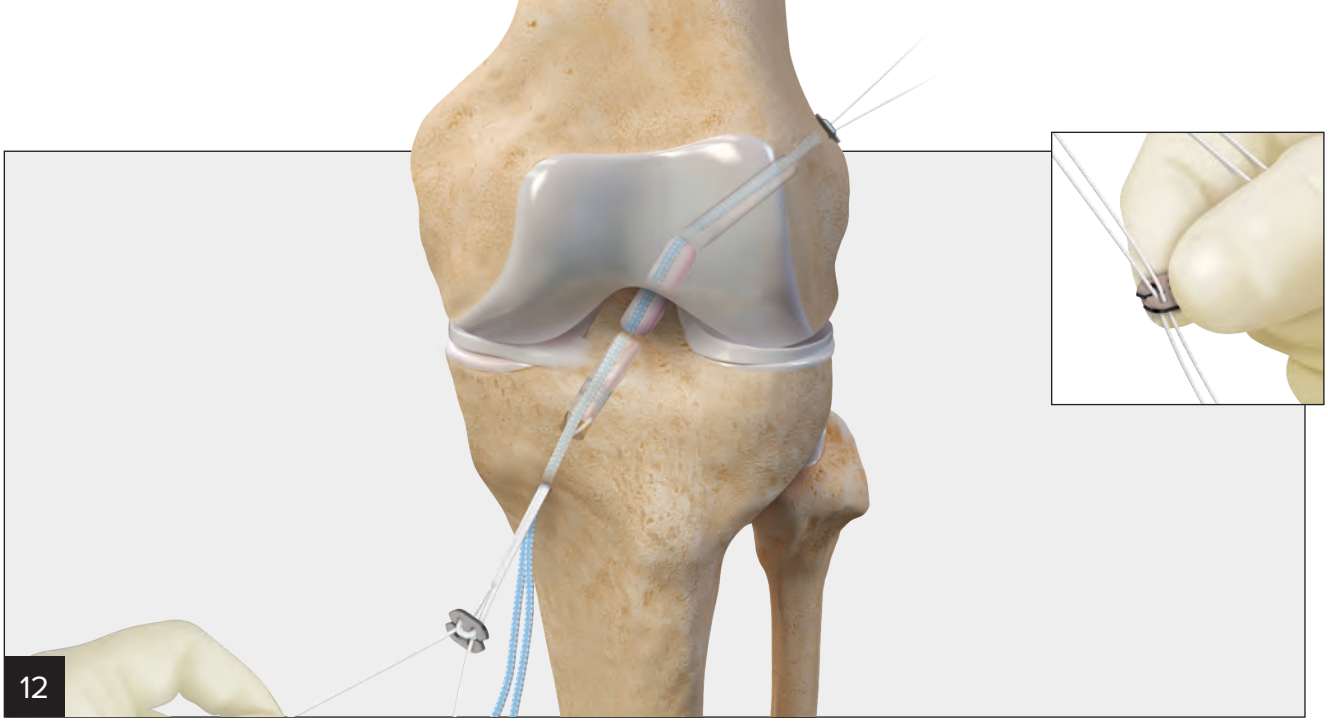


Remove the cinch suture from the TightRope ABS implant. Advance the graft into the tibia by pulling on the inside of the ABS loop and whipstitch sutures.

Concave ABS Buttons

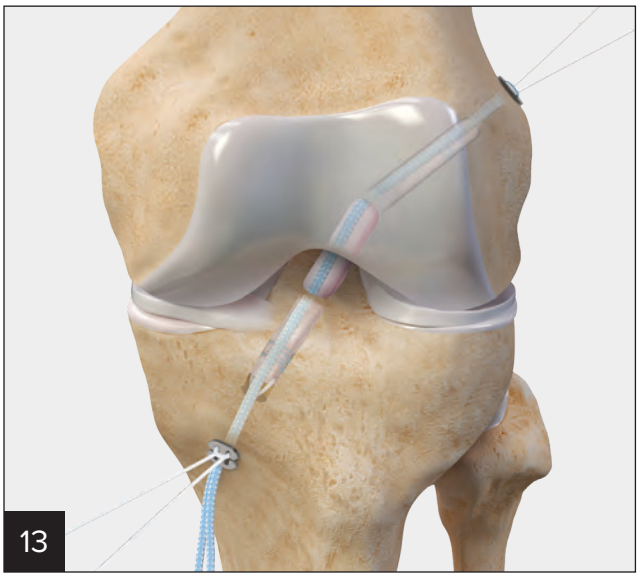
Concave ABS buttons are an ideal option for full tunnels. The centering feature maintains button position over the tunnel and provides a better seal at the cortex than standard flat buttons. The concave surface countersinks sutures and knots. The 14 mm and 20 mm buttons have slots for the TightRope implant loop along with 2 holes for additional sutures.

Concave ABS Buttons (AR-1588TB-3 – 5)

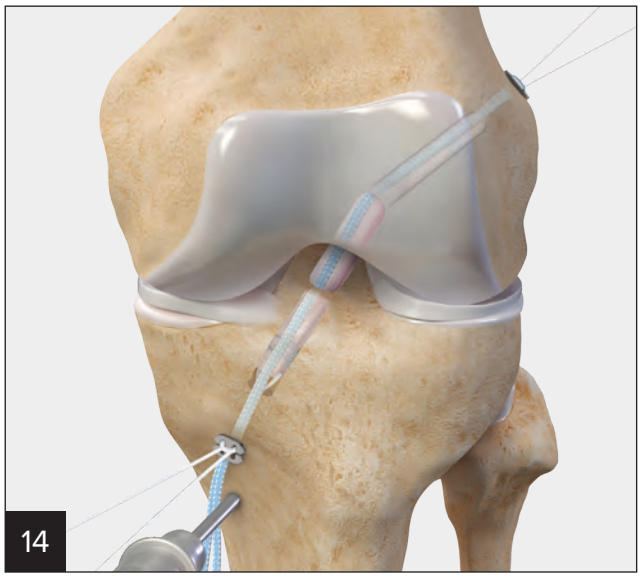


Load the TightRope® ABS button onto the loop. Pull on the white shortening strands to advance the button to bone and tension the graft. ***Note: Ensure that the button has a clear path to bone, as to not entrap soft tissue under the button.***

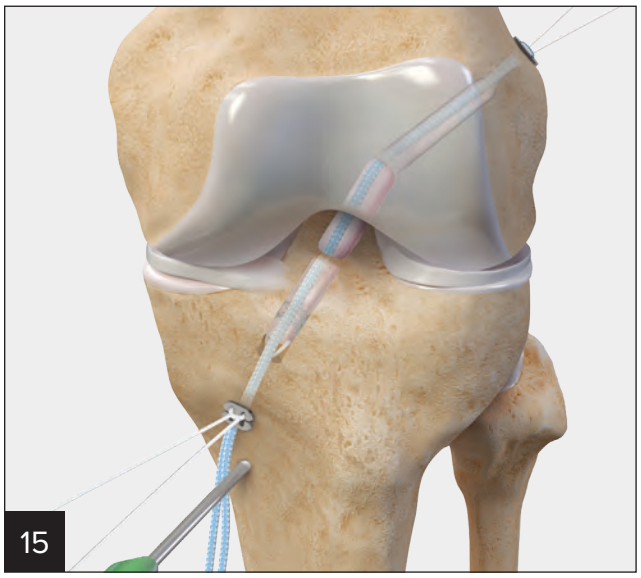
TightRope ABS Implant (AR-1588TN)



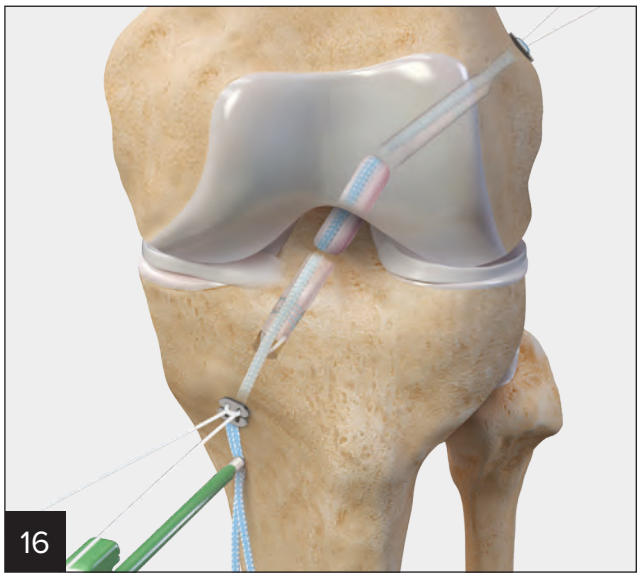
With the knee in extension, preliminarily draw the TightRope suture to the TightRope button without tensioning.



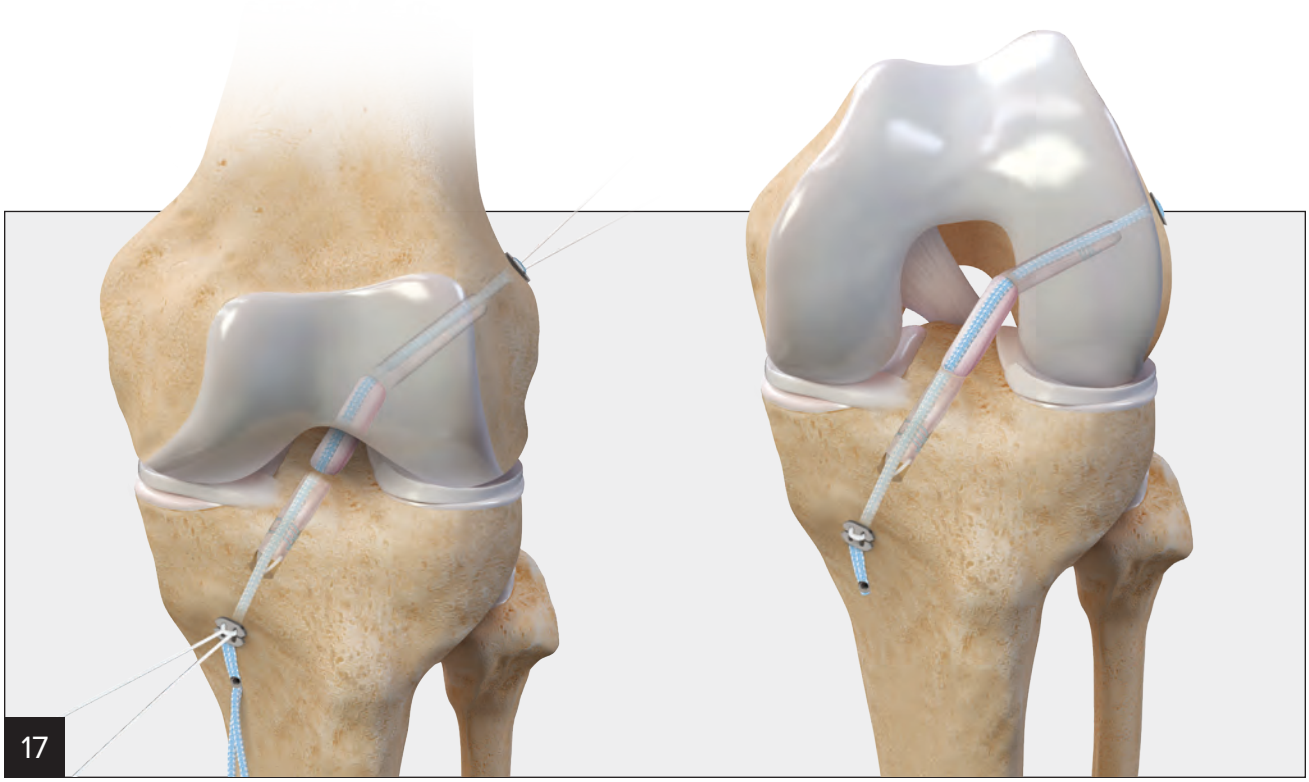
Use the spade-tip drill to drill into the tibia to the depth of the drill collar. This represents a 20 mm depth.



Use the disposable 4.75 mm tap in the drilled hole. Tap the socket with the knee in extension.



Pass the FiberTape® suture through the eyelet of the 4.75 mm BioComposite SwiveLock® anchor. Push the anchor into the drill hole until the eyelet is fully seated. Maintain tension on the suture limbs and screw the biocomposite anchor into the tibia. After removing the driver, keep the knee in extension and remove the retention suture from the anchor.



The TightRope® sutures are fully tensioned. After the knee is cycled several times, the TightRope sutures can be tensioned again with the knee in extension.

Ordering Information

Implants

Product Description	Item Number
ACL TightRope® RT Implant	AR-**1588RT-J**
TightRope ABS Implant	AR-**1588TN**

ABS Buttons

Product Description	Item Number
TightRope ABS Button	AR-**1588TB**
Concave ABS Button, 11 mm, 14 mm, 20 mm	AR-**1588TB-3 – 5**

Instruments (FlipCutter® II Technique)

Product Description	Item Number
ACL ToolBox	AR-**1900S**
FlipCutter® II Reamers, 6 mm-13 mm	AR-**1204AF-60 – 130**
Short FlipCutter II Reamers, 6 mm-13 mm	AR-**1204AS-60 – 130**
Side-Release RetroConstruction™ Handle	AR-**1510HR**
Stepped Drill Guide Sleeve	AR-**1510FS-7**
TightRope RT Implant System, w/ 8 mm, 9 mm, 10 mm, and 11 mm FlipCutter II Reamers	AR-**1588RT-07, 18, 11, 13**

Instruments (Medial Portal Technique)

Product Description	Item Number
Transportal ACL Guides (TPG), 4 mm-8 mm	AR-**1800-04 – 08**
Low-Profile Reamers, 5 mm-13 mm	AR-**1405LP – 1413LP**
TightRope Drill Pin, open	AR-**1595T**
TightRope Drill Pin, closed	AR-**1595TC**
ACL TightRope RT Implant Delivery System, w/ ACL TightRope Drill Pin	AR-**1588RTS**

Accessories

Product Description	Item Number
Suture Retriever	AR-**12540**
Graft Tube Set	AR-**1886-S**
GraftPro™ Graft Prep System Case	AR-**2950DC**
GraftPro Graft Prep System Board	AR-**2950D**
GraftPro Graft Prep System Posts, qty. 2	AR-**2950AP**
GraftPro Graft Prep System Soft Tissue Clamps, qty. 2	AR-**2950SC**
GraftPro Graft Prep System w/ RetroButton® Button Holder	AR-**2950BH**
GraftPro Graft Prep System w/ GraftLink® Holder	AR-**2950GH**
GraftPro Graft Prep System w/ GraftLink Tensiometer	AR-**2950GT**
Graft Sizing Block	AR-**1886**
Suture Cutter for ACL TightRope Implant	AR-**4520**
Atraumatic Hamstring Harvester	AR-**10300**
Minimally Invasive Hamstring Harvester	AR-**1297L**
ACL Backup Fixation System	AR-**1593**

Suture Options

Product Description	Item Number
#2 FiberWire® Suture, 38 in (blue) w/ 1 straight diamond-point needle	AR-**7246**
#2 FiberWire Suture, 38 in (blue) w/ 2 straight diamond-point needles	AR-**7246-02**
FiberStick™ Suture, #2 FiberWire suture, 50 in (blue), 1 end stiffened	AR-**7209**
TigerStick® Suture, #2 TigerWire® suture, 50 in (white/black), 1 end stiffeneed	AR-**7209T**
FiberTape® Suture, 36 in	AR-**7237**

Products may not be available in all markets because product availability is subject to the regulatory approvals and medical practices in individual markets. Please contact Arthrex if you have questions about the availability of products in your area.

References

1. Smith PA, DeBerardino TM. Tibial fixation properties of a continuous-loop ACL hamstring graft construct with suspensory fixation in porcine bone. *J Knee Surg.* 2015;28(6):506-512. doi:10.1055/s-0034-1394167.
2. Blackman AJ, Stuart MJ. All-inside anterior cruciate ligament reconstruction. *J Knee Surg.* 2014;27(5):347-352. doi:10.1055/s-0034-1381960.
3. Benea H, d'Astorg H, Klouche S, Bauer T, Tomoaia G, Hardy P. Pain evaluation after all-inside anterior cruciate ligament reconstruction and short-term functional results of a prospective randomized study. *Knee.* 2014;21(1):102-106. doi:10.1016/j.knee.2013.09.006.
4. Nawabi DH, McCarthy M, Graziano J, et al. Return to play and clinical outcomes after all-inside, anterior cruciate ligament reconstruction in skeletally immature athletes [abstract]. *Orthop J Sports Med.* 2014;2(suppl 2):2325967114S00038. doi:10.1177/2325967114S00038.
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