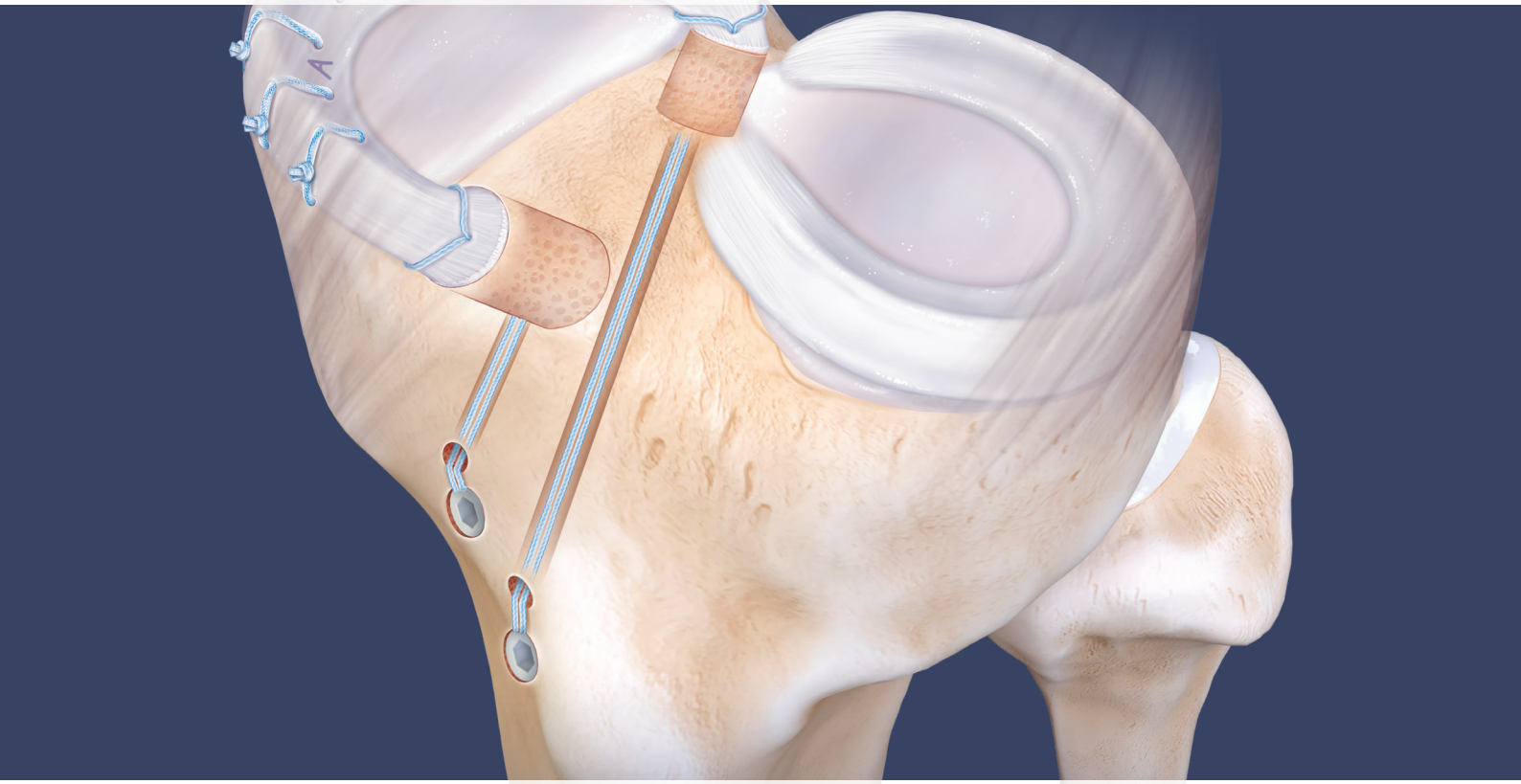
Double Bone Plug Meniscus Allograft Transplantation

Surgical Technique

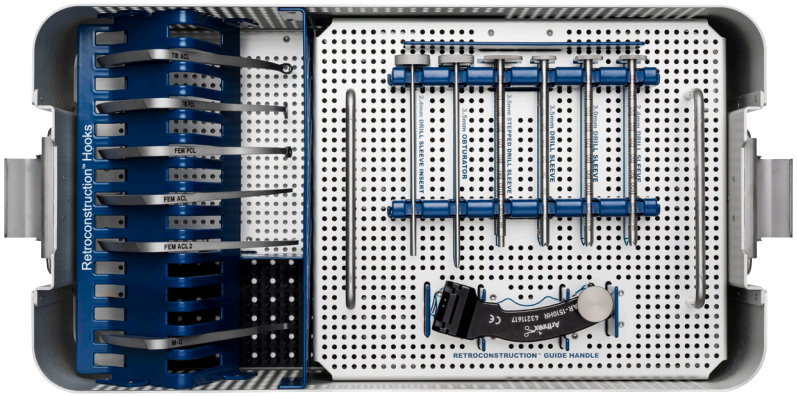


Arthrex®

Double Bone Plug Technique

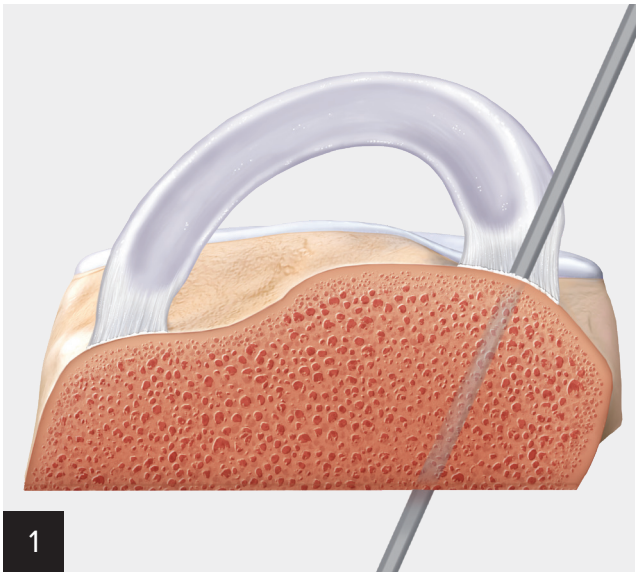
The double bone plug technique for meniscal allograft transplant (MAT) provides a method for implanting the meniscal allograft with rigid fixation at the horn attachments. It has been demonstrated that bony fixation at the attachment site allows for the maintenance of functional hoop stress by the meniscal allograft.[1]

Graft Preparation
Allow 25 minutes to thaw the graft. Proper handling instructions are included with the graft.



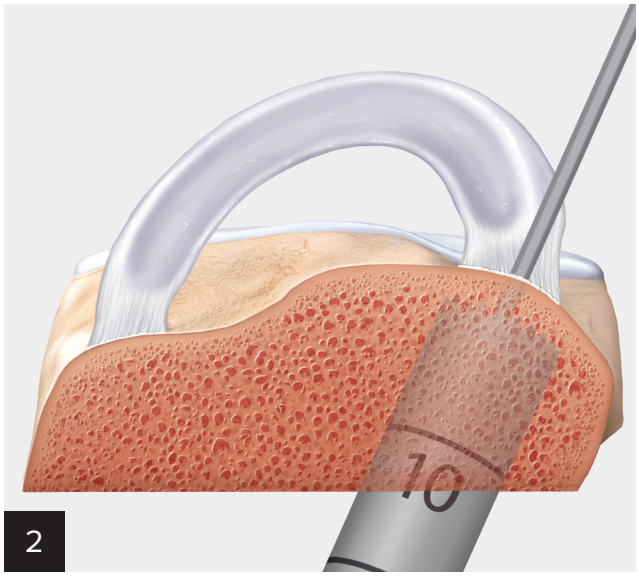
- RetroConstruction™ Drill Guide System Instrument Set (AR-**1510S**)

Graft Preparation | **Option 1:** Coring Reamer Technique



Drill a 2.4 mm guide pin through the attachments of the allograft at angles that approximate the tunnel to be drilled in the tibia. The pin hole should be extended through the middle of the bone bridge.

Note: Use a collared pin and coring reamer of corresponding size.

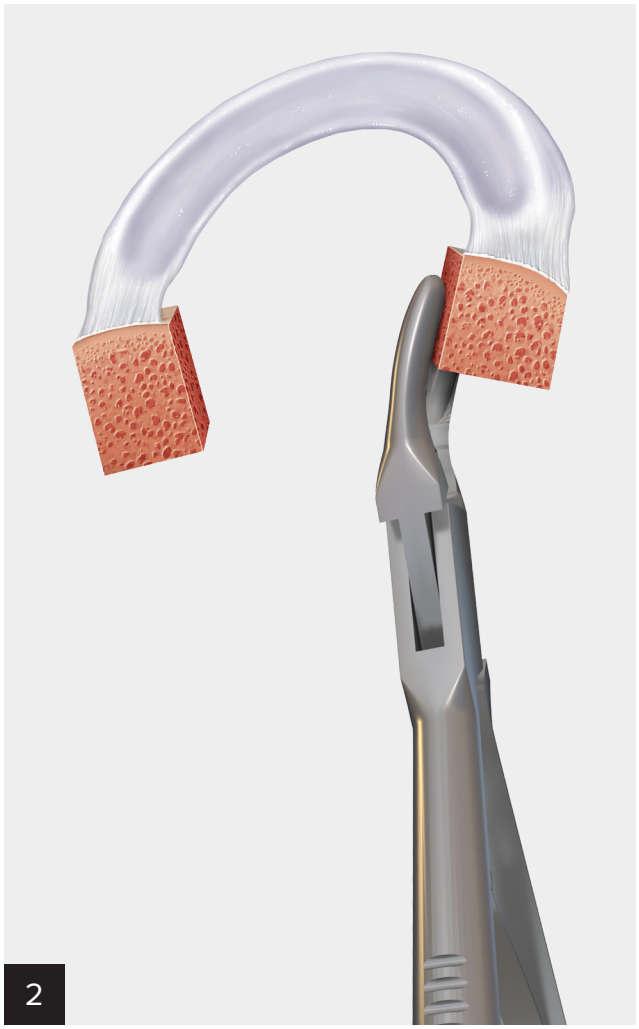


Insert a collared pin into the bottom of the bone bridge so a coring reamer can be used to cut a dowel.

Graft Preparation | **Option 2:** Freehand Technique

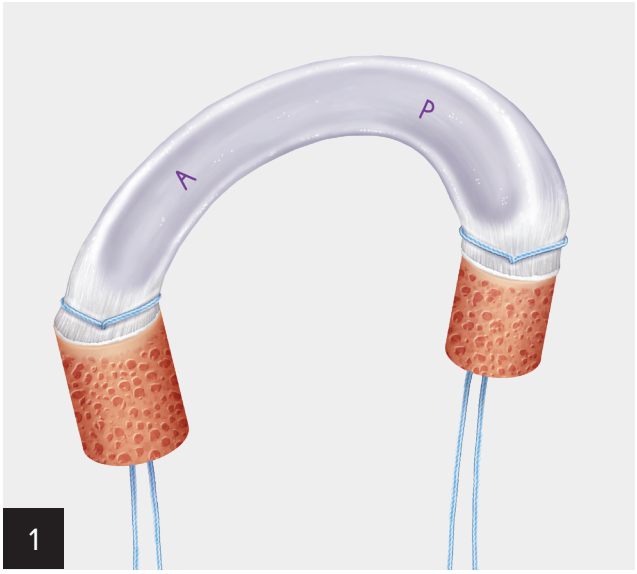
Using a 1 mm microsagittal saw, make four box cuts around each of the meniscal horns. Start with the posterior cut, then the anterior cut. Create the medial and lateral cuts. Make these cuts in the same trajectory as the retrograde drilled socket that will be prepared later. Move to the medial side and retract the meniscus to protect the attachment in preparation for the next cut. Make the sagittal cuts about 10 mm medial to the lateral wall of the graft.

To release the bone plug from the donor, cut the meniscus bone block to a depth of 10 mm.



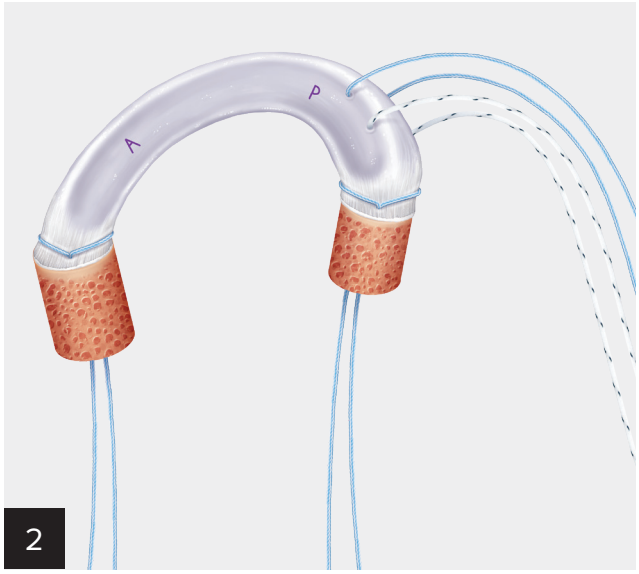
Use a freehand technique to tubularize the bone plugs using a rongeur and/or a bone cutter tool. Prepare the plugs to have a 7 mm to 8 mm posterior diameter (8 mm long) and a 9 mm anterior diameter (10 mm long).

Suture Passing



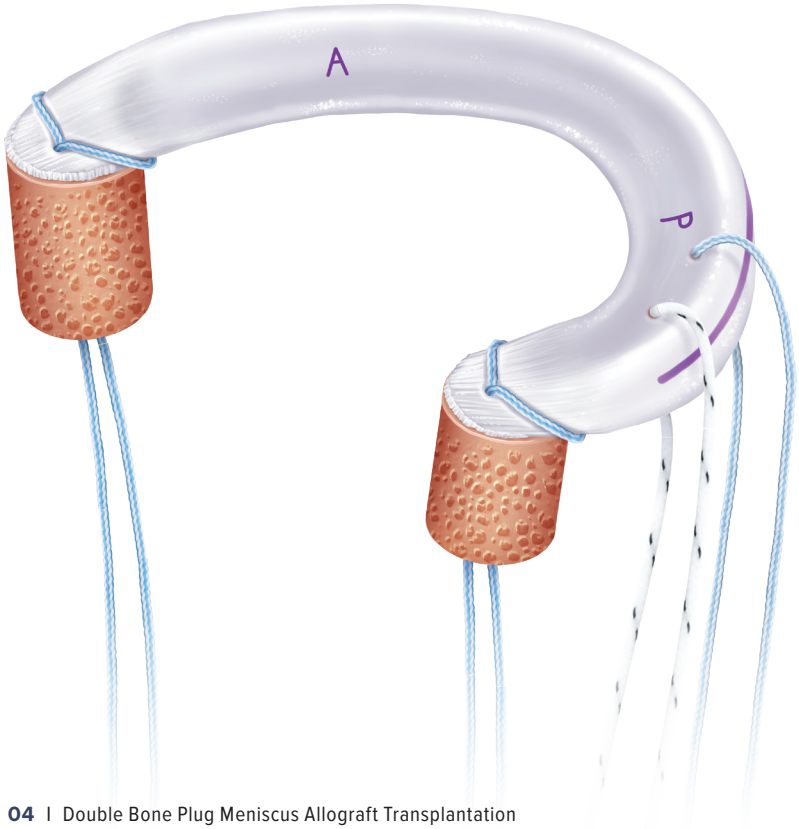
Pass #2 FiberLoop® suture through the posterior plug. Place a modified Kessler or horizontal mattress suture incorporating meniscal tissue through the posterior attachment. Pull the suture back down through the posterior plug. Prepare the anterior plug similarly with #2 FiberWire® suture.

Note: Complete these two steps for either technique.



Place two vertical #2 FiberWire sutures in the meniscus. The first is the posterior horn vertical suture 5 mm from posterior bone plug. The second is the midbody vertical suture 15 mm from the posterior horn suture toward the body of the meniscus. These provide two permanent sutures that will be tied over the capsule posteriorly upon implantation of the construct.

Mark the anterior of the graft with an “A.” Not only will this denote the anterior portion, it will show where the last (most anterior) stitch should be placed on the graft. Mark the posterior of the graft with a “P.”

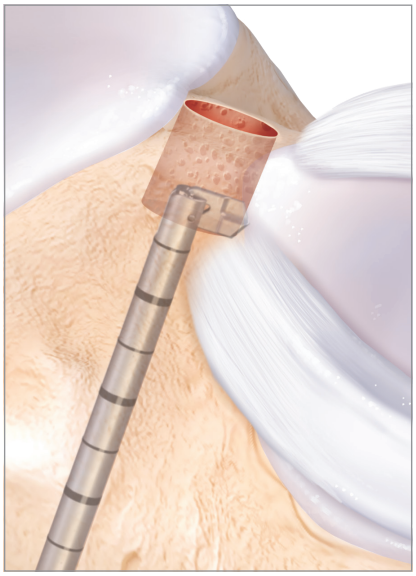


- **Note: It can be beneficial to colorize the posterior rim so when the graft is passed, the color acts as a visual indicator to show that the graft has not rotated or twisted across the joint.**

Posterior Tunnel Preparation

Anatomic position: Drill the posterior horn socket in a retrograde manner through the anterior-most portion of the residual nub of the meniscus attachment point. It should be appropriately and anatomically juxtaposed to the PCL. This socket should be just off the shoulder of the cartilaginous portion of the plateau and just behind the eminence medially.

1

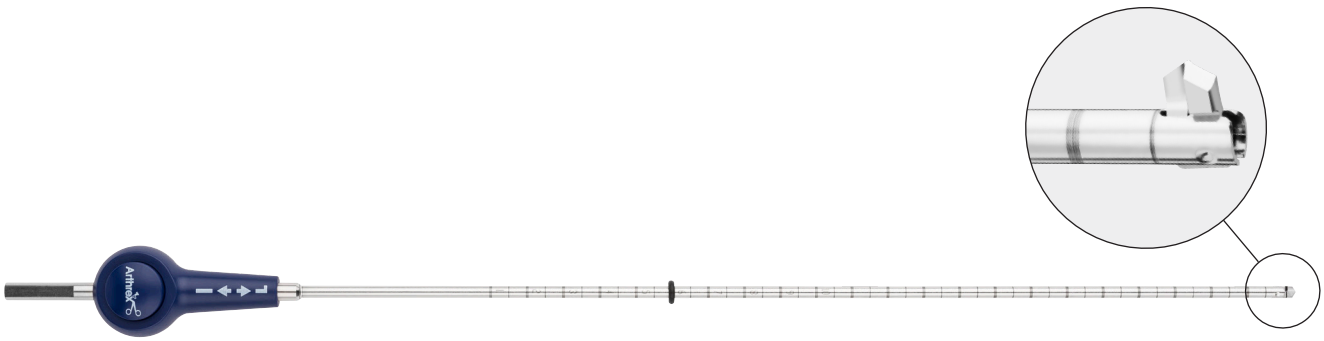


Position the RetroConstruction™ guide with the meniscal root marking hook on the middle of the posterior remnant attachment at an angle that is as perpendicular to the tibial plateau as possible.

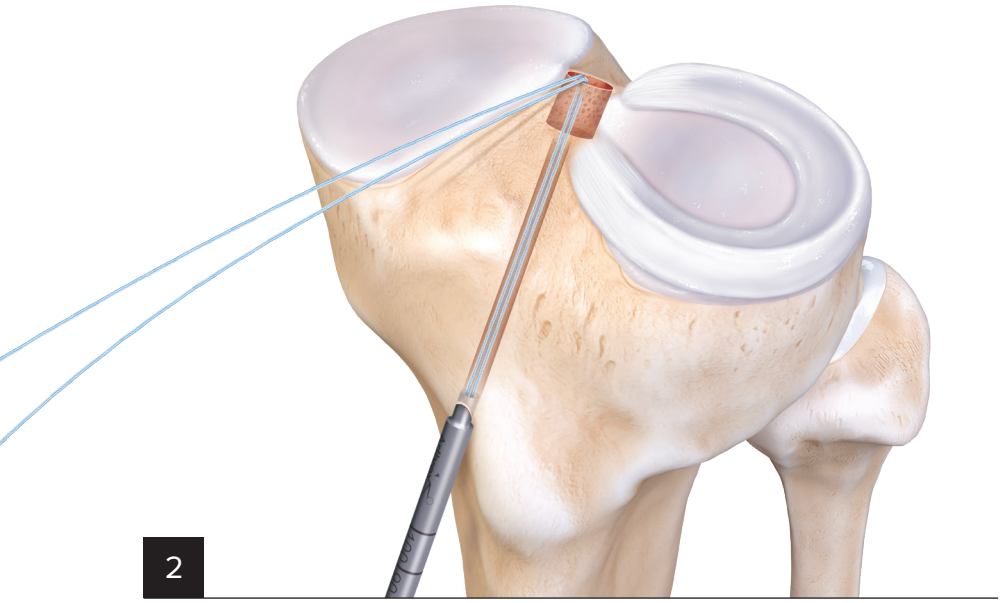
Choose a FlipCutter® drill size 1 mm larger than the diameter of the posterior plug on the donor meniscus. Drill the FlipCutter reamer into the middle of the posterior remnant. Remove the guide and tap the cannula into bone.

Flip the FlipCutter II drill into its cutting position and drill backward to a depth of 10 mm. Use the rubber grommet on the FlipCutter II drill to measure the 10 mm distance.

After drilling the posterior tunnel, use a curved rasp or shaver to remove any extraneous pieces of tissue from around the tunnel's superior rim. Any piece of soft tissue or cartilage will present difficulties in reducing the posterior plug.



- FlipCutter II Drill (AR-**1204AF-90**)



2

Pass a FiberStick™ suture through the FlipCutter® drill sleeve and retrieve the passing sutures through the medial portal.

3

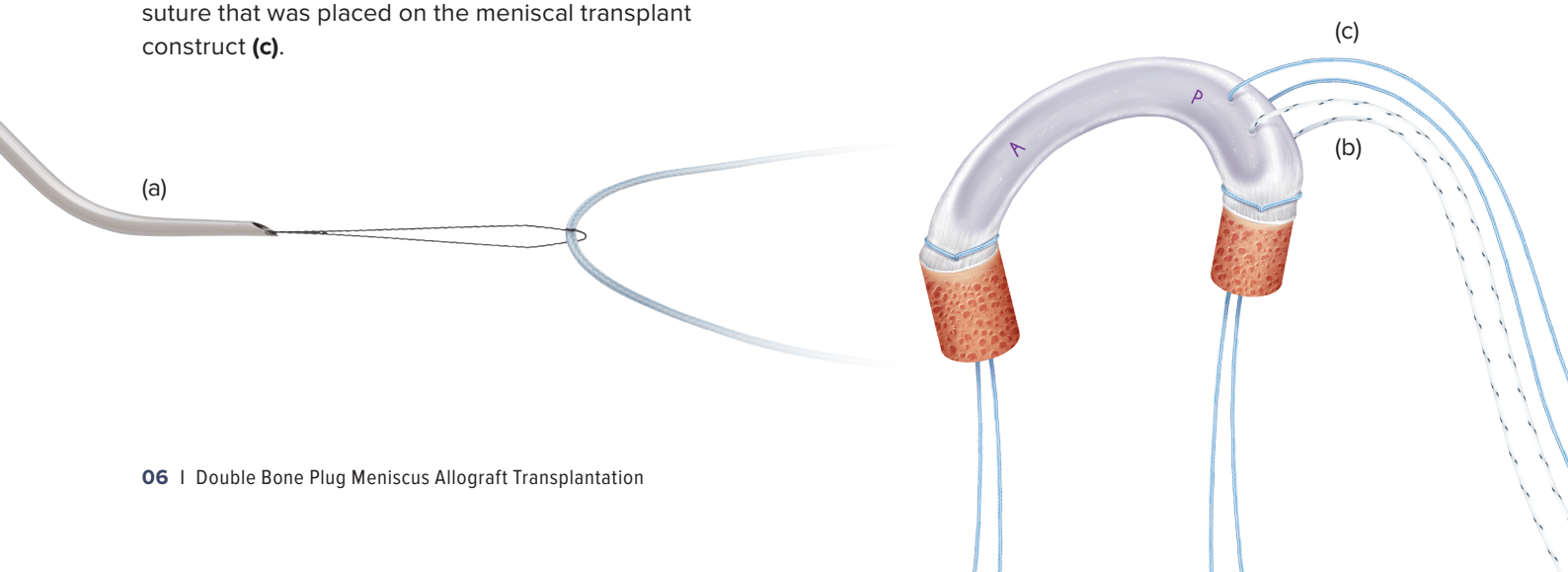
For graft passage and fixation, follow a standard inside-out suturing technique with a 4 cm incision made on the posteromedial aspect of the knee.

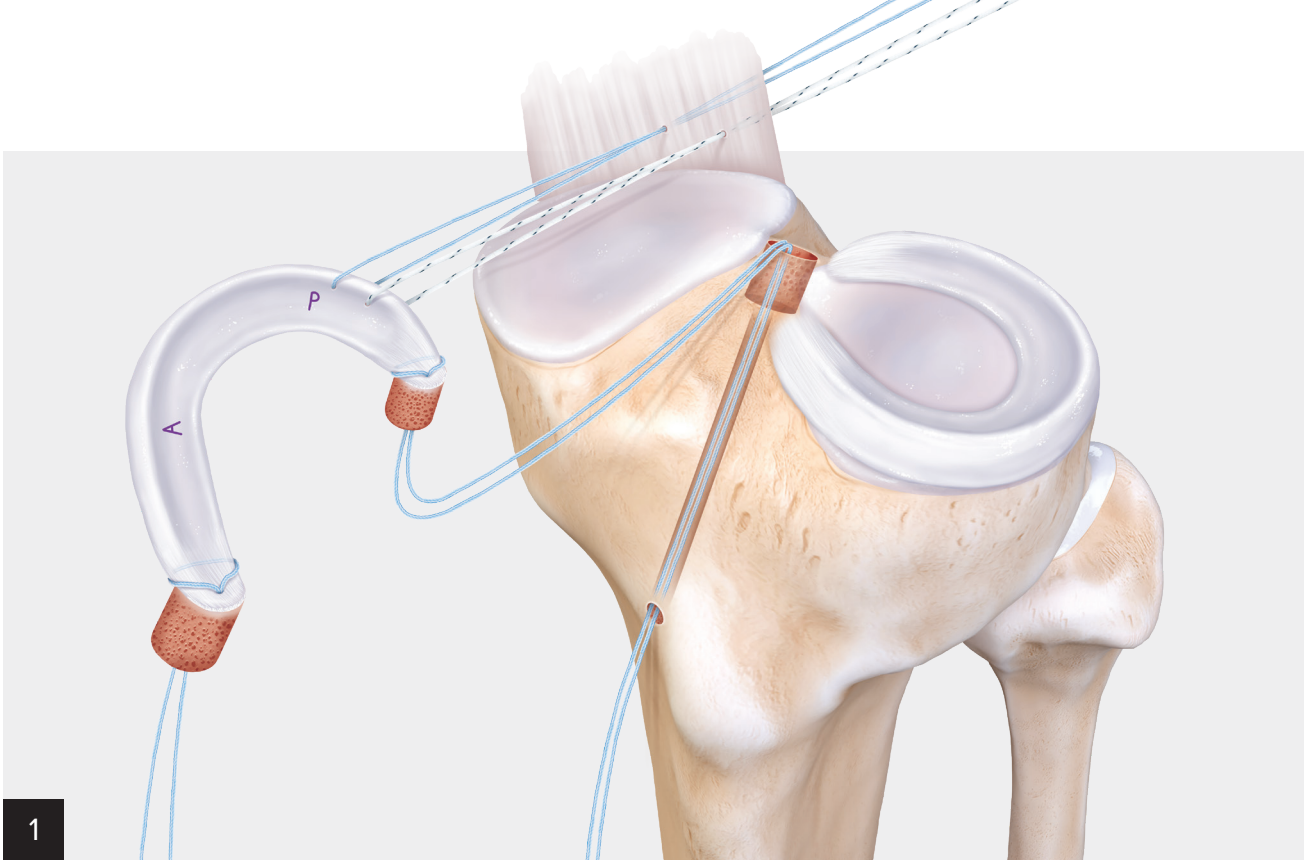
Dissect down to the medial head of the gastrocnemius. Follow the tissue plane anterior to the gastrocnemius and bluntly dissect further to the posteromedial capsule.

Passing the Allograft

With direct visualization and the inside-out technique, pass a Micro SutureLasso™ suture passer **(a)** through the notch in the dilated portion that was created for the passage of the posterior horn. Use the suture passer to move the passing suture out of the posterior capsule. Then use the passing suture to deliver the posterior horn vertical suture **(b)** that was placed on the meniscal transplant construct. With the knee in valgus position, use the same technique to place a second passing suture at the midbody of the capsule. This passing suture will be used to deliver the midbody vertical suture that was placed on the meniscal transplant construct **(c)**.

Note: A PassPort Button™ cannula can aid in suture management and avoid a soft-tissue bridge between passing sutures. The cannula should be used in at least one anterior portal that is ipsilateral to the transplant. This is critical so the graft does not twist on itself during implantation. Be sure to remove the cannula before passing the allograft while maintaining suture segregation.





Pass the three posterior passing sutures on the allograft in the following order:

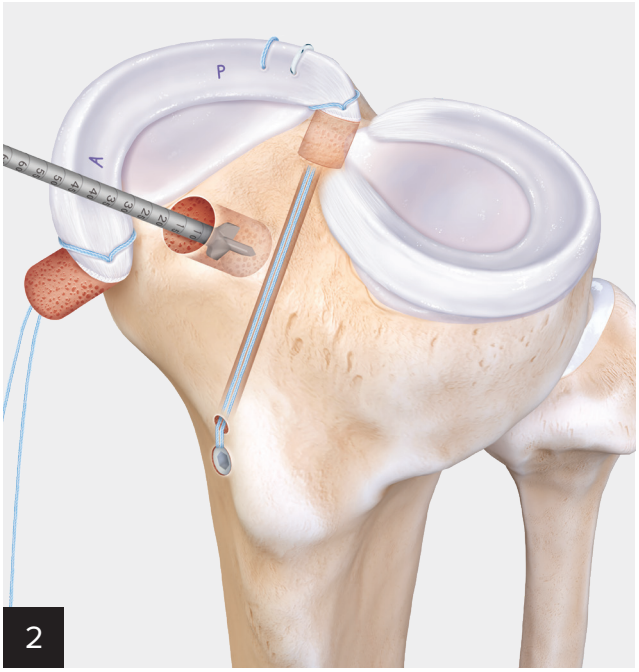
1. Pass the suture on the posterior bone plug with the previously place posterior shuttle suture through the posterior socket and down the tunnel.
   - **Note: Do not pass the meniscus at this time.**
2. Pass the posterior horn passing sutures.
3. Pass the midbody passing sutures.

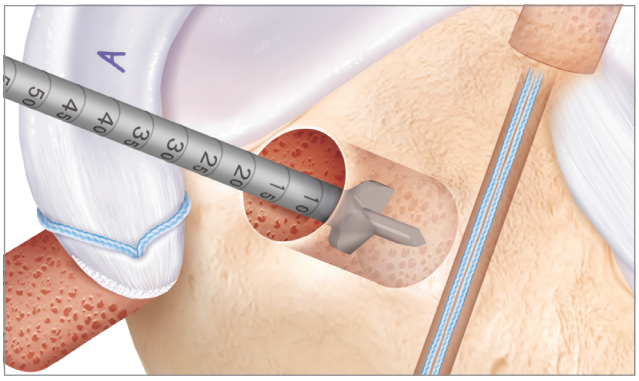
Prepare for graft insertion by applying valgus stress on the knee. Begin inserting the allograft by leading with the posterior horn.

Continue to take up any slack in the other sutures as the allograft is inserted. Use a probe to help guide the posterior bone plug into place. Use a meniscal probe or blunt instrument to maneuver the posterior plug into position while applying gentle traction on the posterior suture.

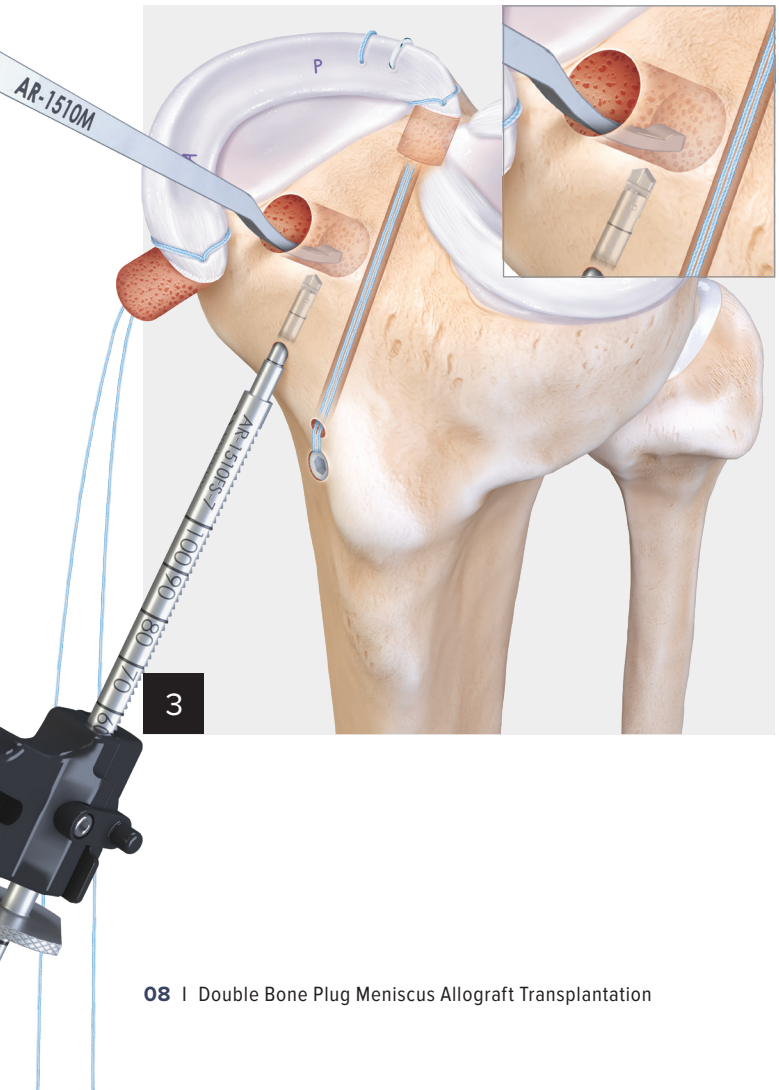
Visualize to ensure that the plug and the meniscus have reduced properly. Pass the posterior horn suture through the capsule and midbody sutures and tie.

Securing the Anterior Plug



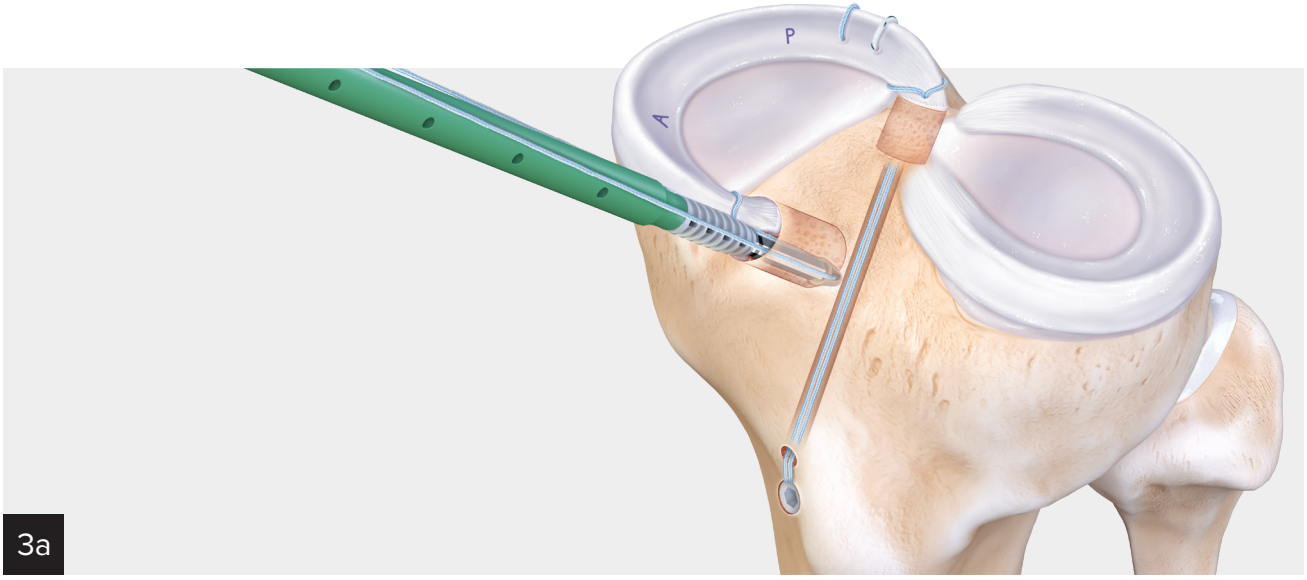


Use the 2.4 mm drill sleeve to help protect the patella and soft tissues to deliver a 2.4 mm pin in the correct anatomic position of the anterior meniscus attachment. Use a low-profile reamer to drill a 10 mm-deep socket. Ensure the anterior horn sutures are safely out of the way before drilling.



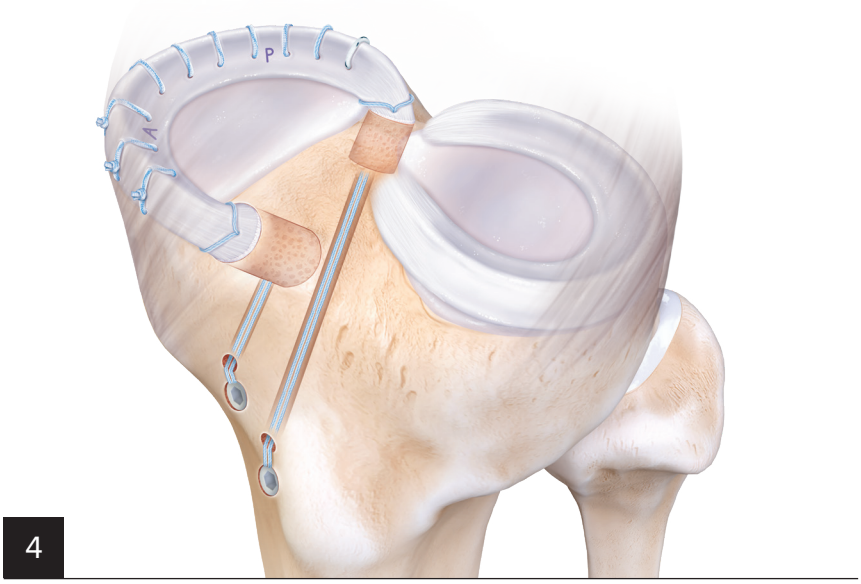
Using the multiuse marking hook, position the RetroConstruction™ guide into the anterior tunnel. Tap the stepped 3.5 mm drill sleeve of the FlipCutter® reamer cannula onto the tibia to create an orthogonal angle to the anterior bone plug socket. Drill the FlipCutter reamer to the socket, taking care not to flip the FlipCutter reamer. Pass a FiberStick™ suture through the drilled tunnel and retrieve through the medial portal. Pass the anterior bone plug sutures through the tunnel, and using a probe, maneuver the anterior plug into the socket.

Pass the anterior bone plug sutures through the eyelet of a 4.75 mm SwiveLock® anchor. Tension the sutures to achieve full reduction of the bone plug into the socket and place the anchor into the tibia to complete anterior bone plug fixation. Alternatively, use a suture button to complete fixation.



3a

Alternate fixation method: Use a SwiveLock® anchor to press fit the bone plug in the socket. The leading edge of the SwiveLock anchor reduces the bone plug. Place the trailing aspect of the SwiveLock anchor on the notch side of the bone plug; this acts as an interference screw to lock the anterior bone plug and meniscus in place.



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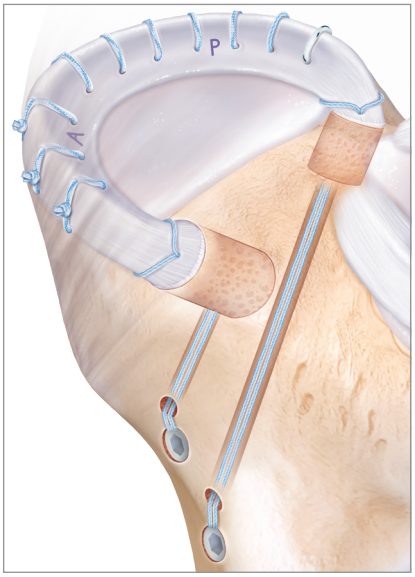
The anterior sutures of the meniscocapsular interface may be placed under direct visualization. Size 2-0 absorbable suture is frequently used for this application. The arthrotomy should be closed so the remaining sutures can be placed using the ZoneNavigator™ system **(a)** with 2.0 SutureTape meniscus repair needles.



Routinely, 6 to 8 sutures are used to secure the peripheral interface.

Note: Vertical sutures provide additional strength.

Ordering Information

Product Description	Item Number
RetroConstruction™ Drill Guide Set	AR-**4555S**
Side-Release RetroConstruction Handle	AR-**1510HR**
Meniscal Root Marking Hook	AR-**1610MR**
Locking Guide for Meniscal Root Marking Hook	AR-**1610LG**
Coring Reamer and Collared Pin Set, 9 mm	AR-**1223S**
Coring Reamer and Collared Pin Set, 10 mm	AR-**1224S**
Low-Profile Reamer, 10 mm	AR-**1410LP**
Suture Retriever	AR-**12540**
Suture Cutter	AR-**12250**
Knee Scorpion™ Suture Passer	AR-**12990**

Disposables

Product Description	Item Number
Meniscal Root Repair Kit	AR-**4550**
Knee Scorpion Needle	AR-**12990N**
#2 FiberLoop® Suture, w/straight needle	AR-**7234**
FiberStick™ Suture, #2 FiberWire® suture, 50 in	AR-**7209**
TigerStick® Suture, #2 TigerWire® suture, 50 in	AR-**7209T**
#2 FiberWire Suture, 38 in w/ tapered needle	AR-**7200**
Micro SutureLasso™ Suture Passer, minor bend	AR-**8701**
FlipCutter® II Reamers, 6 mm – 13 mm	AR-**1204AF-60–130**
Suture Button, 3.5 mm	AR-**8920**
Suture Button, round,12 mm	AR-**8922**
ZoneNavigator™ System	
System Handle	AR-**7900**
System Cannula, anterior	AR-**7905**
System Cannula, mid/posterior, left	AR-**7910L**
System Cannula, mid/posterior, right	AR-**7910R**
Mini SutureTape Meniscus Repair Needles w/ 0.9 mm SutureTape and 2 Needles	AR-**7523**
Suture	
2-0 FiberWire Meniscus Repair Needles	AR-**7223**
Protector™ Meniscus Suturing Set	AR-**4060S**
Meniscal Repair Joystick System	AR-**4007JS**
Anchors	
BioComposite SwiveLock® Anchor, 4.75 mm × 19.1 mm, closed eyelet	AR-**2324BCC**
Spade-Tip Drill for 5.5 mm BioComposite SwiveLock Anchor	AR-**1927D**
PassPort Button™ Cannulas	
PassPort Button Cannulas, 6 mm × 2 cm – 5 cm	AR-**6592-06-20 – 50**
PassPort Button Cannulas, 8 mm × 2 cm – 5 cm	AR-**6592-08-20 – 50**
PassPort Button Cannulas, 10 mm × 2 cm – 5 cm	AR-**6592-10-20 – 50**

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 your Arthrex representative if you have questions about the availability of products in your area.

Reference

1. Chen MI, Branch TP, Hutton WC. Is it important to secure the horns during lateral meniscal transplantation? a cadaveric study. *Arthroscopy.* 1996;12(2):174-181. doi:10.1016/s0749-8063(96)90007-9