

# All-Inside Meniscal Repair with the ULTRA FAST-FIX<sup>◇</sup> Meniscal Repair System

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## Reviewed by:

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# All-Inside Meniscal Repair with the ULTRA FAST-FIX<sup>®</sup> Meniscal Repair System

## Introduction

Repair of peripheral and red/white meniscal tears has become the standard of care as evidence accumulates supporting meniscal preservation and its role in joint nutrition, lubrication, stability, load transmission, shock absorption, neuromuscular proprioception, and prevention of intra-articular chondrosis and arthrosis.

Inside-Out and Outside-In procedures require additional incisions and dissection to avoid neurovascular complications and have the potential to cause capsular tethering, neuroma formation, and suboptimal repair tension secondary to knot tying over excess tissue. In addition, prolonged intraoperative and tourniquet time can cause increased pain and morbidity as well as increased anesthesia costs.

The All-Inside arthroscopic approach has gained popularity because of its insertion ease and potential minimization of the aforementioned problems. However, many of the devices used in this approach have demonstrated inferior biomechanical properties and have been associated with breakage, loosening, distraction of the repair, neurological injury, subcutaneous prominence, and articular cartilage abrasion and damage. These complications have contributed to a recent trend back to the Inside-Out and Outside-In techniques, despite their inherent difficulties.

## Overview

The ULTRA FAST-FIX<sup>®</sup> Meniscal Repair System (Photo 1) provides a strong, reproducible, reliable, and time-efficient meniscal repair with equal biomechanical properties to the open vertical mattress suture technique<sup>1</sup>. This result is achieved without the associated comorbidities of Inside-Out or Outside-In meniscal repair and without the need for intra-articular knot tying.

The ULTRA FAST-FIX Meniscal Repair System also gives the surgeon the versatility of placing horizontal or vertical mattress suture fixation, without risk to neurovascular structures. As with all arthroscopic procedures, good visualization of the meniscal tear and adequate arthroscopic distention are essential. To minimize the potential for damage to neurovascular structures, Smith & Nephew recommends the use of the curved delivery needle and the variable depth penetration limiter (as indicated by the meniscal tear position, especially if a vertical mattress suture is utilized).



Photo 1. ULTRA FAST-FIX<sup>®</sup> Meniscal Repair System

## Setup

Each ULTRA FAST-FIX® device contains two 5 mm polymer integrated anchors (resorbable or bio-inert), with a pre-tied, self-sliding knot comprised of #0, non-absorbable, UHMW polyethelene ULTRABRAID® co-braid suture. The entire system is packaged in an easy-to-insert, integrated delivery needle. The anchors are placed into the meniscus sequentially, seated safely beyond the capsule, and are then tightened in a simple manner without the need for arthroscopic knot tying (Photos 2 and 3).

The dark blue sheath comes preset to a depth of 25 mm from the tip of the needle and 17 mm from the back of the implant, which has been shown to avoid neurovascular injury while allowing predictable meniscocapsular placement<sup>2</sup>.

Peripheral, popliteal, hiatal, and mid-1/3 medial meniscus tears may require penetration less than the 17 mm allowed by the dark blue sheath. Use of the meniscal depth probe, in conjunction with the trimmable depth penetration limiter (white plastic sheath), allows controlled penetration (Figures 1a and 1b).

If the trimmable depth penetration limiter is used with the split cannula, then the split cannula should be completely split before inserting it over the white depth penetration limiter, to allow for easier removal.

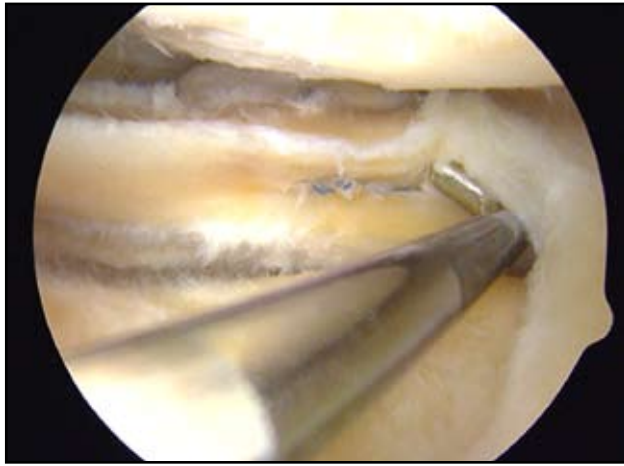


Photo 2. Completed repair - horizontal

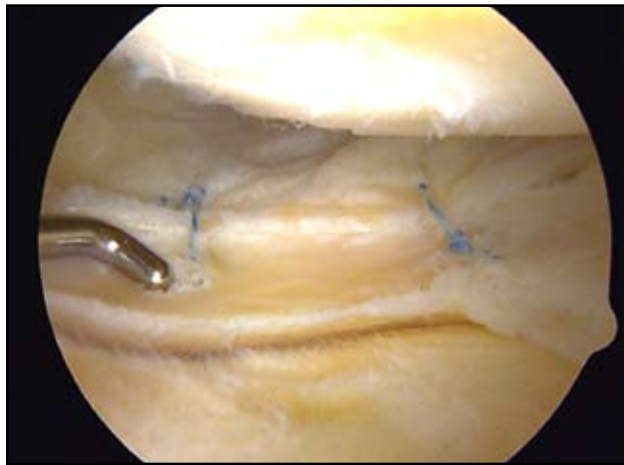


Photo 3. Completed repair - vertical x 2

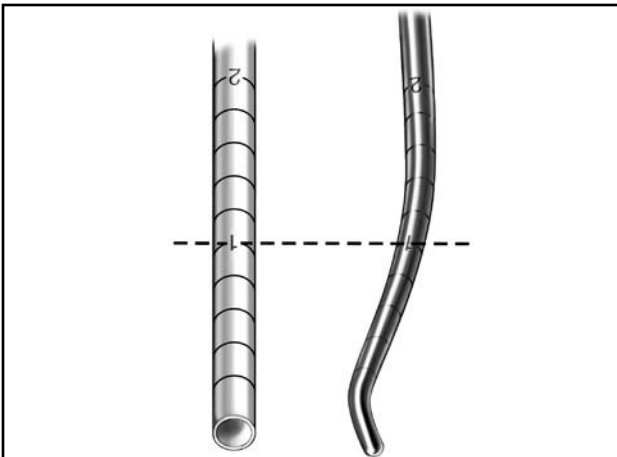


Figure 1a. Trimmable depth penetration limiter and meniscal depth probe



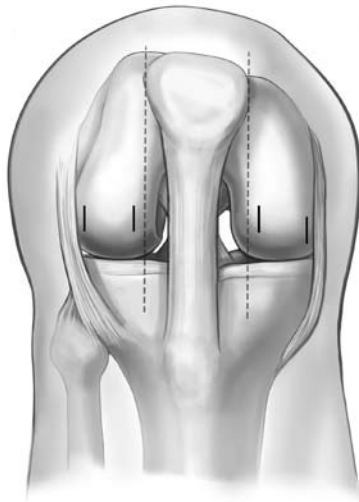
Figure 1b. Trimmable depth penetration limiter



Photo 4. Holding needle like a dart



Photo 5. Metal slotted cannula



#### Vertical Incision

##### Mid-1/3 and Posterior-1/3 Tears

The inferolateral/inferomedial portal should be 5 mm off the patella tendon, 1 cm above the joint line.

##### Anterior-1/3 Tears

The lateral portal should be in front of the iliotibial band, 1 cm above the joint line.

The medial portal should be in front of the medial collateral ligament, 5 mm above the joint line.

The supralateral or supramedial portal can also be used to access the anterior horn.

Figure 2. Portal placement

## Procedure

First, locate the portals using an 18 gauge spinal needle to precisely select the insertion direction/vector. For mid-1/3 and posterior-1/3 tears, make a vertical portal incision 5 mm off the patella tendon and 1 cm above the joint line. For anterior-1/3 tears, position the lateral portal in front of the iliotibial band, 1 cm above the joint line. The medial portal should be made in front of the medial collateral ligament, 5 mm above the joint line. The supralateral or supramedial portal can be used to access the anterior horn.

To create the portals, use a knife to excise the tissue through to the joint and an obturator to dilate the portal. Use a meniscal depth probe to determine if an ipsilateral or contralateral portal is best.

Meniscal tear site preparation is essential and advised. Meniscal rasps and/or arthroscopic shavers are used to stimulate the tear site and the peripheral vasculature.

1. Insert the ULTRA FAST-FIX® Delivery Needle into the appropriate arthroscopy portal, holding it like a dart (Photo 4). Insertion is facilitated through the use of either the metal slotted cannula (Photo 5) or the blue split cannula. Place the ULTRA FAST-FIX device either through the inferior (tibial) or superior (femoral) surface of the meniscus for optimal strength.

**Note:** For the easiest knot sliding and avoidance of the neurovascular bundles, insert the needle perpendicular to the tear using a contralateral approach. Use portals placed adjacent to the patella tendon (Figure 2) to facilitate this procedure.

The split sheath cannula obviates the need for a larger cannula incision and the need to pass the needle through a diaphragm. In addition, it can be partially or totally removed by retraction and peeling.

**Caution:** The opening of the split cannula must be at 90° to the curved ULTRA FAST-FIX® needle to prevent the needle from slipping out as it is introduced into the knee (Figure 3). If using the slotted cannula, make sure the curve of the needle faces down (Figure 3a).

To minimize needle bending, grasp the cannula on the shaft and hold it like a dart or pencil when passing through the fat pad (Photo 4).

**Note:** The pretied, self-sliding knot, included in the ULTRA FAST-FIX device, slides from the first implant (T1) to the second implant (T2). Therefore, placing T1 further away than T2 will facilitate sliding of the knot.

**Note:** Maintaining the needle insertion tip within the arthroscopic view at all times avoids suture tangling.

2. For a horizontal repair, place the first implant (T1) farthest away and advance the needle into the outer meniscal fragment until the implant pops through the meniscus.

For a vertical repair, place the superior implant first and advance the needle into the outer meniscal fragment (bisecting the fragment) until the implant pops through the meniscus (Photo 6).

Using the curved ULTRA FAST-FIX device may facilitate initial penetration.

Using the slotted cannula minimizes needle skiving when accessing more anterior tears. Leave the cannula in to help steer the needle tip.

3. Oscillate the needle approximately 5° and pull the needle out of the meniscus, releasing T1 behind the meniscus (Figure 4).

To reduce the amount of suture in the field of view, slowly pull back on the needle after deploying implant 1. Use a forefinger for control upon withdrawal. Piercing the meniscus by 2–3 mm prior to advancing T2 can also help with suture management.

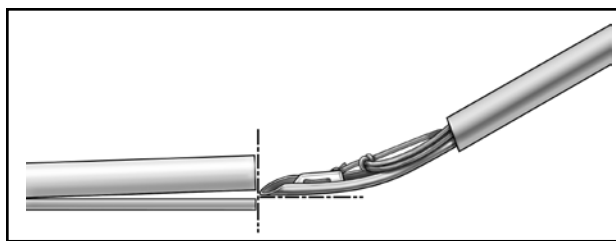


Figure 3. Blue split cannula positioned 90° to the curve of the delivery needle

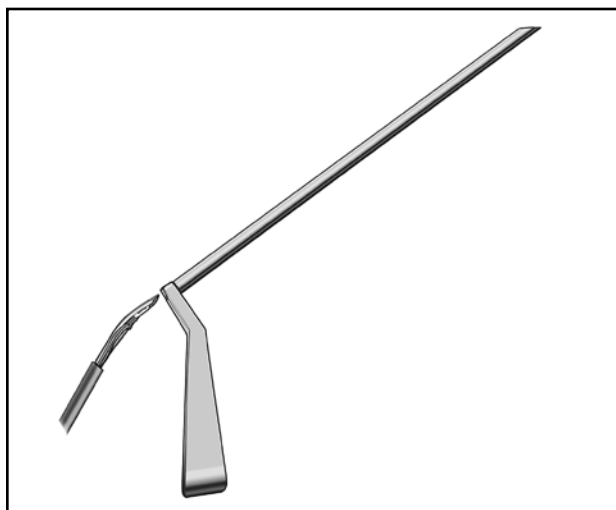


Figure 3a. Needle curve facing down



Photo 6. Implant 1 placed superior to tear

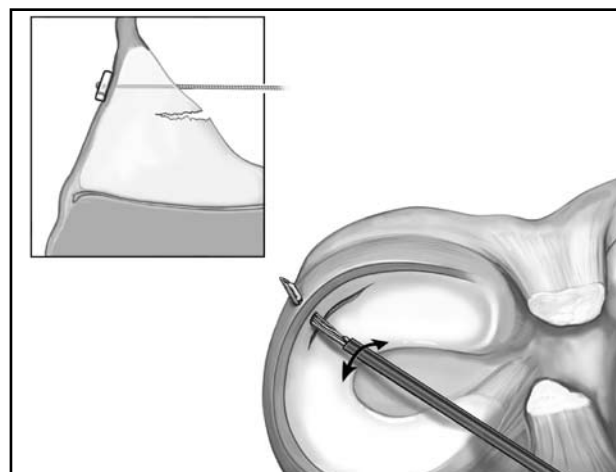


Figure 4. Placement of implant 1

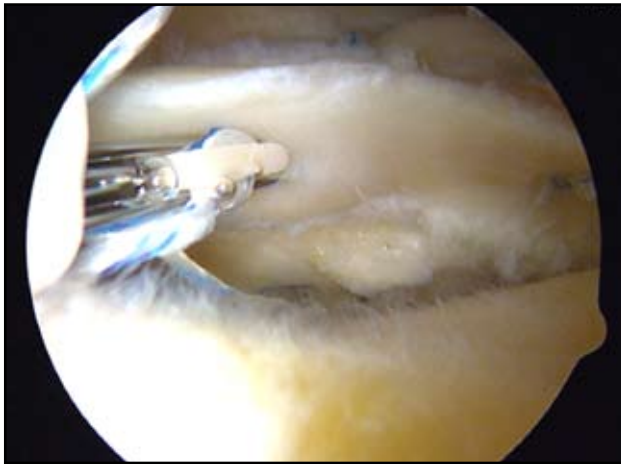


Photo 7. Implant 2 fully advanced to the ready position

- Using the tip (rather than the volar pad) of the thumb, slide the gold trigger forward to advance the second implant into the ready position (Photo 7 and Figure 5).

**Note:** It is normal to encounter resistance prior to achieving the ready position. A snap or click is heard when the trigger is fully advanced, ensuring that the implant is fully seated at the end of the needle (Figures 6 and 7).

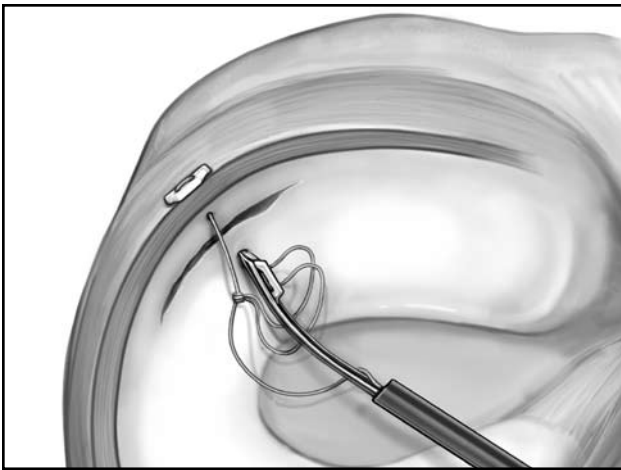


Figure 5. Implant 2 fully advanced to the ready position

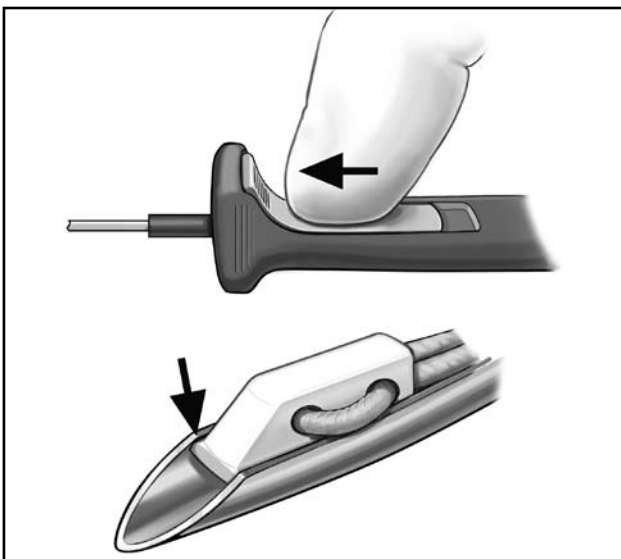


Figure 6. Proper positioning of implant 2

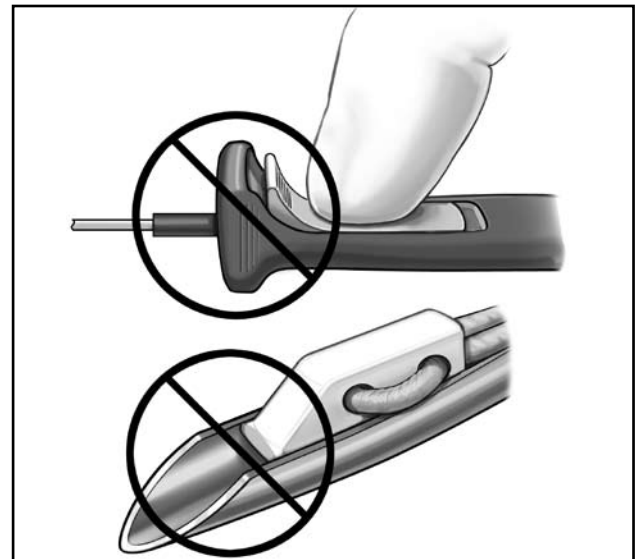


Figure 7. Improper positioning of implant 2



5. Insert the delivery needle to release implant 2.

- For a horizontal repair, insert the needle between the entry point and the first implant, approximately 4–5 mm inferior from implant 1 (Figure 8, Photo 8).
- For a vertical repair, insert the needle approximately 4–5 mm inferior from implant 1 (Figure 8, Photo 9).

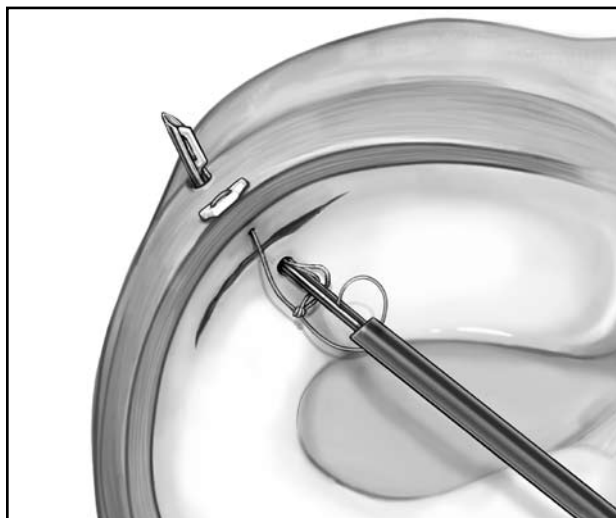


Figure 8. Implant 2 ready for release

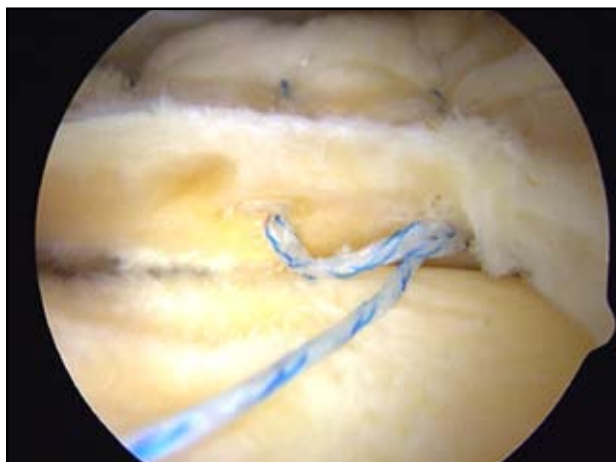


Photo 8. Horizontal mattress suture

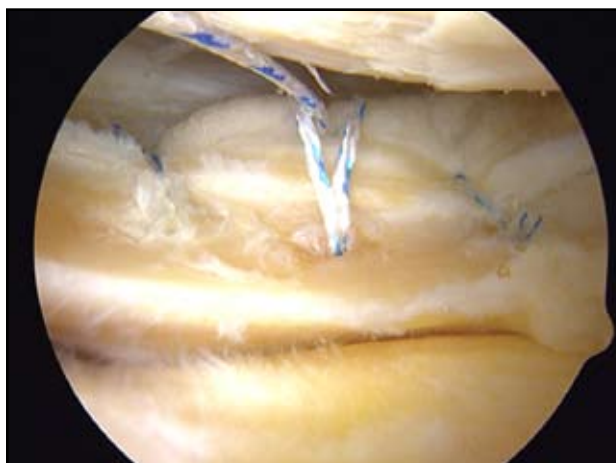


Photo 9. Vertical mattress suture

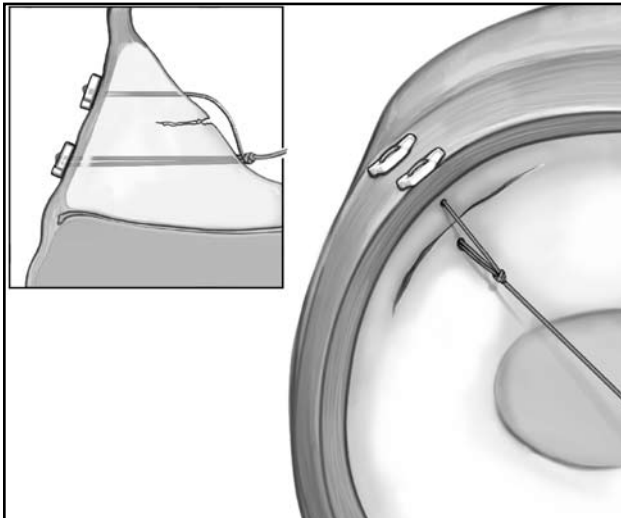


Figure 9. Prior to tightening suture construct

6. Remove the delivery needle from the knee, leaving the free end of the suture. Pull the free end of the suture to advance the sliding knot and reduce the meniscal tear (Figure 9, Photos 10 and 11). It is normal to encounter considerable resistance as the knot is snugged down. It is important to pull the free end of the suture in a line directly perpendicular to the tear site.

Avoid suture breakage by wrapping the suture around several fingers and using the tibia as a fulcrum to provide a tactile feel. Apply slow, increasing tension. In most cases, this steady pulling of the suture will cinch the knot down. As the knot is tightened, it may strangle the free leg of suture, creating a loop of suture. If controlled tightening does not eliminate the loop, place a probe under the tight leg of suture and use it as a pulley.

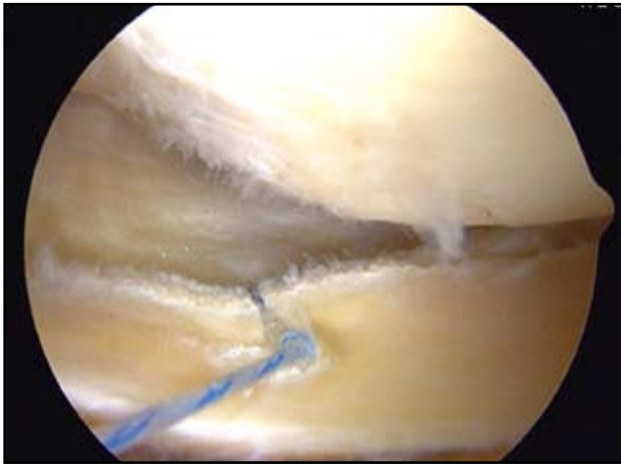


Photo 10. Hand-tightened suture construct - vertical mattress

7. To further snug down the suture construct, thread the free end of the suture through the ULTRA FAST-FIX® Knot Pusher/Suture Cutter. Both curved and straight knot pushers/suture cutters are available. This threading can be facilitated with the use of the suture funnel.

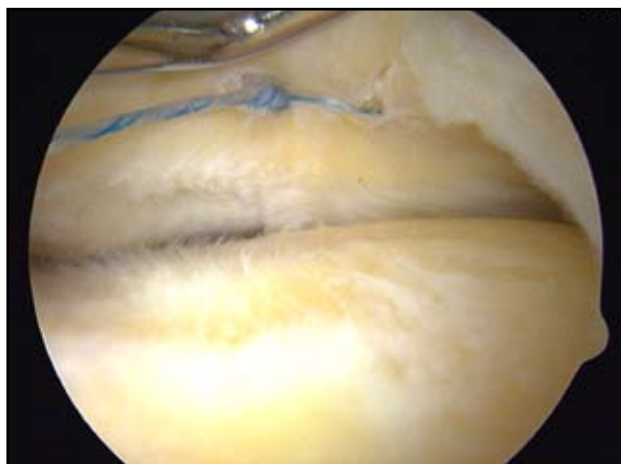


Photo 11. Hand-tightened suture construct - horizontal mattress

8. While holding the suture taut, gently slide the knot pusher/suture cutter to the meniscus to achieve the desired tension (Figure 10). The knot pusher should engage the suture in a direct line and perpendicular to the repair. A manual suture “pull”/“push” maneuver is suggested.
9. Rest the tip against the knot to allow for a 2–3 mm suture tail. Cut the suture by sliding the gold trigger forward (Photos 12 and 13, Figure 11). Alternatively, trim the suture with arthroscopic scissors.

To reduce puckering that may result from the femoral surface repair, the implants can subsequently be placed on the tibial side of the meniscus to help pull down the meniscal flap. The reverse curve ULTRA FAST-FIX® device is recommended for tibial side tears.

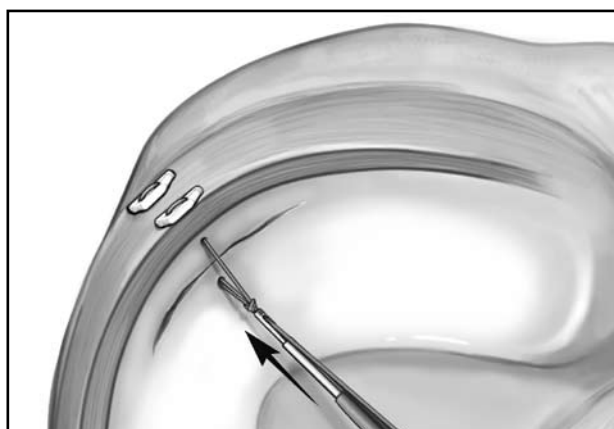


Figure 10. Suture construct tensioning

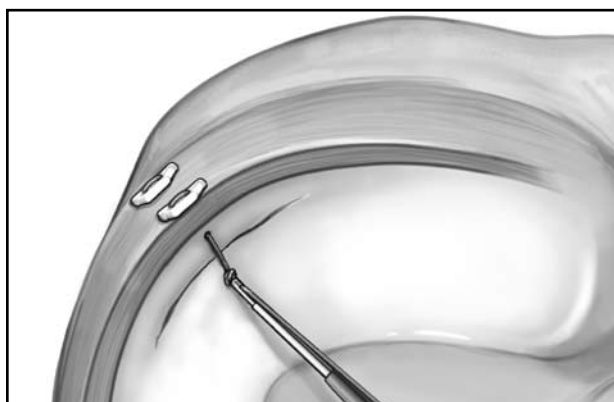


Figure 11. Suture cutting

## Postoperative Care

Reestablish full extension and quadriceps activation early, along with joint kinematics and proprioception involving the entire kinetic chain progression to full weight bearing; limit flexion to 90° for three weeks and to torsion for six weeks. Running is indicated at 8–12 weeks. Cutting activities are indicated at 10–12 weeks. Return to full activity is indicated at 3–6 months. Individualization is based on the stability of the tear, repair construct security, and associated pathology.



Photo 12. Suture cutting - horizontal mattress

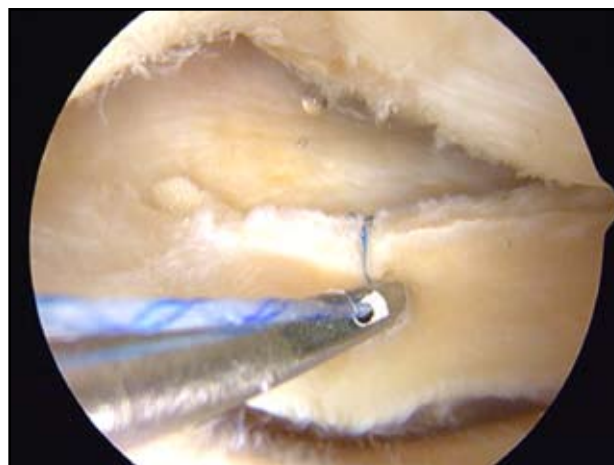


Photo 13. Suture cutting - vertical mattress

## Additional Instruction

Prior to performing this technique, consult the Instruction for Use documentation provided with individual components – including indications, contraindications, warnings, cautions, and instructions.

## References

1. Caborn, Borden, Nyland, Pienkowski:  
Biomechanical Comparison of the FAST-FIX  
Meniscal Repair Suture System with Vertical  
Mattress Sutures and Meniscus Arrows.  
*The American Journal of Sports Medicine*,  
Vol 31, No. 3, 2003.
2. Coen, Caborn, Urban, et al: *Arthroscopy* 1998.

Courtesy of Smith & Nephew, Inc.,  
Endoscopy Division

Caution: U.S. Federal law restricts this device to sale  
by or on the order of a physician.

## Pearls

- Prepare site and assess geometry of reduction.
- Reduce tear center-to-center to avoid “dog ears”/gapping/ruffles.
- Approach tear from contralateral portal/view from ipsilateral portal.
- Use curve of needle to increase safety zone of vector and improve insertion positioning.
- Hold delivery needle like a dart to stabilize.
- Insert curved delivery needle within split cannula with convexity up.
- Ease insertion using metal slotted cannula.
- Vertical mattress suture: T1 goes posterior and superior; T2 goes anterior and inferior.
- Insert T2 (implant 2) 4 mm to 5 mm from T1 (implant 1).
- Advance gold slide trigger and implant 2 completely to tip until a click is heard (requires force). Use the tip of the thumb on slide trigger rather than volar pad of thumb.
- If implant 1 does not deploy, it is most likely NOT inserted through the entire meniscal tissue: advance deeper.
- If implant 2 does not deploy, it is most likely NOT advanced to the deployment position at the tip of the delivery needle.
- Thread suture onto knot pusher/suture cutter with suture funnel.
- If the knot does not cinch smoothly, it usually requires a more forceful steady pull which is facilitated by wrapping the suture around several fingers like a pulley and applying traction.
- Cinch knot to obtain compression of the suture across the tear but avoid over-cinching or puckering the tissue.
- Alternate divergent femoral side and tibial (tensile) side suture placement.
- Consider reverse curved devices for tibial side fixation.

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