All-Inside Double Bundle ACL Reconstruction

The All-Inside Double Bundle ACL reconstruction technique represents an exciting new dimension in anatomic ACL reconstruction with less morbidity than a standard transosseous reconstruction. The technique incorporates clinically proven “retrodrilling” and fixation methods that facilitate reproducible surgical steps with accurate and controlled socket drilling. Precise measuring tools facilitate socket depth and socket-to-socket measuring for optimum graft length determination.

Precision drill guides allow accurate socket drilling to 0.5 mm, maintaining optimum bone bridge distances between sockets. Anatomic reconstruction and fixation of the 6 mm diameter AM semitendinosus allograft bundle and fixation of the 6 mm diameter PL semitendinosus allograft bundle more closely reconstructs the anatomical kinematics of the knee through range of motion and provides greater rotational stability than single bundle reconstructions.

Twin semitendinosus allografts for the All-Inside Double Bundle technique are available from ATSI.

4.5 mm Corkscrew FT

Sometimes smaller can be better! A small anchor, with excellent strength, can allow placement of more anchors without crowding the rotator cuff footprint. As with all fully threaded anchors, the new 4.5 mm Corkscrew FT is designed to be inserted flush with the cortical surface to maximize fixation strength and anchor stability. Strong cortical purchase helps fully threaded anchors minimize gap formation (or anchor “pullback”) that is commonly found during cyclic loading of standard, eyeleted anchors.

Traditional Corkscrew FT suture eyelets were replaced by a molded eyelet, located near the distal tip of the anchor, to allow for a double-loaded, internally driven anchor, with minimum diameter. This eyelet design maintains the superior strength, excellent suture-sliding characteristics and high insertion torque demonstrated by the rest of the Corkscrew FT family.

Biomechanical testing of the 4.5 mm Bio-Corkscrew FT showed a load-to-failure in straight axial pull-out of 68.7 lbf. This is 29% higher than the pull-out strength of the larger 5 mm Mitek Spirakol.

The anchor is 14 mm long and is currently available in bioabsorbable PLLA and permanent, radiolucent PEEK. A titanium version will be released this fall.
Multi-Function Wireless Footswitch

Used with the Adapteur Power System II (APS II), the multi-function Wireless Footswitch uses infrared technology to independently control up to two APS II accessory handpieces such as a shaver, drill or sagittal saw. Unlike previous infrared or Bluetooth footswitches, communication issues between the footswitch and the receiver is a thing of the past due to its revolutionary method of transmitting and receiving infrared signals.

The Wireless Footswitch uses every surface in the OR to reflect the signal to the receiver to ensure consistent performance. All APS II functions, including speed and direction, are accessed using this user friendly footswitch. Function type is user-selectable from a standard on/off footswitch or a gas pedal type footswitch.

Aggressive Serrated Tooth Resector, Curved

The popular curved Serrated Tooth Resector shaver blade just got better with the addition of the edge formation of our Aggressive series, making this new 4.20 mm blade even more useful than its predecessor. Other changes include a more distally located center of curve radius to more closely match knee anatomy in all patients and a larger inner diameter to reduce the tissue clogs common in competitive curved shaver blades.

SabreTooth Resector

Introducing the SabreTooth Resector: an aggressive tissue resection tool that ferociously attacks tough tissue, even in its smallest size. Its unique tooth design creates razor sharp cutting surfaces that quickly remove tissue without clogging, thereby reducing surgery time and aggravation with a blade that “just doesn’t cut it.” Available now in four sizes (3.85 mm, 4.20 mm, 4.85 mm and 5.85 mm), these hungry devices await your challenge.

Suture Cutter w/WishBone Handle

A new option for cutting #2 FiberWire is now available. This closed-end Suture Cutter is intended to leave a 3 mm suture tail for arthroscopic suture cutting after knots have been tied. The new WishBone handle simplifies the cutting procedure while maintaining the same function and maneuverability as the previous design. The button is pressed to open the jaw and load the suture. The handle is compressed to close the jaw until it clicks into position. The cutter is advanced to the knot and the handle is fully compressed to cut the suture.

Banana BirdBeak

The curve of the Banana BirdBeak makes it ideal for passing sutures through the rotator cuff from the Neviser portal or other superior percutaneous incisions. This specially designed instrument features a 22° up tip for ease of use. Like the other Arthrex BirdBeaks, the sharp tip penetrates soft tissue easily and the WishBone handle allows for simplified operation from virtually any hand position.

Penetrator Suture Retriever

This unique instrument combines a small penetrating tip with a suture grasper to allow suture delivery or extraction in one step. The 2.7 mm diameter tip slides easily through the tissue with the suture either sliding or grasped within the self-ratcheting mechanism. The Penetrator is available with either a straight or 15° up tip design and is an ideal instrument for either instability or rotator cuff repairs.

NeedlePunch II, 16 mm

Double row rotator cuff repairs can be placed more medial with this new 16 mm NeedlePunch II. This low profile instrument can fit down in a 7 mm diameter cannula, grasp tissue, pass suture, and retrieve. It uses the same NeedlePunch needles as the current NeedlePunch II. The current NeedlePunch II passes suture 10 mm medial to the edge of the tissue where the new NeedlePunch II passes 16 mm.

Curved 90° SutureLasso SD

Combining a small 1.8 mm tip diameter, a tight 90° bend and a stiff shaft has resulted in a new SutureLasso SD that is ideally suited for suture passing through the lowest positions of a Bankart repair. The new devices are available with both left and right curves and use the proven Nitinol SutureLasso SD wire loop with thumb advance for easy and reliable suture passage.

Low Profile 5 mm Cannulas

These 5 mm cannulas are the lowest profile on the market. The reduced size is less constraining in tight spaces, allowing the user unparalleled functional space. The clear design allows for direct visualization of instruments and suture passing. The proximal portion of the cannula is similar to the Crystal Cannula with a barrel-shaped retention bowl that pools fluid to eliminate cannula “squirting.” The ribbed shaft design controls the insertion depth and helps prevent “fall-out”.

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SwiveLock & FiberChain Double Row Rotator Cuff Repair

SwiveLocks and FiberChain allow knotless double row repairs to be constructed that have equivalent biomechanical strength as traditional double row repairs that require four knots and six suture passes.

The knotless double row repair is created by inserting two 5.5 mm Bio-Corkscrew FTs loaded with FiberChain in the medial row. The FiberChain suture from each anchor is passed through the tendon, and the FiberChain is fixated laterally using SwiveLocks placed just lateral of the “drop-off” of the greater tuberosity. The completed repair can be seen in Figure 1.

Drs. Stephen Burkhart and Chris Adams compared the fixation strength of the knotless double row repair using SwiveLock and FiberChain to that of a traditional double row repair. Bio-Corkscrew FTs were used for the traditional double row repair. A mattress stitch from both medial anchors and a simple stitch from both lateral anchors were created. The yield and ultimate load for the knotless repairs was on average greater than that of the traditional knotless repair; however, the differences were not statistically significant (p = 0.192 and p = 0.297 respectively). The data can be seen graphically in Figure 2.

The knotless SwiveLock and FiberChain construct is a rotator cuff repair with statistically equivalent strength of a standard double row repair that requires six suture passes through tendon and four knots. In addition, the SwiveLock and FiberChain construct can provide time savings through its requirement for only two suture passes through tendon, simplification of suture management, and the elimination of knot tying.

Figure 1

Figure 2

Yield and Ultimate Load

<table>
<thead>
<tr>
<th>Force (N)</th>
<th>Yield</th>
<th>Ultimate</th>
</tr>
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<tbody>
<tr>
<td>411</td>
<td>511</td>
<td>539</td>
</tr>
<tr>
<td>487</td>
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</tbody>
</table>

The #2 TigerLoop is made of green and white striped FiberWire to differentiate graft strands for graft passing and tensioning.

RetroScrew Tamps

The RetroScrew Tamps assist with insertion of tibial RetroScrews into the tibial tunnel and prevent screw migration and graft wrapping. Once the RetroScrew has been loaded on the RetroScrew Driver, the RetroScrew Tamp is placed through the medial portal and over the head of the RetroScrew. Once proper position has been established, downward pressure is placed on the RetroScrew and the driver is turned until screw is fully seated.

“RetroTamps” come in straight and 90˚ handles.

RetroScrew Reverse Thread

Reverse thread RetroScrews simplify insertion for right knees by allowing the screw and driver to be turned clockwise to advance the screw, away from the PCL. The reverse thread RetroScrew reduces the need to manipulate the RetroScrew Driver or to make a far medial notch to avoid PCL impingement. These new RetroScrews are available in size 8 mm through 10 mm and use the same instrumentation as standard RetroScrews.
SutureBridge Improves Repair Strength for Achilles Tendon Reattachment

More surgeons are converting to a SutureBridge construct for reattachment of the Achilles tendon, following a resection for Haglund’s or retrocalcaneal exostosis. This double row technique creates a larger contact ‘footprint’ for the Achilles tendon on the back of the heel, improving strength and allowing surgeons to feel more comfortable with early return to activities for these patients.

While there are different technique variations for different situations, the basic construct for the Achilles SutureBridge consists of two 5.5 mm Bio-Corkscrew FT anchors proximally, and two 3.5 mm Bio-PushLock anchors distally.

The Bio-Corkscrews are placed into the cancellous bone of the posterior tubercle with a mattress or comparable FiberWire stitch through the Achilles. One suture end from each knot is placed through the eyelet/tips of the PushLock, tension is adjusted, and the anchor is placed inferior to the Achilles attachment and below the proximal anchor. The other PushLock is placed in the same manner on the other side of the tendon/heel. The sutures are cut at the cortex. The finished result looks similar with knots lying down and an ‘M’-shaped footprint compressing the tendon to good cancellous bone.

An Arthrex sponsored study at the University of Connecticut took place in March to look at the biomechanics of the construct in terms of initial compression pattern, compression during cyclic loading and ultimate load-to-failure. Preliminary results indicate that the average load-to-failure for the SutureBridge is more than double that of a conventional two anchor repair.

As published in Orthopedics Today, 2006: “In a prospective study of 26 patients with calcific insertional Achilles tendinosis who failed conservative treatment, James R. McWilliam, M.D., found that patients’ AOFAS scores increased 18 points after receiving an Achilles detachment and repair with an immediate weight-bearing regimen. During an average two-year follow-up, he also discovered that 92% of the patients reported good or excellent results with the procedure.

They repaired the Achilles using the SutureBridge technique. Surgeons immediately cast patients in a neutral position. “With the tendon fixed in such a way as to allow neutral casting, there’s much less postoperative tension,” McWilliam said. “It also allows patients to be weight-bearing early.”

The surgeons allowed patients limited weight-bearing to perform activities of daily living.”

<table>
<thead>
<tr>
<th>Achilles SutureBridge vs. Two-Anchor Construct Peak Load Comparison*</th>
<th>Peak Load</th>
</tr>
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<tbody>
<tr>
<td>Load (N)</td>
<td>424 N</td>
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</tbody>
</table>

*data on file

![SutureBridge and PushLock](image1)

![SutureBridge and PushLock](image2)

![SutureBridge and PushLock](image3)
Syndesmotic Repair Using the TightRope System

Q. What has been your standard approach to treating the athlete with syndesmotic repair?
A. Our standard approach for unstable and diastased syndesmotic injuries has been percutaneous or open reduction with two-screw fixation. Screw removal is typically performed at 12 weeks. Due to the risk for screw breakage, we ask the individual to remain partial weight-bearing in a boot until that time.

Q. How has the TightRope helped you treat this injury?
A. The use of the TightRope has enabled us to avoid screw removal and the concern for screw breakage. We have also used the TightRope in conjunction with a screw and have found this to be beneficial in the event of premature screw breakage or if the screw is removed prior to completion of ligament healing - we still have syndesmotic protection.

Q. What technical pearls can you offer for using the TightRope Syndesmosis Kit?
A. 1. Ask your hospital and/or Arthrex representative to keep a minimum of two stainless steel and two titanium kits in the operating room at all times. These cases are often done at unexpected times.
2. Assuming no fibular fracture, we recommend the use of two TightRopes. In the event of ORIF of a fibular fracture with syndesmotic injury, we typically use one TightRope thru the hole of the plate that approximates a distance of 2.5-3.5 cm proximal to the joint.
3. In seating the button on the far cortex (tibial), it is helpful to separate the strands of the FiberWire medial to the fibular button and guide the tibial button down like a “puppet on strings”.
4. One may wish to place a TightRope at the time of screw removal to ensure a longer period of syndesmotic protection - this can oftentimes be done utilizing the screw hole itself.

Q. Describe your results thus far.
A. We have utilized this device in all types of patients - varying ages, occupations, degrees of injury, etc. We have had success in the elite athletic population as well. We have no known cases of failure - all have maintained reduction of the syndesmosis and none have required removal. It has enhanced our rehab program to allow for earlier range of motion, pool therapy, etc.

Q. Are there instances where screws (either bio or metal) should be used in conjunction with a TightRope?
A. The use of a screw with the TightRope may be beneficial in cases of significant diastasis and instability of the syndesmosis. I will place a four-cortice cortical screw first, bring the syndesmosis into proper apposition and then place the TightRope.

Q. What other areas could possibly be treated with this device?
A. I believe that the TightRope will have applications for other ligament injuries of the foot, such as Lisfranc, particularly as smaller diameter devices become available. In the case of the Lisfranc, the TightRope can mimic the damaged Lisfranc ligament, coursing from the medial cuneiform to the base of the second metatarsal.
Pearls for All-Inside ACL Reconstruction using RetroButton

Graft Preparation
For the majority of cases, the required graft length will be approximately 75 mm but can vary slightly depending on the size of the patient. Use the following pearls to simplify graft prep and graft passing:

1. Fold graft in half and cut to a length of 85 mm. Whipstitch the last 30 mm of each tail of the graft using FiberLoop for one end and TigerLoop for the other. When final socket depth is known the graft can be easily shortened by unthreading whipstitches and trimming the graft ends to length.

2. For a single-folded graft (tibialis, peroneus longus, etc.) whipstitch each tail of the graft individually.
   For double-folded grafts (hamstrings) whipstitch the semitendinosus to the gracilis at each end so graft functions as a single-folded graft with only two sets of passing sutures.

3. Taper the ends of the graft by trimming ends of the graft. A “cinch stitch” may be used to reduce “flaring” of the graft tails and reinforce terminal whipstitching (1).

Femoral Socket Drilling
Knee must be brought into maximum flexion to ensure proper angle of drilling and to avoid “blow out” of the posterior cortex (2). This position is easily accomplished with the hip flexed while patient is lying supine. If a leg holder is used, it must be placed very proximal and the end of the bed must be removed or flexed to allow the knee to be flexed as well. Occasionally the leg must be removed from the holder to accomplish adequate hyperflexion. The transtibial guide may be used through the AM portal to guide the RetroButton pin into place. Once socket is drilled pass a suture through femur using the eyelet of the RetroButton pin to be used for RetroButton/graft passage later in the case.

Tibial Socket Drilling with RetroDrill
Note the length from the tibial plateau to the anterior tibial cortex on the RetroDrill drill sleeve (3). Drill the tibial socket as deep as possible without violating the anterior cortex (3 inset). This will ensure that there is adequate socket length for the graft to be tensioned and will ease insertion/positioning of the RetroScrew Driver.

After “retrodrilling” the tibial socket, leave the cannulated RetroDrill pin in place. A #2 FiberStick may be inserted through the pin and into the joint to be used for graft passing through the anteromedial portal. Alternately, a 2-0 FiberWire may be passed through the loop of a Nitinol Graft Passing Wire and both (wire and suture) are passed through the cannulated RetroDrill pin and into the joint. The cannulated RetroDrill pin is then removed and the RetroScrew Driver is passed over the wire and through the tibial tunnel to dilate the hole (4). This step assures easy suture passage and tensioning, especially in hard bone. The 2-0 FiberWire can then be used to pass the graft and wire into place.

Measuring Intraarticular Length and Final Graft Length
Once femoral and tibial sockets have been drilled and measurements confirmed, the intraarticular length of the graft may be estimated to be average length (28 mm), or the distance can be measured using a 70 degree Measurement Probe (5).

Alternatively, the Determinator (soon to be released) may be pulled into the joint using femoral and tibial passing sutures and tensioned until the measuring beads “bottom out” in the femoral and tibial sockets. The Determinator is then removed and the graft length is made to match length of suture between measuring beads.

Graft Fixation
The graft is passed into the femur first and the tibia second. The femoral side is fixed and then the RetroScrew Driver is passed over the Nitinol wire into the joint. If the RetroScrew driver does not enter the joint in the proper position (anterior to the graft), remove the wire and “walk” the driver into position. This is accomplished by rolling the handle of the driver and leveraging the tip around the graft and into the proper position. Exchange a #2 FiberStick for the Nitinol wire, pulling the suture out the medial portal.

Use a Shoehorn Cannula to place the RetroScrew into the joint. Pull the tip of the RetroScrew Driver down to the rim of the tibial socket to allow the screw room to flip. If the screw remains horizontal because it is caught on fat pad/soft tissue, place a grasper next to the knot and pull the distal end of the suture so that the grasper is pulled against the screw (6). The end of the screw can now be “steered” using the grasper so that the screw can be turned vertical onto the tip of the driver.

Using a RetroScrew Tamp can help to start the screw in hard bone and prevent screw migration and graft wrapping (6 inset).
PushLock Single Portal Anterior SLAP Repair using FiberLink

FiberLink is a #2 FiberWire that has a loop formed on one end to aid in creating a quick cinch stitch to be used in conjunction with the 3.5 mm PushLock knotless anchor for labral repairs. The FiberLink can be used to complete an easy single portal SLAP repair.

All required instruments can be passed through the new 5 mm x 7 cm Low Profile Cannula which is a clear, thin-wall cannula with a ribbed design that provides excellent holding power. It is an excellent choice when creating a minimally invasive portal.

1. Insert a 5 mm Low Profile Cannula in an anterior portal. Grab the looped end of a FiberLink in the jaws of a 15° up tip Penetrator and pass it through the labrum. (BirdBeaks and SutureSnares are also good passing options.)

2. Release the FiberWire and back the passing device out of the labrum, then reach over the labrum to retrieve the passed FiberLink loop through the cannula.

3. Pass the FiberLink tail through the loop to create an easy cinch stitch.

4. Pull the FiberLink tail to advance the cinch stitch to the labrum.

5. Preload the single FiberLink tail through the PushLock eyelet.

6. Prepare the bone socket and insert the PushLock normally, through the same Low Profile Cannula.
**Coding Corner: Hallux Valgus Scenarios**

Since the launch of the Mini TightRope, several coding scenarios have been considered. The chart below contains a range of acceptable codes and descriptors. Each practitioner must assure that operative note documentation supports their choice of MTP procedures.

HCPCS (Health Care Common Procedure Coding System) code C1713 for the Mini TightRope implant may be used in the appropriate site of service.

According to the AAOS Global Service Guide, the following procedures are included in CPT code 28296:

12. arthroscopy (eg, 28022, 28052)
13. synovial biopsy (eg, 28052)
14. tendon release or transfer (eg, 28240)
15. synovectomy (eg, 28072)
16. capsular release and reconstruction (eg, 28270)
17. removal of additional exostoses in the area of the joint (eg, 28122, 28124, 28126, 28288)
18. internal fixation (eg, 28485)
19. articular shaving
20. arthroscopy (eg, 29909)
21. removal of bursal tissue
22. repair of released tendon (eg, 28200, 28208)
23. implant insertion
24. local bone graft
25. excision of bone or synovial cysts (eg, 28090-28092, 28104, 28108)

**STO Featured Product Information**

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<th>CPT</th>
<th>Non-Facility</th>
<th>ASC</th>
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<td>28292</td>
<td>488.00—703.62</td>
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<td>299.24—456.44</td>
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<tr>
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1. Physicians Fee Schedule: Varies from state to state, carrier, practice expense and other factors. Used as reference only. Arthrex does not recommend procedure codes or assume liability for data herein. All reimbursement decisions will be subject to payer policy.
2. Hospital Outpatient Prospective Payment System
3. Ambulatory Surgical Center

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**Scope This Out** is an informational newsletter designed to educate orthopaedic surgeons on state-of-the-art surgical procedures and "pearls" to assist in improving surgical skills. This newsletter is published quarterly by Arthrex, Inc., exclusively for the orthopaedic surgeon community.

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