BIOTEK

Surgical Technique Guide

BUTTONFIX®

ACL reconstruction with
S.T.A.R technique

EU-MDR



MORE MOBILITY

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Dual suspension ACL reconstruction with S.T.A.R. technique

Anterior cruciate ligament reconstruction (ACLR) is a frequently performed procedure in sports medicine. Surgical techniques and Implants have evolved to combine anatomical ACLR with minimally invasive approaches, aiming to reduce bone loss, bleeding, and pain, thereby facilitating faster rehabilitation.

Dual suspension ACL reconstruction with SutureTape Augmentation Reconstruction (STAR) represents a newer method designed to address graft re-rupture. The Suture Tape is intended to protect the graft during ligamentization and contribute to load sharing, potentially improving success rates.

This dual suspension STAR technique aims to enhance patient outcomes by reducing invasiveness, minimizing complications, and improving graft tensioning control. Preservation of cortical bone and pain reduction are also targeted, potentially leading to faster postoperative recovery.

Featured Technology

BUTTONFIX® with BioFiber tape size 2:

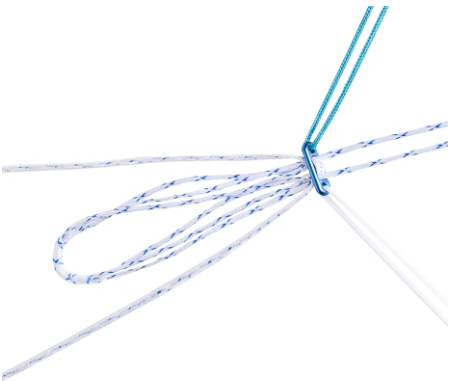
The BUTTONFIX with BioFiber tape is a variation of the BUTTONFIX system that incorporates additional Suture tape for graft augmentation and added stability. This technique is often employed in revision ACL reconstruction or in cases presenting a high risk of graft failure.

Properties

Adjustment limbs: Facilitates fine-tuning of fixation and simple loop reduction technique

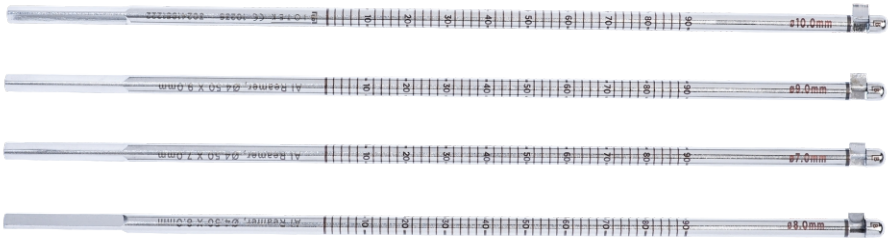
Titanium button -Low profile and strong material, compatible with common extension devices.

Graft jacket- Designed to reduce relative motion and sawing effect between device and graft



AI Reamers:

The AI reamer facilitates minimally invasive socket creation in cruciate reconstruction via an inside-out approach. These reamers provide accurately formed retrograde sockets in diameters from 6 to 10mm, with 0.5mm increments, and are compatible with the Biotek OnLoc aimer drill guide system.



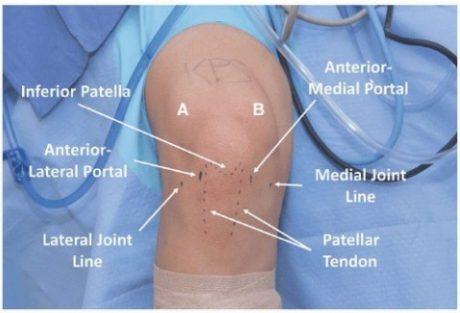
Properties:

Minimally invasive: Socket creation without tibial tunnel or medial portal, reducing surgical steps and morbidity.
Accurate: Improves anatomical tunnel creation.
Safe: Blunt tip minimizes condyle injury risk.
Easy to use: Simple blade deployment via drill switch.
Precise: Measures intra-osseous tibial length and controls tunnel blow-out.

Surgical Technique

Dual Suspension ACL reconstruction with Suture Tape Augmentation Reconstruction

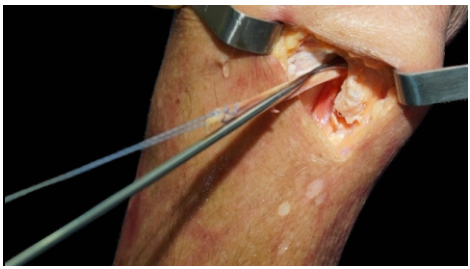
Step 1: **Portal Preparation**



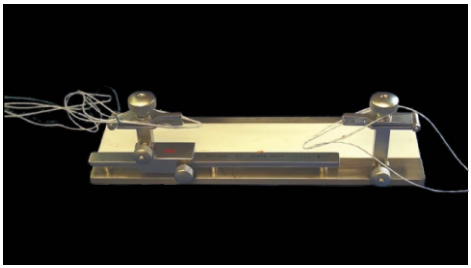
Create an Anteromedial and an Anterolateral portal at the lower knee joint line near the patella, along with a secondary anteromedial portal situated low and near the midline while considering the boundaries of the medial meniscus and femoral condyle, facilitate access for procedures.

Step 2: **Graft Harvest**

The **semitendinosus graft** (ST) is identified, detached from adhesions, and harvested using an **Open/Closed Tendon Stripper (BAK-7071)** with the knee flexed at 90°.



Step 3: **Graft Preparation**



Step 3.1:

Place the **BUTTONFIX®** and **BT-FIX** on the graft preparation board (BAK-7069).

Step 3.2:

Clean & and measure the length of the graft. The **graft** must measure **26cm long.** Cut the graft off at 26cm.

Step 3.3

Take the graft with the ends of the graft in each hand. Place the ends of the graft through the **Buttonfix** and the other end through the **BT-FIX loop**. Keep the Tendon that has gone through the **Buttonfix** still. Bring the **BT-FIX loop** tendon around and through the **Buttonfix**. Take that same tendon and put it through the middel of the graft and bring the ends of the tendons together.

Step 3.4

Whipstitch the ends of the tendon together about 15mm from the end of the tendon using a **BioFiber Loop #2**. Cut the one suture limb at the needle junction to split the suture limbs. Take one suture limb through the **BT-FIX loop** and tie the suture limbs onto the **BT-FIX loop** while the graft is held under slight tension.

Step 3.5

Take a BF-2WC number 2 Biofiber suture and prepare the Tibial end of the graft, at about 20mm from the end, with circumferential sutures. *See video for technique.*

Note:
Zero no. **Biofiber®** wire also can be used to stitch together both ends of the graft and close the loop to prevent the graft from becoming oversized.

Step 4: **Femoral Socket Creation:** (with OnLoc femoral Aimer)

The **OnLoc ACL femoral aimer (BAK-7035(d))** is fixed at an angle between 55 and 60 degrees and is positioned on the anatomical femoral ACL footprint.

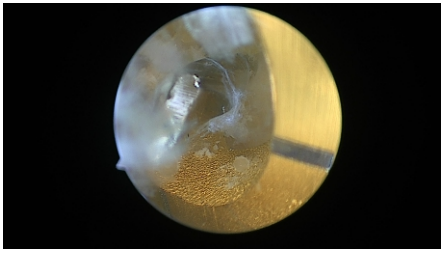
The **cannulated Bullet guide pin sleeve (10562)** is advanced into the femoral bone until resistance is encountered, at which point the tip of the Bullet guide pin sleeve rests on the lateral femoral condyle's lateral cortex.

The interosseous length is then read from the junction of the drill sleeve and handle using a depth gauge.



Steps as Follows:

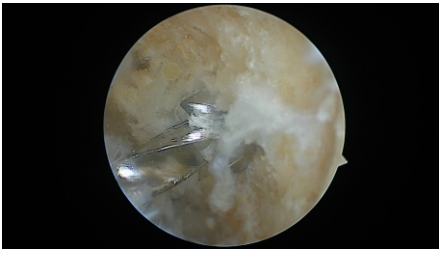
Step 4.1:



A **2.4mm drill pin (BAK-9036)** is advanced into the knee to confirm anatomical footprint placement. Drilling over the drill pin with a **4.7mm cannulated drill bit (BAK-7118)** creates the interosseous tunnel for button passage.

Step 4.2:

Un-chuck the 4.7mm reamer off the drill, keeping the 4.7mm reamer in the bone. The **Guide sleeve for AI Reamer (10562)** positioned and malleted over the 4.7mm drill bit onto the femoral cortex aperture.



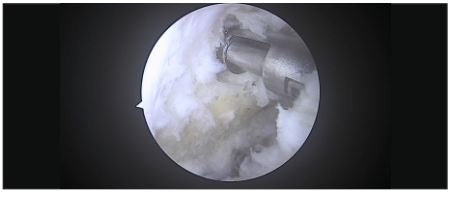
Step 4.3:



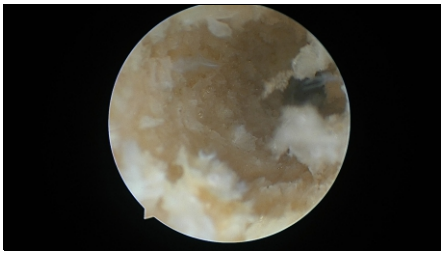
Remove the 4.7mm reamer out the lateral femoral condyle. Connect the appropriately sized AI reamer onto the drill and advance it through the femoral tunnel into the intra-articular zone, either manually or using a power tool in reverse.

Step 4.4:

When the AI reamer's distal tip is visible intra-articular, it is retracted until the laser line aligns with the femoral bone.



Step 4.5:



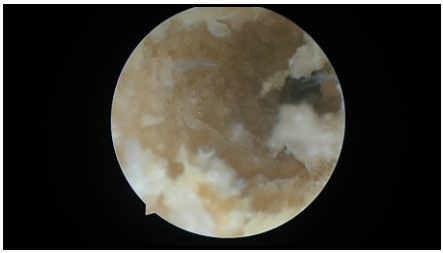
The **blue O-ring** is advanced down the AI reamer shaft until flush with the drill sleeve's back. This marks the starting point for femoral tunnel length measurement.

Forward drilling is initiated, which opens the AI reamer blade. continues with the drill in forward direction, drill is pulled back toward the femoral cortex. **Retrograde drilling** continues until the distance between the blue O-ring and the drill sleeve's back reaches the predetermined length (typically 20mm or 25mm).

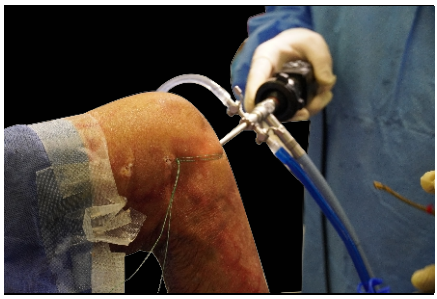
Note: The laser line increments on the AI reamer shaft goes up in 2mm increments. Make sure a minimum bone bridge of 10mm is left.

Step 4.6:

After socket preparation, the drill is switched to reverse mode for safe AI reamer withdrawal (reverse mode automatically closes the blade).



Step 4.7:



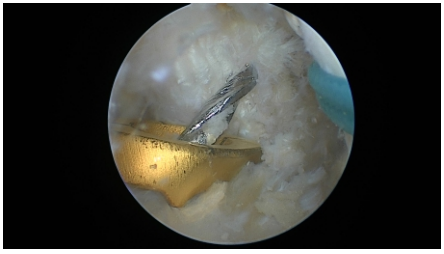
A passing suture is loaded into the eyelet of the Guide pin and inserted through the AI sleeve and into the joint. Fetch the loop through the Anterior Lateral portal. Cinch the loop on itself and keep it out the way. This suture is later used for graft passage after tibial preparation.

Step 5: **Tibial Socket Creation:** (with OnLoc footprint Aimer)

The **OnLoc Footprint (BAK-7035(b)) tibial aimer** is used to create the tibial socket. The tibial footprint aimer is inserted through the **standard low AM portal.** The tibial footprint aimer is placed just lateral and posterior to the anterior medial meniscal horn, at the center of the ACL tibial footprint.



Step 5.1:

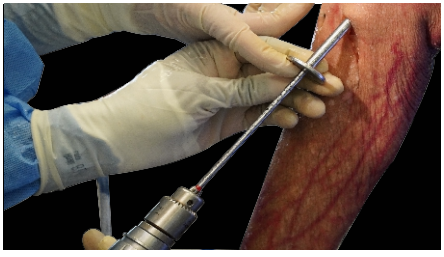


A **2.4mm drill Beath pin (BAK-9036)** is advanced into the knee to confirm anatomical footprint placement.

Note: BAK-7203 - Spade tip Graft passing Pin dia 4.7mm also used to reduce steps

Step 5.2:

Over dill the 2.4mm Beath pin with a **4.7mm cannulated drill bit (BAK-7118).** This creates the button passage tunnel for AI Reamer.



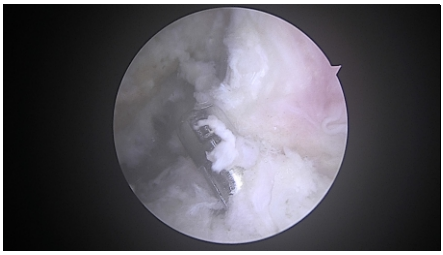
Step 5.3:

Remove the drill off the 4.7mm reamer, keeping that reamer in the tibia. The **Guide sleeve for AI Reamer (10562)** is positioned over the 4.7mm drill bit and tapped into the tibial cortex aperture till its depth-stop. The 4.7mm reamer is removed.

Step 5.4:

Connect the appropriately sized AI reamer onto the drill and advance it through the tibial tunnel into the intra-articular zone, either manually or using a power tool in reverse.

Step 5.5:



When the AI reamer's distal tip is visible, it is retracted until the laser line aligns with the tibial tunnel aperture.

Step 5.6:

The blue O-ring is advanced down the AI reamer shaft until flush with the drill sleeve's back. This marks the starting point for tibial tunnel length measurement.

Step 5.7:

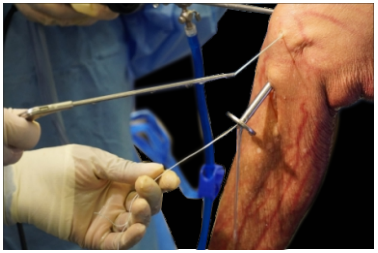
First, forward drilling opens the **AI reamer blade**. Then the drill is pulled back while still in forward drilling mode. **Retrograde drilling** continues until the distance between the blue O-ring and the drill sleeve's back reaches the desired length, usually 20mm or 25mm. The blue rubber ring on the AI aimer's tip helps measures this length.

Note: The Laser line on the AI reamer shaft go up in 2mm increments.

Step 5.8:

After socket preparation, the drill is switched to reverse mode for safe AI reamer withdrawal (reverse mode automatically closes the blade).

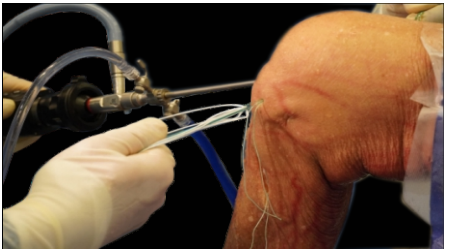
Step 5.9:



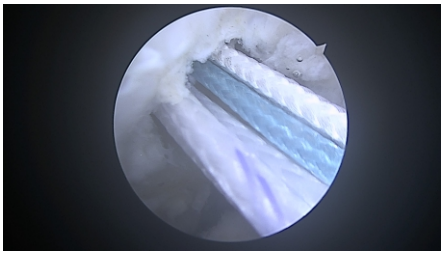
A passing suture loop suture is loaded into the eyelet of the Guide pin and inserted through the Al sleeve and into the joint. Fetch the Passing suture loop through the Anterior Medial portal. Cinch the passing suture loop on itself and park it out the way. This suture is later used for graft passage after tibial preparation.

Step 6: **Graft Passage and Fixation**

Femoral:
Before graft passage can begin, both femoral and tibial Suture loops need to be collected out the Anterior Medial portal at the same time to avoid a tissue bridge.



Step 6:1

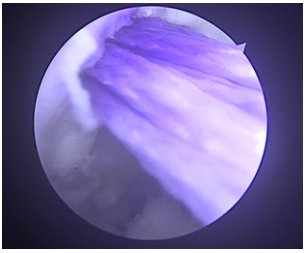


Identify the passing suture loop, load all six sutures of the **Buttonfix** into the femoral passing suture Loop. Pull the passing suture loop that is coming out the lateral femur to shuttle the **Buttonfix** strands through the joint and out the lateral cortex of the femur.

Step 6.2:

Separate the sutures that are coming out the lateral cortex of the femur and gather the white leading suture. Pull on the white leading suture to flip the button vertically. Once the button is vertical, gatherall the other sutures into the same hand and shuttle the buttonfix through the femur.

Step 6.3:



Once the purple mark on the Buttonfix reaches the aperture of the femoral tunnel, stop pulling. Seperate the sutures and gather the white sutures into one hand ad the green sutures in the other hand and perfrom the **positive flip test** to flip the button onto the lateral cortex of the femur. Pull on the Loop and sutures of the **BT fix** coming out the tibia to confirm that the button has flipped, and graft is secure.

Step 6.4:

Once the **ButtonFix** is secure on the lateral femoral cortex, grab the blue, white shortening strands of the **ButtonFix** and **pull** them one by one, in line with the femoral tunnel, to pull the graft up into the femoral socket. Stop once the graft marking is at the aperture of the femoral tunnel.

Tibial side Fixation

Step 1:

Using a BF-2WC suture, luggage tags the BF-2WC suture through the loop of the BT Fix and load the ends of the BT fix shortening strands and the BioFiber tape (S.T.A.R) strands into the luggage tag.

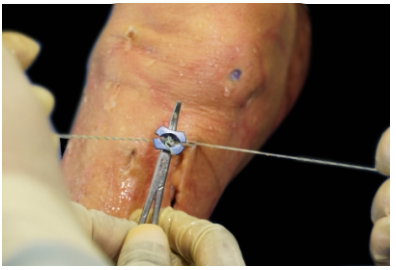
Step 2:

Take your **loop** tibial shuttling suture loop and load the luggage tag that's prepared, into your Tibial shuttling suture. Pull on the tibial end of the tibial shuttling suture to shuttle the luggage tag stitch and tibial graft into the knee joint and through the tibia.

Once all the strands of the BT fix and Biofiber tape strands are out the tibia, remove the luggage tag and separate the sutures.

Step 3:

Open the loop of the BT Fix and load the MR- Fix button into the open slots of the MR-FIX button. Place a curved artery behind the loaded MR-Fix button to create counter tension when toggling in the MR-Fix Button. Also, load the BioFiber tape into the openings of the MR-Fix button.



Step 4:

To fixate the MR- Fix button, grab the blue/white shortening strands and toggle them one by one, in line the tibial tunnel, to shorten the loop and securing the MR- Fix Button the tibia. Please

Note: In case, if surgeon doing full- tibial tunnel fixation use Smart -Fix button, Orientate the Smartfix Button to sit horizontally on the Tibia, and not vertically.

Fixation of Suturetape

A **2.4mm Guide pin, BAS-9036,** is drilled into the tibia, 2cm distal to the tibial ACL tunnel. **Over drill** the guide pin with the **4.7mm reamer, 20mm** into the tibia.



Load the BioFiber tape into the eyelet of a **BAS-9142.475F VimFix LRP anchor.** Slide the LRP anchor down the tape towards the prepared bone socket.

Place the eyelet of the LRP anchor at the entrance of the tunnel, while keeping the leg in full extension.



Pull the Tape limbs to get the tension on the tape the surgeon requires. Once the tension is correct, keep the eyelet at the entrance of the tunnel, bring the tape limbs up alongside the shaft of the LRP anchor.

Take a marking pen and mark the tape limbs where the distal tip of the anchor body starts. Remove the eyelet out the tunnel entrance and slide the eyelet onto the mark on the tape limbs.

Keep the eyelet on the marking of the tape limbs and insert the eyelet of the LR anchor into the bone. Mallet the shaft of the anchor into the bone until the anchor body touches the tibia. Screw the anchor in and cut the tapes off to complete the procedure.

Ordering information - Implants

Cat Code	Description
BAK-7195	**BUTTONFIX®** Fixation Button with Adjustable Loop
10447	**BUTTONFIX®** Fixation Button with Adjustable Loop With Fiber Tape Size 2
10049	**BT-FIX** Adjustable Fiber Loop for Attachable Button System
BAK-7221S	**SMARTFIX,** Tibial Base Plate, Size Medium
BAK-7222S	**SMARTFIX,** Tibial Base Plate, Size Large
10119	**MR-FIX** Tapered Round Fixation Button
10220	**BioFiber®** Fiber USP Size 0 with Reverse Cutting needle White-Blue, Len. 36
BF-2W	**BioFiber®** Fiber USP Size 2 with MO-6 needle White, Len. 36
BF-2WC	**BioFiber®** Fiber USP Size 2 with MO-6 needle White-Blue, Len. 36
BF-2ST	**BioFiber®** Fiber Tape Size 2 White-Blue, Len. 39
BF-2BST	**BioFiber®** Fiber Tape, Size 2 White-Black, Len. 39
BF-2WSB	**BioFiber®** Fiber Loop, Size 2 with straight needle, Len. 6cm White-Blue, Len. 24
10244-36	**AI Reamer** 6-10 mm with increasing 0.5 mm 4.50x10mm

Disposable Single Use

Cat Code	Description
10131	**Suture Passing Pin, Spade- Tip** (Beath Pin) Dia. 4.7mm; Len. 355mm
10132	**Suture Passing Pin, Trocar- Tip** (Beath Pin) Dia. 2.4mm; Len. 355mm
10133	**Suture Passing Pin, Drill Tip** (Beath Pin) Dia. 2.4mm; Len. 355mm
10038	**Tap** for **VIMFIX-PK®** Dia 4.5mm & 5.5mm and **VIMFIX®-LR** Dia 4.75mm & 5.5mm

Disclaimer:

The information in this document is for educational purposes only. It is not intended to serve as comprehensive medical advice or a full description of the procedure. It is the responsibility of the operating surgeon to determine and utilise the appropriate products and techniques in accordance with their clinical experience and evaluation of each patient. Review and understand all product and safety information including indications for use, contraindications, effects, precautions and warnings.



BIOTEK

Chetan Meditech Pvt. Ltd.

MD-04, Sanand-II, GIDC,
Ahmedabad, Gujarat-382110

Email: contact@biotekortho.com
Website: www.biotekortho.com

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All Implants specified in the catalogue are CE certified

BT/AR/24; Rev 00