NOTE
This document describes the M-ARS ACL (Medacta Anatomic Ribbon Surgery) surgical technique using harvested autologous semitendinosus ligament.
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## 9. IMPLANTS AND INSTRUMENTS NOMENCLATURE
1. INTRODUCTION

This surgical technique describes how to perform an Anatomic Ribbon Surgery ACL reconstruction using an Extracortical Femoral Button and a Tibial Pull Suture Plate.

**CAUTION**
Federal law (USA) restricts these devices to sale distribution and use by or on the order of physician.

1.1 INDICATIONS OF USE

Extracortical femoral button: reconstructive therapy of ruptures to the anterior and posterior cruciate ligament by means of autologous grafts.

Pull Suture Plate: reconstructive treatment of ruptured anterior and posterior cruciate ligaments by means of autologous grafts.

1.2 CONTRAINDICATIONS

Medacta Anatomic Ribbon Surgery ACL reconstruction using an Extracortical Femoral Button and a Tibial Pull Suture Plate is contraindicated where there is:

- Osteoporosis and osteomalacia
- Degenerative osteopathies
- Adiposity or patient obesity, leading to excessive strain on the fixation button
- Osteomata in the area in which the fixation button is to be placed
- Deformities of the bone, or general conditions of the bones which exclude implantation of a fixation button in the opinion of a physician
- Systemic diseases and metabolic disorders that may compromise the output of the surgery

2. IMPLANTS OVERVIEW

The Extracortical Femoral Button is used for the femoral fixation of the graft. It has to be loaded through the two central holes, with two USP#2/EP5 sutures with a needle at one end. Two additional USP#2/EP5 sutures (preferably in two different colours) have to be loaded on the side holes to pull the implant (pulling suture) towards the femoral tunnel and to flip it (flipping suture) once it has reached an extracortical position (inside-out technique). The flip length of the Medacta Extracortical Button is about 7 mm.

The graft, assembled with the sutures and the Extracortical Femoral Button (without the flipping and pulling sutures) is represented in image 2. The sutures necessary to create the loop have to be fixed on the graft in accordance with paragraph 3.4. Sutures for pulling and flipping are assembled only after the graft reinforcement.
2.1 TIBIAL PULL SUTURE PLATE (PSP)

The Tibial Pull Suture Plate (PSP) is an extracortical fixation device which is fixed in correspondence to the tibial tunnel using a dedicated impactor described in paragraph 2.8.

3.

3. INSTRUMENTS OVERVIEW

3.1 PREPARATION TABLE

The preparation table is designed to enable cleaning and preparation of the tendon graft or the ligament implant.

It is composed of a main board (Ref. 05.05.10.0009), a plastic cleaning panel (Ref. 05.05.10.0011), two graft clamps (Ref. 05.05.10.0010), a loop sizer (Ref. 05.05.10.0083) and dedicated implants/suture supports (Ref. 05.05.10.0012, Ref. 05.05.10.0013 and Ref. 05.05.10.0014). The clamps’ shape allows for graft fixation and extracortical buttons lodging. These clamps can slide along a scaled track to adequately tension the graft. The scale allows for evaluation of the length of the tendon graft or ligament implant. To insert/remove the plastic cleaning board, verify that the fixation button of the metal board is in the open position and slide in/out the board from the side of the table. The plastic board fixation clamp can be used, if desired, to fix one side of the graft before performing the cleaning phase.

5.

The preparation table enables:

- Preparation of the tendon graft and set of its length
- Setting of the button loop length (for this step, a dedicated loop sizer, Ref. 05.05.10.0083, is available)
- Strengthening of the femoral and tibial tips of the tendon graft by applying reinforcing sutures (reinforcement phase)

The implant has to be assembled with two USP#2/EP5 sutures following the path represented in image 4. These sutures have to be used for the reinforcement of the graft during the reinforcement phase according to paragraph 3.4. Use sutures of different colours on each side of the graft, as represented.

4.

Dedicated implant supports (available in different colours to easily distinguish the components) can be assembled within the graft clamps to allow Medacta implants (Ref. 05.05.0001 and Ref. 05.05.0002) coupling with the reinforcing sutures coming from the graft. To insert the implants, press the dedicated supports’ legs.

6.

An additional support is available, if desired, to manage sutures coming from the graft. It can be positioned on the graft clamp (like the other supports). Sutures can be wrapped around the suture support central shaft.

7.
**GRAFT CLAMP**

The graft clamp holds the Medacta supports and the edge of the tendon graft during the preparation phase.

By moving the clamp along the board track it is possible to tension the graft. Press down the lower bar to fix the clamp.

To prevent graft slippage during the reinforcement phase, the graft edge needs to be fixed in the clamp, and locked using the upper wheel.

To insert/remove the Medacta supports, press the golden locking button positioned at the rear of the clamp and slide the supports into/out of the dedicated slot.

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**LOOP SIZER**

This instrument has to be coupled with the preparation table during the graft preparation phase.

Insert the instrument within the rail of the preparation board, in between the two graft clamps, maintaining the instrument perpendicular to the rail during insertion. Rotate the device counterclockwise to stabilize it on the preparation table (only one direction of rotation is allowed). Slide the instrument to the desired position. To properly evaluate the length of the button loop, the instrument has to lie against the femoral button support.

To disassemble the device, rotate the instrument by 90 degrees within the preparation table rail (only one direction of rotation is allowed) and remove it.

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**3.2 FEMORAL AIMER**

The femoral aimer is used to create three overlapping holes in the femoral bone in correspondence with the ACL femoral insertion.

It consists of a central guide hole for a 380 mm Ø2.4 mm k-wire (Ref. 05.05.10.0026) and two adjacent guide holes for 220 mm Ø2.4 mm k-wires (Ref. 05.05.10.0028). Furthermore, it features a window at its tip to view the insertion site of the ACL. The tip features a pin to avoid the instrument slipping off the femoral condyle allowing at the same time for adjustment of the aimer’s orientation.

The tip is blunt in order to facilitate the positioning on the ACL femoral insertion. The central k-wire (Ø2.4 mm) should be drilled in the middle of the ACL femoral insertion site.

Femoral aimers with two different tip configurations are available: 35° and 50° inclinations. According to patient anatomy select the aimer that better enables targeting of the ACL femoral insertion site.

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**TIP**

To improve the femoral tunnel positioning and depending on surgeons preference it is also possible to either use an anteromedial or transtibial femoral aimer before using the Medacta M-ARS specific femoral aimer.
3.3 FEMORAL DILATOR

The three femoral overlapping holes are dilated using the femoral dilator. Three different sizes are available (labelled Small, Medium and Large). Select the size according to the dimension of the reinforced harvested graft.

The femoral dilator is cannulated in order to insert a central Ø2.4 mm k-wire.

The tip features a flat, chamfered design to create the rectangular femoral tunnel. In order to evaluate the femoral tunnel depth, the femoral dilator is graduated.

3.4 SLIDE HAMMER

The slide hammer has been designed with a self-locking mechanism to be coupled with the femoral or the tibial dilators. It enables easy removal of the dilators in case of significant friction between the dilators tip and bone.

NOTE: as an alternative, the standard hammer (Ref. 05.05.10.0050) can be used.

3.5 TIBIAL AIMER

The tibial aimer is used to create three overlapping holes with a C-shaped pattern.

It consists of two different components:

- Aiming Arc (available in right and left configurations)
- Bullet (drill guide), available in two sizes (Small and Medium)

The aiming arc tip features two pins that allow strict positioning of the aimer on the ACL tibial insertion, avoiding instrument rotation. Moreover, a C-shape slot enables direct visualization of tunnel footprint and orientation before its creation.

A locking lever allows the drill guide to be advanced/locked in the desired position.

The aiming arc enables for a unique possible coupling with the bullet, so that no errors can be made regarding the C-shape drilling pattern orientation.

In addition, the bullet features a longitudinal slot whose design guarantees that no accidental disassembly can occur during usage.

A special central k-wire (Ref. 05.05.10.0032) has to be used with this instrument, which avoids the bullet from slipping. This wire features two different diameters in the proximal and distal portions (proximal diameter reduction).

The special k-wire is inserted from the tip of the bullet up to the diameter reduction: the tip of the k-wire protrudes approximately 2 mm from the tip of the drill sleeve.
3.6 SPECIAL K-WIRE

The special k-wire features a diametric reduction in its proximal portion in order to be easily introduced into the tibial aiming bullet (from the tip of the drill guide) preventing posterior slippage from the bullet.

3.7 TIBIAL DILATOR

The tibial C-shape holes are dilated using the tibial dilator. The size of the tibial dilator is related to the dimension of the graft: three sizes are available (Small, Medium and Large).

In order to avoid incorrect orientation of the dilator during insertion, the head is introduced in the tibial lateral holes with the help of two lateral guidewires (Ø2 mm, Ref. 05.05.10.0115). These wires freely run along the dilator avoiding any possible condylar damage during dilation since the wire features fully rounded edges on both sides.

These lateral wires are moved upwards until they are arthroscopically visible within the joint, while the dilator is positioned on the tibia. The dilator is then inserted by tapping on its back end: the wires will slide down without damaging the femoral condyle during dilation.

3.8 PULL SUTURE PLATE IMPACTOR

The impactor is used to impact the PSP implant at the entrance of the tibial tunnel. It features a specific tip design that mimics the inner contour of the PSP implant. Use this instrument to ensure the appropriate extracortical fixation of the PSP in correspondence with the tibial tunnel.
4. GRAFT PREPARATION

4.1 SETTING THE GRAFT LENGTH

The graft path inside the bone consists of three different portions:
- Femoral tunnel (minimum length 30 mm)
- Intra-articular path (depending on joint anatomy, 20-35 mm)
- Tibial tunnel (minimum length 35 mm)

Depending on the length of the harvested graft, the following folding method can be adopted:

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>PREPARATION</th>
<th>MINIMUM RECOMMENDED LENGTH [cm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semitendinosus</td>
<td>3 Fold Preparation</td>
<td>18</td>
</tr>
<tr>
<td>Semitendinosus</td>
<td>4 Fold Preparation</td>
<td>24</td>
</tr>
</tbody>
</table>

4.2 EXTRACTION AND PREPARATION OF THE SEMITENDINOSUS

The semitendinosus is harvested using a tendon stripper. Within Medacta’s portfolio, two different versions are available, labelled Close (Ref. 05.05.10.0023) and Open (Ref. 05.05.10.0024) to adapt the instrument to the individual, anatomical particulars of the patient.

- The graft is harvested and then cleaned on the plastic panel (Ref. 05.05.10.0011) of the preparation board (Ref. 05.05.10.0009). The tendon is cut with a scalpel up to its core along its longitudinal direction, following the direction of the tendon fibers.

  20.

- Spread the tendon using the back end of a scalpel (or using the leg of a tissue forceps).

  21.

- A ribbon shaped structure is obtained (1-2 mm thickness, 10-15 mm width).

4.3 GENERAL INFORMATION ABOUT THE GRAFT PREPARATION

The graft is prepared following these steps:
- The tendon is folded according to the length of the harvested tissue on the preparation table
- The tendon is positioned in between the two clamps (fixed by the two clamps). If desired, the tendon can be fixed only on one side and held at the opposite edge using a Lahey Tissue Grasping Forceps (Ref. 05.05.10.0116)
- The tendon is reinforced on both sides
- Two additional sutures are assembled with the extracortical femoral button for its insertion (pulling suture) and flipping (flipping suture)

**CAUTION**

During the surgical procedure, after the graft has been harvested and prepared, it must be stored in a moist gauze while other surgical tasks are completed (such as addressing meniscal pathology and creating the femoral and tibial tunnels).
THREEFOLD PREPARATION
In the threefold preparation, the tibial free end is folded towards the femoral direction (line 2 in image 22). Thereafter, the femoral edge is bent towards the tibial side (in the middle of its length, line 1 in image 22). The graft is tensioned and fixed on the preparation table. Reinforce each side using the preparation table as described in paragraph 3.4.

FOURFOLD PREPARATION
In the fourfold preparation, fold the graft (in the middle, line 2 in image 23) by folding the tibial free end towards the femoral direction. Thereafter, fold the graft femoral free side (in the middle of its length, line 1-3 in image 23) towards the tibial direction. Reinforce each side using the preparation table as described in paragraph 3.4.

4.4 GRAFT REINFORCEMENT
FEMORAL SIDE
Reinforce the femoral side of the graft using two sutures (ideally a different colour for each side) as represented in paragraph 1.1. This step can be performed with the graft clamped in between the graft clamps’ mouth or fixed on one side to the tibial clamp and grabbed on the opposite side using a Lahey Tissue Grasping Forceps (Ref. 05.05.10.0116) as represented in image 24.

With reference to the description in paragraph 1.1 (image 2) and to the following images, start the reinforcement on one side with one suture, obtaining free ends 1 and 2. Create at least three locked whipstitches starting approximately 2 mm from the femoral edge of the graft and moving distally (towards the tibial side).
Using an additional suture, reinforce the graft on the opposite side, obtaining free ends 3 and 4, performing the same stitching pattern.

These lateral reinforcements have to be performed piercing only the lateral edges (as represented in image 27) and not the central portion of the tendon, otherwise the graft would naturally fold into a round and rigid structure.

Additionally, use each reinforcing suture to perform central reinforcement (spiral seam) of the graft piercing only the upper portion of the tissue. The bottom portion should not be pierced.

Perform this central reinforcement piercing the graft from the opposite reinforced side towards the native one (i.e., with reference to image 2, the central reinforcement using the blue suture has to start from the right grey side moving towards the left blue one).

**NOTE:** this suture scheme allows a reinforced edge that, if tensioned, naturally folds into a C-shape, facilitating the insertion within the created tunnels.

After the reinforcement, open the femoral clamp mouth, remove the clamp from the rail, turn it by 180 degrees and reinsert it as represented below. Insert the femoral implant within the dedicated support and move two of the sutures through the dedicated central holes creating the loop as represented in paragraph 1.1.

**NOTE:** examine if all the graft strands are properly tightened. Apply tension by pulling the femoral strands before fixing the femoral length. Alternatively, move the clamp towards the loop to tension. Fix the femoral loop length in accordance to paragraph 3.5, perform at least five knots for each couple of sutures in order to fix the femoral loop.
**TIBIAL SIDE**

Perform the reinforcement using one suture for each side (using different coloured sutures). Perform 4-5 reinforcement stitches, as represented in the following images.

**CAUTION**

The reinforcement has to be performed on the lateral edges of the graft, without piercing the central portion (as represented in the following images), otherwise the graft would naturally fold into a round, more rigid, structure. The reinforcement has to be performed under tension in order to achieve a good fixation of the suture with the tendon graft. Start from the more proximal edge. Pierce only the graft.

With reference to the description in paragraph 1.2 and to images 31-33, start the reinforcement on one side with one suture, obtaining free ends 1 and 2. Using an additional suture, reinforce the graft on the opposite side, obtaining free ends 3 and 4. On the first reinforcement side of the graft (blue suture side in image 34), pass free end 1 through the lateral hole (A) of the implant (same side as reinforcement) and pass free end 2 through hole (B) of the implant (same side as reinforcement) avoiding cross over. On the second reinforcement side (grey suture side in image 34), pass free end 3 through the hole (C) of the implant (same side as reinforcement) and pass free end 4 through the lateral hole (D) of the implant (same side as reinforcement) avoiding cross over. Once passed through the respective holes, tie suture 1 with 3 and 2 with 4, or 1 with 4 and 2 with 3. Use sutures of differing colours for each side of the graft as represented.

**4.5 FEMORAL BUTTON LOOP LENGTH**

**NOTE:** this step has to be performed after the creation of the femoral tunnel.

To set the button loop length, deduct the graft in tunnel length (30 mm) from the total femoral tunnel length and add a flip path of at least 7 mm. As an example, consider:

- Total femoral tunnel length: 40 mm
- Graft in tunnel length: 30 mm
- Flip path: x mm

In this case, the button loop length has to be set at (40 mm - 30 mm + x mm).

If the button loop length is too long, it leads to a reduced contact between the graft and bone, affecting the stability of the reconstructed ACL.
To facilitate the evaluation of the button loop length, a loop sizer (Ref. 05.05.10.0083) is available. Insert the device within the rail of the preparation board, between the graft clamps, keeping the instrument perpendicular to the rail. Rotate counterclockwise to fix the sizer (as represented in image 36). Slide the device until it lies against the femoral button support (as represented) to evaluate the button-loop length.

![Image 36](image36.png)

4.6 GRAFT SIZE EVALUATION

The graft sizer has three slots to help for the evaluation of the reinforced graft cross section size. Each slot features an opening through which sutures coming from the graft can be passed. All the edges are rounded to avoid harming the tendon during usage.

![Image 37](image37.png)

The instrument is designed with two components that can be rotated obtaining two working configurations:

- **Open configuration**: the suture slots of the two components are congruent and sutures can be passed through these. Graft slots are not congruent between the two components (the tendon cannot be inserted through these openings)
- **Closed configuration**: the suture slots of the two components are not congruent and sutures cannot exit from these. Graft slots are congruent between the two components (the tendon can be inserted through these openings)

The instrument, positioned in the open configuration, is inserted from one side of the graft, while it is assembled on the preparation table. After its insertion, the device is rotated by 90 degrees and positioned in the closed configuration around the suture filaments. The device is then moved through the reinforcement filaments. When moving the device, a slight resistance should be felt.

![Image 38](image38.png)

![Image 39](image39.png)

Read the thickness of the graft. This evaluation is important to set the dimension of the bone tunnels (select instruments' size according to this evaluation).
5. FEMORAL TUNNEL CREATION

The femoral tunnel creation consists of two main steps, as described below.

5.1 K-WIRES POSITIONING

Perform this step with the knee at 110-120 degrees of flexion.

Select the most suitable configuration and insert the instrument from the anteromedial portal positioning the aiming tip on the ACL femoral insertion site. If desired, slightly hammer the proximal flat area of the aimer to strictly fix the pin at the tip into the bone, reducing the risk of instrument slipping during use.

NOTE: use the posterior cortical line (black arrows in image 40) as reference for the aimer positioning: the direct insertion of midsubstance fibers of ACL (yellow arrows in image 40) is in line with the posterior femoral cortex. During surgery, this allows to double check the position of the femoral tunnel.

Insert the central k-wire (Ref. 05.05.10.0026) in the central hole of the femoral aimer and drill it through the femur. The exit point of the k-wire represents the desired position of the Extracortical Femoral Button.

CAUTION
Pay attention to properly orientate the guide for a correct tunnel placement.

NOTE: if desired, before placing the aimer, mark the femoral ACL insertion site using a microfracture (Ref. 05.05.10.0084).

Insert the central k-wire until the proximal laser marking is aligned with the intra-articular surface of the lateral condyle. Remove the aimer and verify if the k-wire is properly placed.

If desired, measure the length of the tunnel using the reverse length gauge (Ref. 05.05.10.0022). Insert the reverse length gauge on the distal portion of the central k-wire and slide it up to the patient bone (if necessary, make a small skin incision to facilitate instrument positioning). Evaluate the femoral tunnel length using the distal marking of the k-wire and the scale of the length gauge.

CAUTION
Pay attention to the sharp k-wire tip when inserting the reverse length gauge on the k-wire.
Reinsert the femoral aimor on the protruding portion of the central k-wire and place the two lateral shorter k-wires (Ref. 05.05.10.0028) up to approximately 30 mm.

Remove the aimor from the joint and over drill the lateral k-wires according to the tunnel length using a Ø4.5 mm cannulated headed reamer (Ref. 05.05.10.0034). Check the depth of the hole using the scale marked on the reamer.

**CAUTION**
During the transmission between trabecular to cortical bone there is a significant increase of drilling resistance. An over drilling in the cortical bone must be avoided.

Remove the lateral k-wires and keep the central one in place.

### 5.2 Femoral Dilation

Realize a tunnel according to the size of the reinforced graft.

Insert the dilator along the central k-wire in the drilled bone canal by tapping the back of the instrument using the hammer (Ref. 05.05.10.0050). Proceed slowly to avoid potential posterior blow out. Read the markings to create a socket of 30 mm. After the dilation, check absence of bony fragments in the canal. It is also necessary to ensure that the cortex has not been damaged and is suitable for the fixation of the button.

Remove the dilator and over drill the central k-wire with a Ø4.5 mm cannulated headed reamer (Ref. 05.05.10.0034) until the extracortical cortical bone is reached.

The socket (rectangular cross section) with a central Ø4.5 mm tunnel has now been created. Remove the central k-wire.
6. TIBIAL TUNNEL CREATION

The tibial tunnel creation consists of two main steps, as described below.

6.1 K-WIRES POSITIONING AND DRILLING

Insert the special k-wire within the bullet (see black arrow). It protrudes from the drill guide tip (by approximately 2 mm). The k-wire is not fixed inside the bullet, in order to allow instant drilling after the aimer positioning.

NOTE: whilst handling the bullet, keep in mind that the special k-wire cannot slip posteriorly but it can slip anteriorly.

Insert the bullet into the aiming arc (see black arrow in image 50) aligning the drill guide longitudinal engraving with the black marking on the aimer. Then rotate the bullet clockwise and insert by pressing the lever down. The arc is designed so that no wrong orientation or accidental disassembly of the bullet can occur.

The tip is inserted through the anteromedial portal and is positioned targeting the ACL tibial insertion location (use the anterior horn of the lateral meniscus insertion as a reference).

The bullet is advanced towards the tibia.

The length of the tibial tunnel can be evaluated using the scale marked on the bullet.

Drill the special k-wire, until the tip is visible within the joint. If the k-wire is not in the center of the tunnel footprint, check if the tibial aimer has been displaced. Repeat the previous steps until the k-wire is placed in the center of the C-shaped tip.

NOTE: the line engraved on the aimer tip helps with visualization of the correct position of the special k-wire. As represented in image 52, the special k-wire lies on the line marked on the tibial aimer tip. If the wire does not lie on this line, check if the aimer has been displaced and reinsert the special k-wire to place it in the centre of the C-shaped tip.

Perform the first hole using the shortest Ø4.5 mm drill (Ref. 05.05.10.0051) until its tip is visible within the joint. Pay attention to not damage the femoral cartilage.

Leave the drill in place so that when working together with the central wire, aiming arc rotation is prevented.

Perform the second hole using the longest Ø4.5 mm drill (Ref. 05.05.10.0052) until its tip is visible in the joint.

A C-shaped hole pattern is obtained.

Remove the drills, the bullet and the aimer keeping the central special k-wire in place to over drill it with a Ø4.5 mm cannulated headed reamer (Ref. 05.05.10.0034). Remove the special k-wire.
6.2 TIBIAL DILATION

Insert the two lateral guidewires (Ref. 05.05.10.0115) into the tibial dilator from its tip. The guidewires are advanced into the two lateral Ø4.5 mm holes until they are visible within the joint, thereby avoiding incorrect alignment of the dilator during usage (the wires show the orientation of the dilator during the entire dilation procedure).

Insert the dilator in the tibia by tapping the back of its handle using a hammer (Ref. 05.05.10.0050).

CAUTION

Carry out the dilation phase starting from the smallest dilator and then proceeding step by step increasing the instrument size (i.e., for a Medium size graft, start the dilation with size Small and then use size Medium).

NOTE: the drill guide is available in two configurations for preparation of Small or Medium C-shaped hole pattern. For a size Large ligament graft follow the instructions (especially in cases of hard/sclerotic bone) listed below:

<table>
<thead>
<tr>
<th>GRAFT SIZE</th>
<th>SMALL</th>
<th>MEDIUM</th>
<th>LARGE</th>
</tr>
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<tbody>
<tr>
<td>Bullet Size</td>
<td>Small</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Dilator Size</td>
<td>Small</td>
<td>Small + Medium</td>
<td>Small + Medium + Large</td>
</tr>
</tbody>
</table>

54.

55.

56.
7. GRAFT INSERTION

In image 57, the femoral button is represented with the set button loop length and the reinforcement scheme described in paragraph 3.4. Arrows 1 and 2 indicate specifically:
- Femoral button hole for pulling suture
- Femoral button hole for tilting suture

On the opposite edge, the tibial PSP is represented with the suture path described in paragraph 1.2.

To facilitate handling and to avoid implant disassembly, clamp the sutures coming out from the PSP with a clamp (not represented).

**NOTE:** use USP#2/EP5 for tilting and pulling sutures.

To better control the twisting of the graft in the joint during the insertion, it can be helpful to mark the posteromedial edge of the ligament with a marker. Both the pulling and the tilting sutures of the femoral button are inserted transtibially using a passing wire (Ref. 05.05.10.0030), with the knee in an extended position.

**CAUTION**

Once the femoral end of the graft is visible in the joint, in order to mimic the rotation of the cruciate ligament, the posteromedial portion of the graft is twisted anteriorly using a probe. The graft is twisted and at the same time towed in the femoral tunnel by pulling on the pulling suture. This results in the anterior tibial portion of the graft coming into contact with the femur posteriorly (see arrow in image 58) which reflects the twisting of the anteromedial and posterolateral portions of the ACL in flexion.

Once the femoral button is outside the femoral tunnel, pull on the tilting suture to flip the femoral button. Pulling the graft backwards providing counter tension to the entire construct. Check that the femoral button is in contact with the cortical bone and holds the graft firmly in place. The graft should remain at least 20 mm inside the femoral tunnel.

If the button loop length is too short and therefore the femoral button cannot be properly flipped, pull the graft out of the femoral tunnel and further dilate the femoral tunnel using the femoral dilator to create enough space to flip the button.

Articulate the knee to improve the graft seating and tension. In extension the graft is positioned and clamped to the front. The tensioning and the fixation of the graft is then carried out in 30 degrees of flexion.

**NOTE:** in order to assure that the PSP can properly accommodate the tibial tunnel without twisting of the suture, the correct alignment into the tunnel entrance has to be checked.

8. TIBIAL FIXATION WITH THE PULL SUTURE PLATE (PSP)

Approximate the PSP to the tibia.

**NOTE:** if desired, dilate the first portion of the bone using the largest dilator to better accommodate the tibial button.

Pull the suture until the PSP body is sunk into the tibial tunnel and its edges are seated on the tibial cortex.

Use the PSP impactor (Ref. 05.05.10.0025) to ensure the appropriate positioning of the PSP.

Perform 4/5 knots to fix the implant. The tensioning/knotting phase should be performed in 30 degrees of flexion. Compare the mobility and stability of the knee with the contralateral one. Cycle the leg at least 20 times before the final fixation of the pull suture plate.

Knot the sutures from the inner holes with 5 knots. If desired, the knot can be pushed with a knot holder (not provided). The protruding threads should be cut 2-3 mm above the knots.
### 9. IMPLANTS AND INSTRUMENTS NOMENCLATURE

<table>
<thead>
<tr>
<th>REF. NO.</th>
<th>DESCRIPTION</th>
<th>PICTURE</th>
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<tr>
<td>05.05.0002</td>
<td>Extracortical Femoral Button</td>
<td><img src="image2.png" alt="Image" /></td>
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<td>Sports medicine - Knee general tray – (1 level)</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>05.05S.002</td>
<td>Sports medicine - M-ARS ACL tray – (2 levels)</td>
<td><img src="image4.png" alt="Image" /></td>
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<tr>
<td>05.05S.004</td>
<td>Sports medicine - Knee prep. table tray – (1 level)</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>05.05.10.0084</td>
<td>Knee microfracture 60°</td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
</tbody>
</table>

Part numbers subject to change.

**NOTE FOR STERILIZATION**

The instrumentation is not sterile upon delivery. It must be cleaned before use and sterilised in an autoclave in accordance with the regulations of the country, US directives where applicable and following the instructions for use of the autoclave manufacturer. For detailed instructions please refer to the document "Recommendations for cleaning decontamination and sterilisation of Medacta International orthopaedic devices" available at www.medacta.com.