CROSS PIN TECHNOLOGY FOR AN ANATOMIC ACL

INTRODUCTION

The RIGIDFIX® Curve Cross Pin System is designed specifically for use with the anteromedial (AM) portal approach to achieve a more anatomic soft tissue anterior cruciate ligament reconstruction. The RIGIDFIX Curve System enables accurate placement of two cross pins in more horizontal femoral tunnels that are typical of the AM portal approach. The cross pins provide rigid fixation that is close to the joint line to minimize intratunnel graft micromotion that may cause tunnel widening. The two cross pins compress the graft to the tunnel wall, providing 360° of graft-to-bone interface. The design of the RIGIDFIX Curve System is based on the original RIGIDFIX Cross Pin System, which has been used successfully worldwide for ACL reconstruction for more than 15 years.

The RIGIDFIX Curve System offers clinical benefits that surgeons want:
- Anatomic ACL reconstruction through the anteromedial portal
- Close-to-aperture fixation to minimize intratunnel graft micromotion
- Strong, rigid fixation averaging 896N pull-out strength
- Compression fit from two cross-pins enhances graft-to-bone contact
- 360° of graft-to-bone interface
- Graft fills the entire femoral socket
- Accurate pin placement in anatomic, horizontal femoral tunnels
- Easy-to-use, reliable, reproducible
- Easily revisable

SPECIAL THANK YOU
This surgical technique guide was written in collaboration with Dr. Alessandro Lelli, who heads the Arthroscopy and Knee Surgery Centre at Villa Erbosa, Bologna, Italy. During the past 25 years, Dr. Lelli has dedicated his entire practice to knee surgery (prosthesis, arthroscopic, and reconstructive) and ankle surgery (arthroscopic and reconstructive). Performing approximately 800 ACL procedures and roughly 400 arthroplasty procedures per year, he has completed more than 32,000 surgeries to date. He is the author of numerous scientific publications and is considered a global thought leader in his field.

## RIGIDFIX CURVE SYSTEM PRODUCT INFORMATION

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Not all products are currently available in all markets.
CROSS PIN TECHNOLOGY FOR AN ANATOMIC ACL

Soft Tissue ACL Reconstruction
Graft Harvest and Preparation

Make an incision over the insertion site of the gracilis and semitendinosis tendons. Separate the tendons and whipstitch the ends. Release the tendons from any attachments prior to harvesting or the graft may be prematurely cut in the process.

A finger run around the graft can assure that all connections have been severed before the tendon is stripped. Run a tendon stripper toward the origin of the muscle (Figure 1) to release the tendon.

On the back table, prepare the tendons for implantation by removing any remaining muscle and whip-stitching the ends with a #2 suture. Fold the two tendons over a #5 suture that will be used to pull the graft through the tunnel.

Whipstitch the looped-over part of the graft with an absorbable or nonabsorbable suture as shown (Figure 2). Mark the graft at 30 mm from the distal end.

Size the graft to determine its diameter, which will correspond to the drill size. A tightly fitting graft ensures better initial fixation and allows in-growth directly into the graft and not into a dead space.

Femoral Tunnel Drilling

Establish a standard anterolateral portal. With the knee at 90°, using a spinal needle, ensure good access to the ACL femoral footprint. Place the “working” AM portal approximately 25 mm-30 mm medial to the medial edge of the patellar tendon, distal to the inferior pole of the patella and superior (8 mm-10 mm) to the medial meniscus. Mark the center of the proposed tunnel roughly 3 mm-5 mm anterior to the posterior cortex.

Flex the knee to 90° and place the femoral aimer through the AM portal and position the tip posterior to the marked position (Figure 3).

Then hyperflex the knee to 120°, allowing the aimer to move with the rotating condyle. Hyperflexion during drilling allows for a more anterior directed tunnel, and avoids posterior wall blowout and injuries to the sciatic nerve.

Insert a drill pin through the femoral aimer and drill through the lateral cortex. To maximize lateral bone stock, ensure the drill pin exits the femur close to lateral epicondyle (Figure 4).

Maintain hyperflexion, pass the cannulated reamer (size to match the graft diameter) over the drill pin and drill the femoral tunnel to a depth of 26-30 mm (Figure 5). Remove excess bone debris with a shaver.

Figure 1.

Figure 2.

Figure 3.

Figure 4.

Figure 5.
GUIDE BLOCK AND FRAME ASSEMBLY

1. Slide the Guide Block onto the Guide Frame.
2. Select the femoral rod size to match the femoral tunnel diameter and insert it onto the Guide Frame (Figure 6).
3. Tighten the Femoral Rod Thumbscrew to secure the femoral rod.
4. Advance the Femoral Rod over the drill pin and into the femoral tunnel.
5. Position the Guide Block on the MEDIAL side of the knee. The “LEFT” and “RIGHT” engravings should be visible and correspond with the operative knee.
6. Remove the drill pin. If desired, pass a utility suture through the femoral tunnel before removing the drill pin.

POSITION GUIDE BLOCK FOR SLEEVE/CROSS PIN ENTRY POINT

With the rod fully inserted into the femoral tunnel, position the Guide Block on the frame. To locate the starting position:
1. Locate the medial epicondyle.
2. Mark a position on the patient's skin that is anterior and proximal to the medial epicondyle in the general area of the flat zone behind the medial epicondyle (Figure 7).
3. Adjust the Guide Block on the frame to this mark.
4. Tighten the Guide Block Screw to secure the block in this position.

Note: The Guide Block position should always be anterior to the medial epicondyle to avoid risk of trocar and cross-pins diverging posteriorly into the joint.

MEASURE LATERAL BONE STOCK

Attach the Arc to the Guide Frame (Figure 8). The Arc will be used to determine the available lateral bone stock (distance between tip of the implant and lateral femoral cortex).

Insert the Bone Gauge Pin through the Arc holes, ensuring it penetrates the patient's skin and maintains contact with the lateral femoral cortex (Figure 9).

The laser line on the Bone Gauge Pin must be visible to ensure there is sufficient bone stock. The distance between the laser line and the surface equals the amount of lateral bone stock (Figure 9a).

If the laser line is not visible, then slightly adjust the Guide Block position up or down on the frame and/or rotate the Guide Frame about the tunnel axis. Ensure the Guide Block maintains a position anterior to the medial epicondyle. Recheck bone stock and, if acceptable, mark the new entry location on patient's skin and tighten the Guide Block Screw to maintain the block’s position.
1. Assemble the first Sleeve over the Trocar and ensure they are interlocked. Place the Sleeve/Trocar assembly in the bottom (distal) hole of the Guide Block (Figure 10).

2. Make an incision in the skin where the Trocar-Sleeve assembly will enter.

3. Drill the Trocar-Sleeve assembly into the medial side of the knee until the sleeve hub meets the Guide Block. As the Trocar-Sleeve assembly advances forward, make sure that it stays engaged, and that both elements are spinning together (Figures 11 and 11a).

4. When the Sleeve is in place, reverse-spin the Trocar to disengage and remove from the Sleeve.

5. Repeat the steps above for drilling the second Sleeve through the top (proximal) hole of the Guide Block.

6. Remove the Bone Gauge Pin, detach the Arc, and unscrew the cover from the Guide Block (Figure 12). Rotate the Guide Frame away from the Sleeves, and remove the Guide Frame from the knee, leaving only the two Sleeves in the medial femoral condyle (Figure 13).

7. Under visualization, inspect the location of the Cross Pin holes within the femoral tunnel by inserting a guide pin through each Sleeve.

**Note:** By design the trocars do not penetrate across the femoral tunnel and the sleeves do not enter the femoral tunnel.

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**INSERT GRAFT AND CROSS PINS**

With the knee at 120° of flexion, the graft sutures are then shuttled through the knee via a utility suture loop and passed through the femoral tunnel and out the anterolateral thigh. Pull the graft through the tibial tunnel and into the femoral tunnel.

Apply tension to the graft proximally. Insert a Cross Pin into the proximal (top) Sleeve and mallet the pin in place using the Pin Pusher Rod and small RIGIDFIX System Mallet (Figure 14).

Advance the Cross Pin until the laser line on the Pusher Rod is aligned with the top surface of the Sleeve. This ensures that the Cross Pins are placed in the correct location with respect to the femoral tunnel. Insert the second Cross Pin into the distal Sleeve.

Remove the Sleeves with the Sleeve removal tool. Pull the Sleeve straight out with a slight twist and pull action (without bending or rocking the Sleeve).

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**INSERT GRAFT AND CROSS PINS**

Cycle the knee about 20 times. Complete tibial fixation with INTRAFIX™ ACL Tibial Fastener or BIOINTRAFIX® Tibial Sheath and Screw System or MILAGRO® Advance Interference Screw.