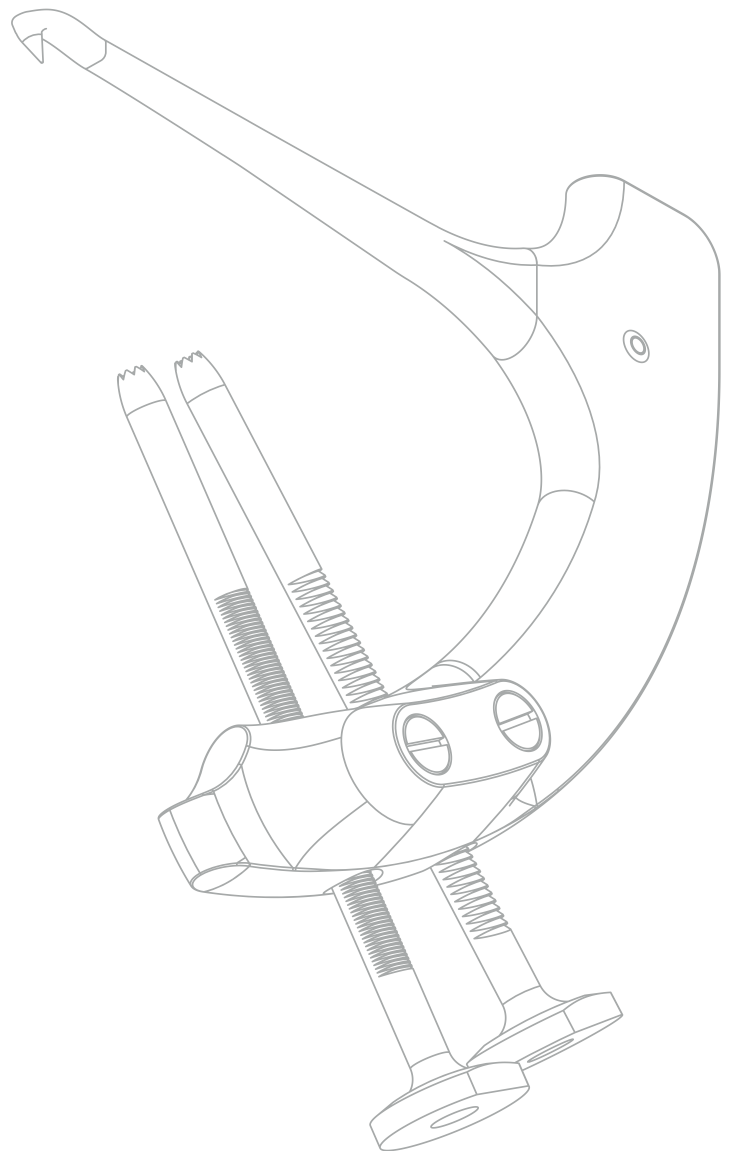
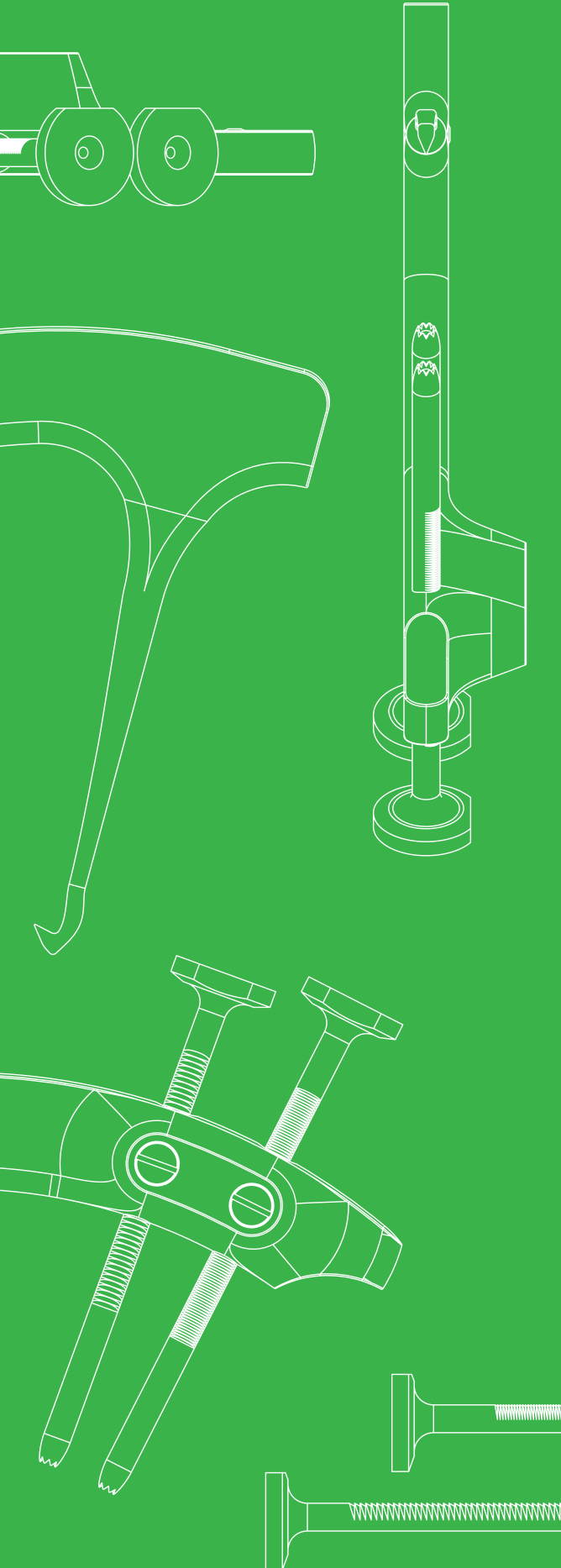


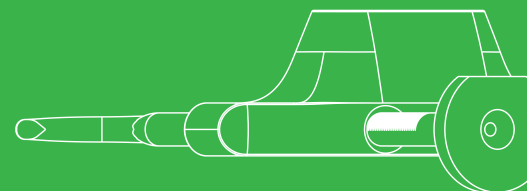
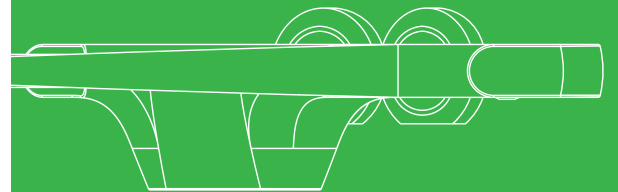
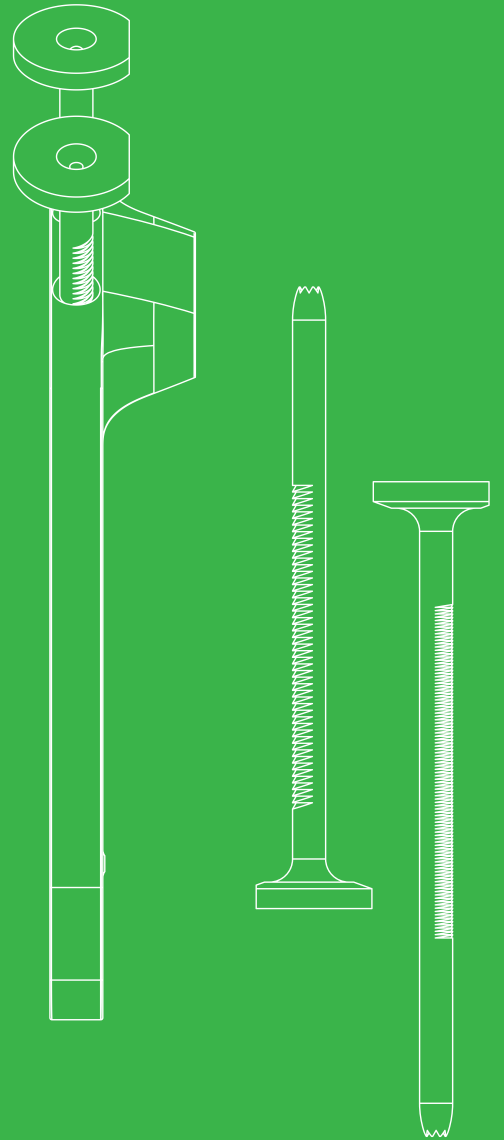
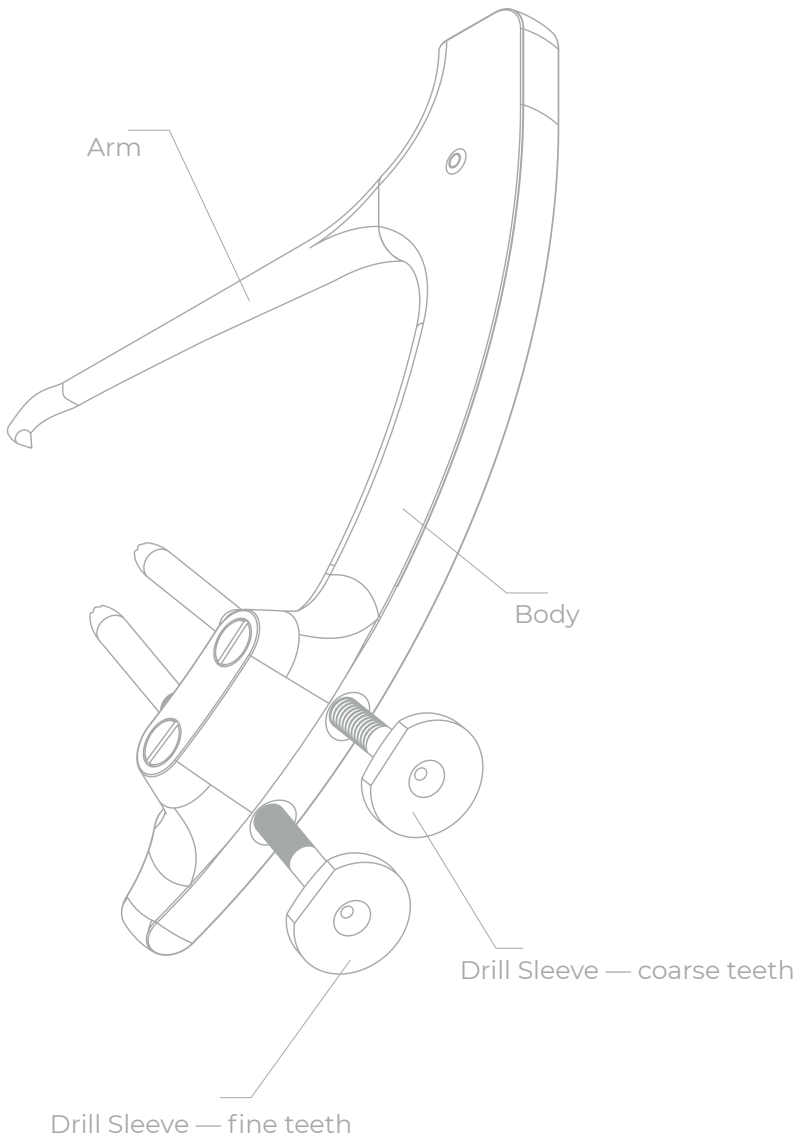
# SURGICAL TECHNIQUE

## Drillbone Root Repair

### Guide for Meniscal Root Repair



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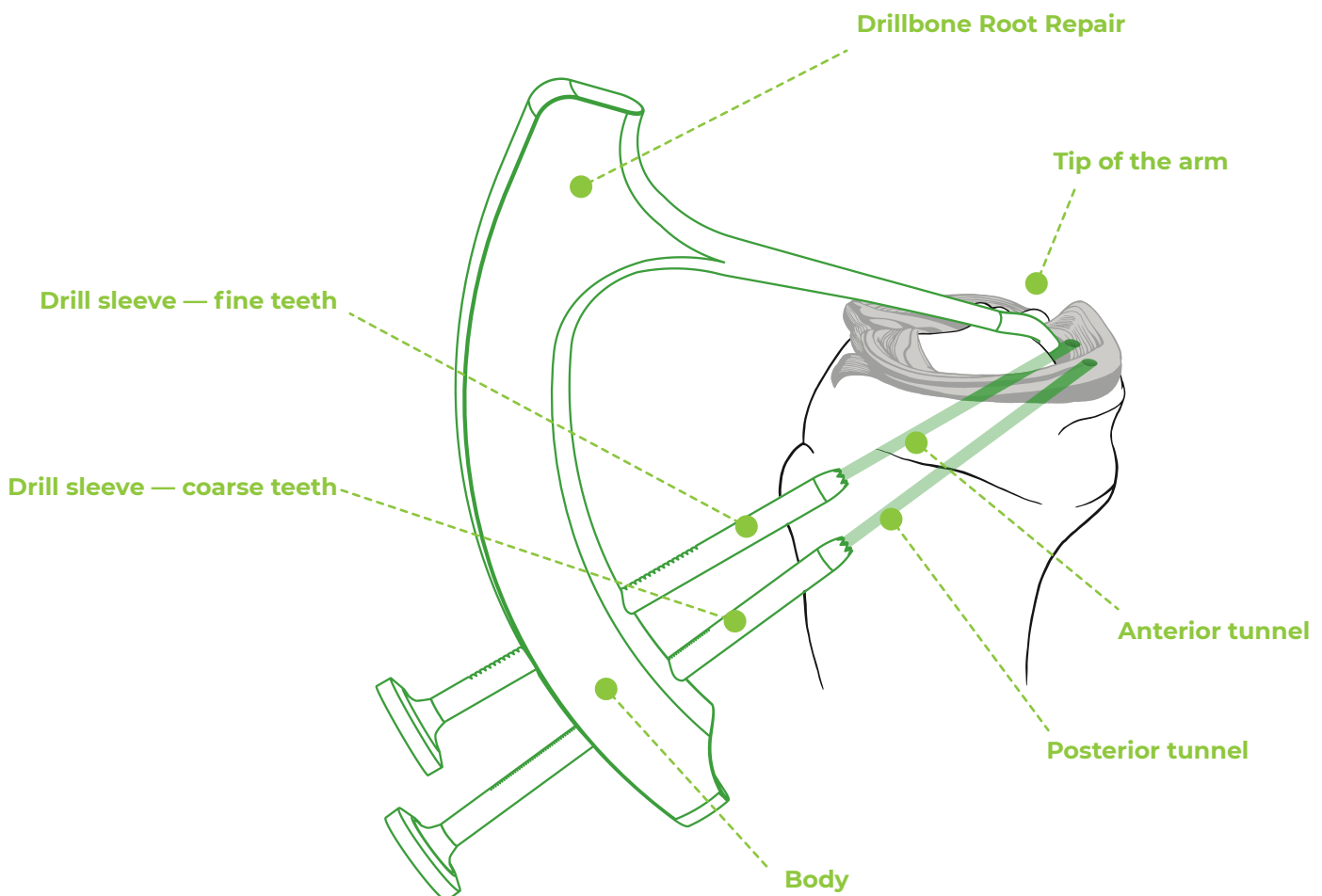


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## 1. Introduction

The Drillbone aiming device for meniscal root repair (Fig. 1) allows precise drilling of tibial tunnels for either single- or double-tunnel techniques to repair a root tear of the posterior horn of the medial or lateral meniscus. Use of an implant for suture fixation is optional. In the double-tunnel technique, surgery can be performed without an implant – sutures tied over a bone bridge provide sufficient primary fixation.



**Fig. 1:** Drillbone Root Repair

## 2. Positioning and Surgical Procedure

The patient is positioned supine for standard knee arthroscopy, with the thigh secured in a holder. The knee is flexed to 90° and allowed to hang freely over the edge of the table. During surgery, the knee may also be extended.

Standard anteromedial and anterolateral portals are used. For optimal access to the posterior horn, the anteromedial portal should be placed as low as possible above the anterior horn of the medial meniscus and close to the patellar tendon. To facilitate manipulation of the posterior horn, an accessory anteromedial or anterolateral portal may be created. In rare cases, a posteromedial portal may be required for suturing.

## 3. Release of the Posteromedial Compartment

Adequate visualization and access to the posterior horn are essential for diagnosis and treatment of root tears. Repair of a medial meniscus root tear cannot be performed safely without release of the posteromedial compartment (MCL release).

This is best achieved using a pink 18G needle introduced percutaneously just posterior to the medial collateral ligament and just above the upper margin of the meniscus. Several oblique punctures directed upward weaken the posterior oblique ligament (POL). With simultaneous valgus stress, gradual opening of the medial joint space is observed.

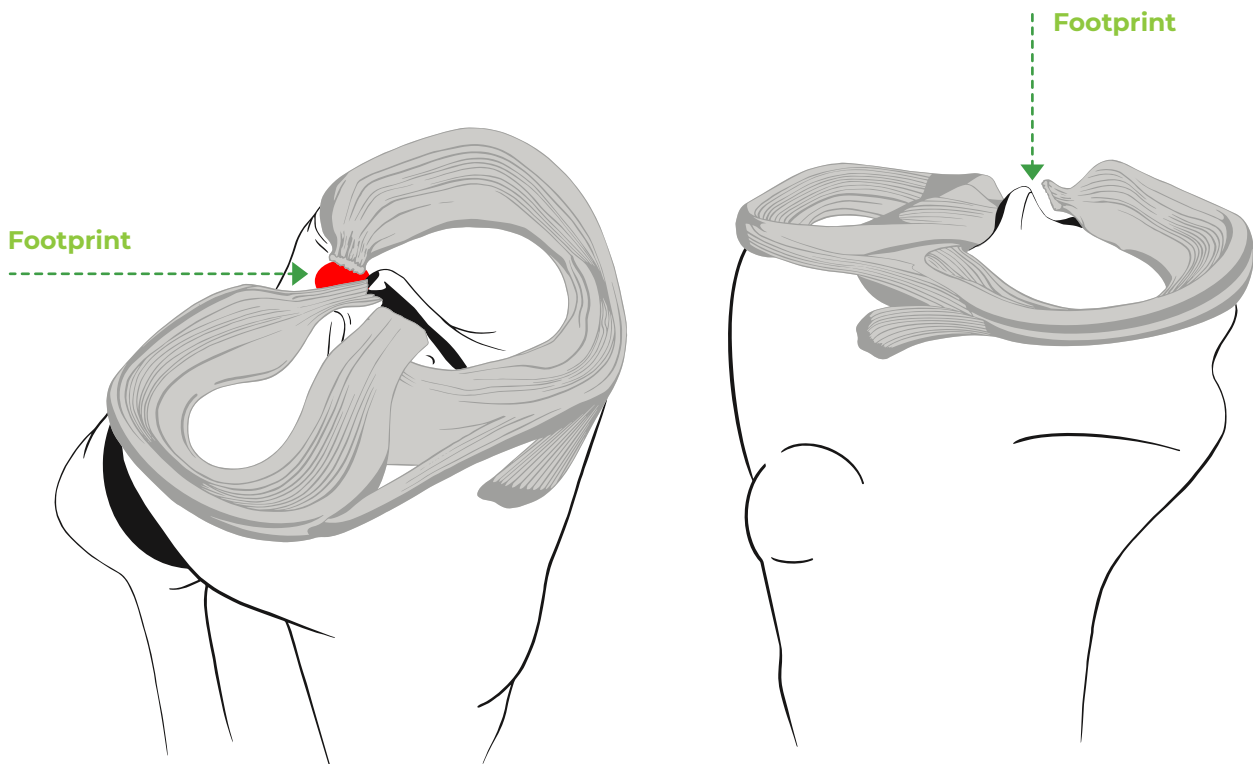
## 4. Meniscus Mobilization

After confirming the tear, meniscal mobility is assessed. In chronic tears with extrusion, the posterior horn may need to be sharply released from adhesions to the posterior capsule.

## 5. Preparation of the Insertion Site

The anatomical footprint is then localized. The medial meniscus attaches to the tibia approximately 10 mm posterior to the medial intercondylar eminence. The correct site lies behind the posterior tibial margin, on the sloping dorsal tibial

surface. From a standard anterior arthroscopic view, the insertion site is usually not visible (Fig. 2). For optimal healing, the meniscus must be refixed into a clean bone bed. All soft tissue remnants are removed from the posterior horn region using a curette, shaver, or RF probe, and the bone surface is decorticated.



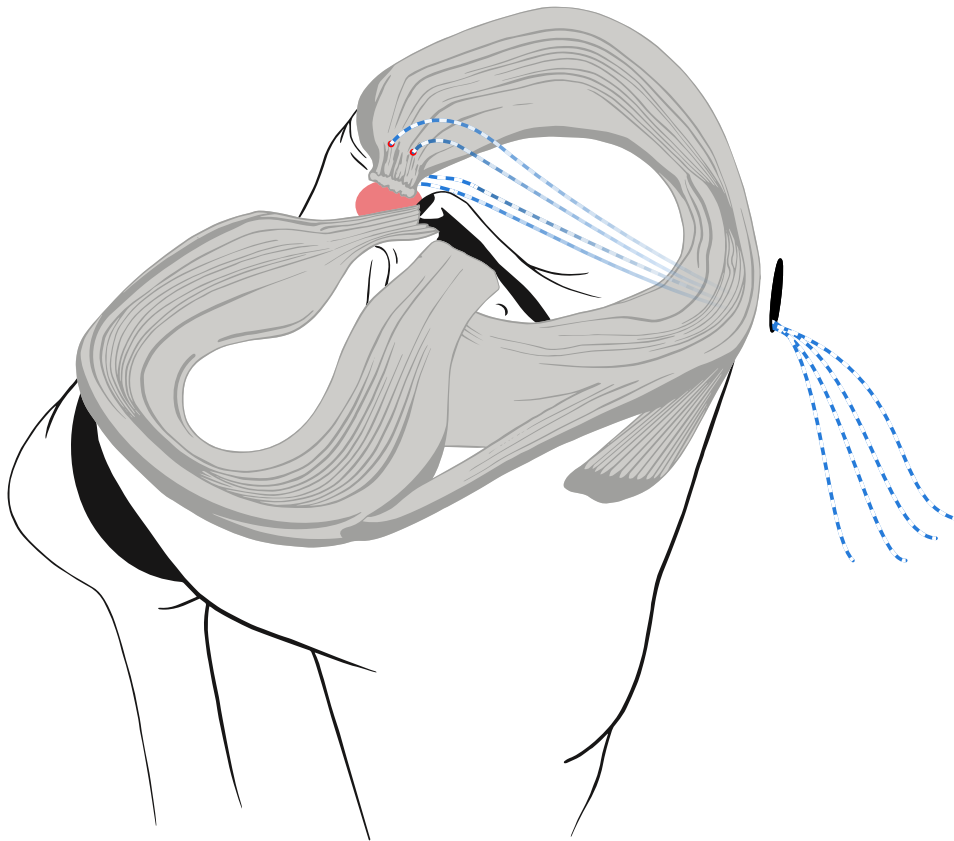
**Obr. 2:** *Anatomic position of median meniscus insertion site*

## 6. Meniscal Suturing

Once the bone bed is prepared and the posterior horn can be reduced without tension, the meniscus is sutured using the preferred technique. Simple vertical stitches are placed 5–10 mm from the posterior horn, in the stronger tissue near the meniscal base (Fig. 3). Alternative techniques such as the Luggage-Tag or horizontal mattress stitch may be used according to surgeon preference.

Different-colored sutures are recommended, preferably braided #2 sutures or narrow tapes. Passage may be performed antegrade (e.g., FirstPass Mini, Knee Scorpion) or, rarely, retrograde through a posteromedial portal using shuttle

needles (Suture Shuttle). All four suture ends emerging through the anteromedial portal are secured with a clamp.



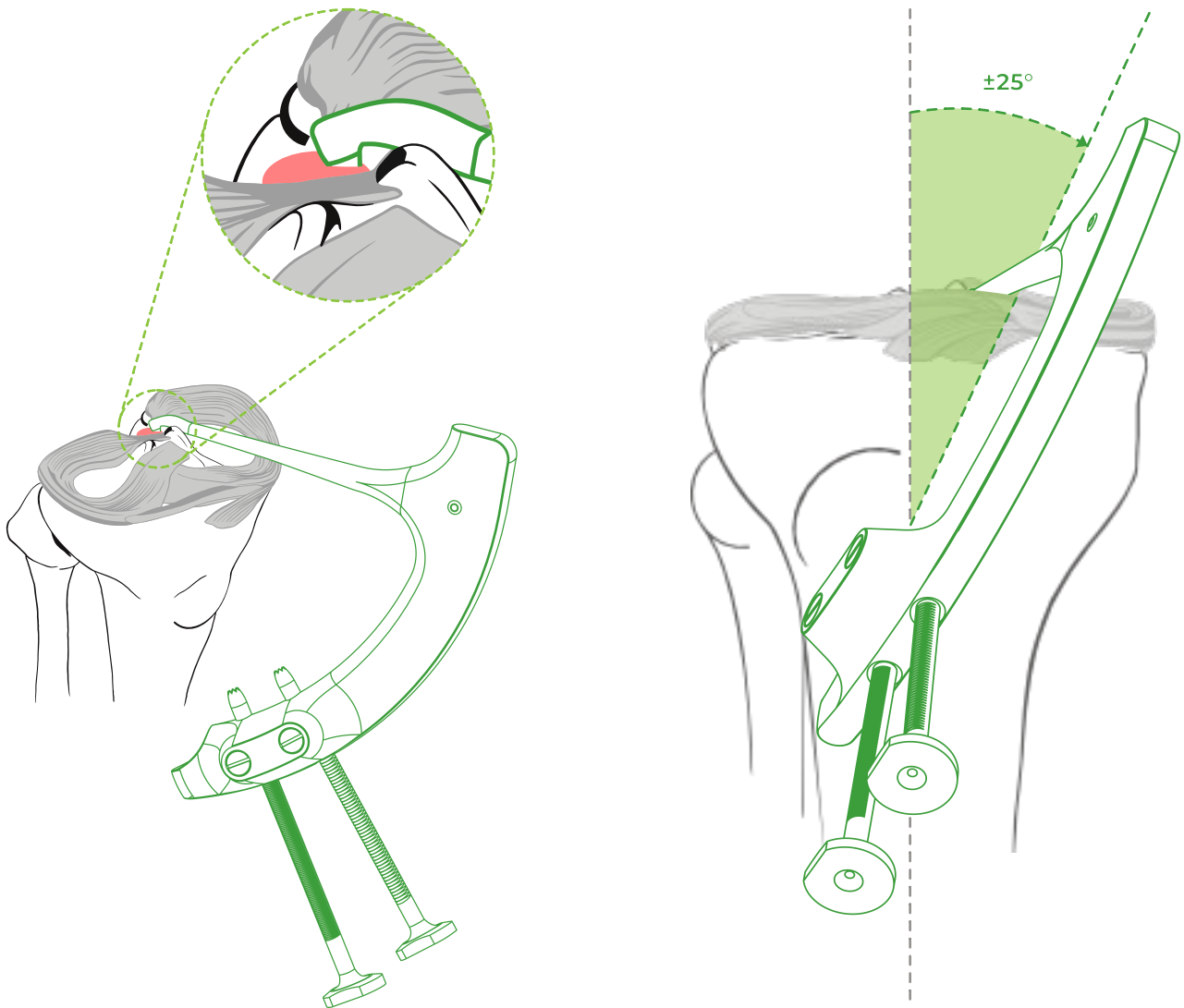
**Fig. 3:** *Meniscus suturing*

## 7. Introduction of the Aiming Device

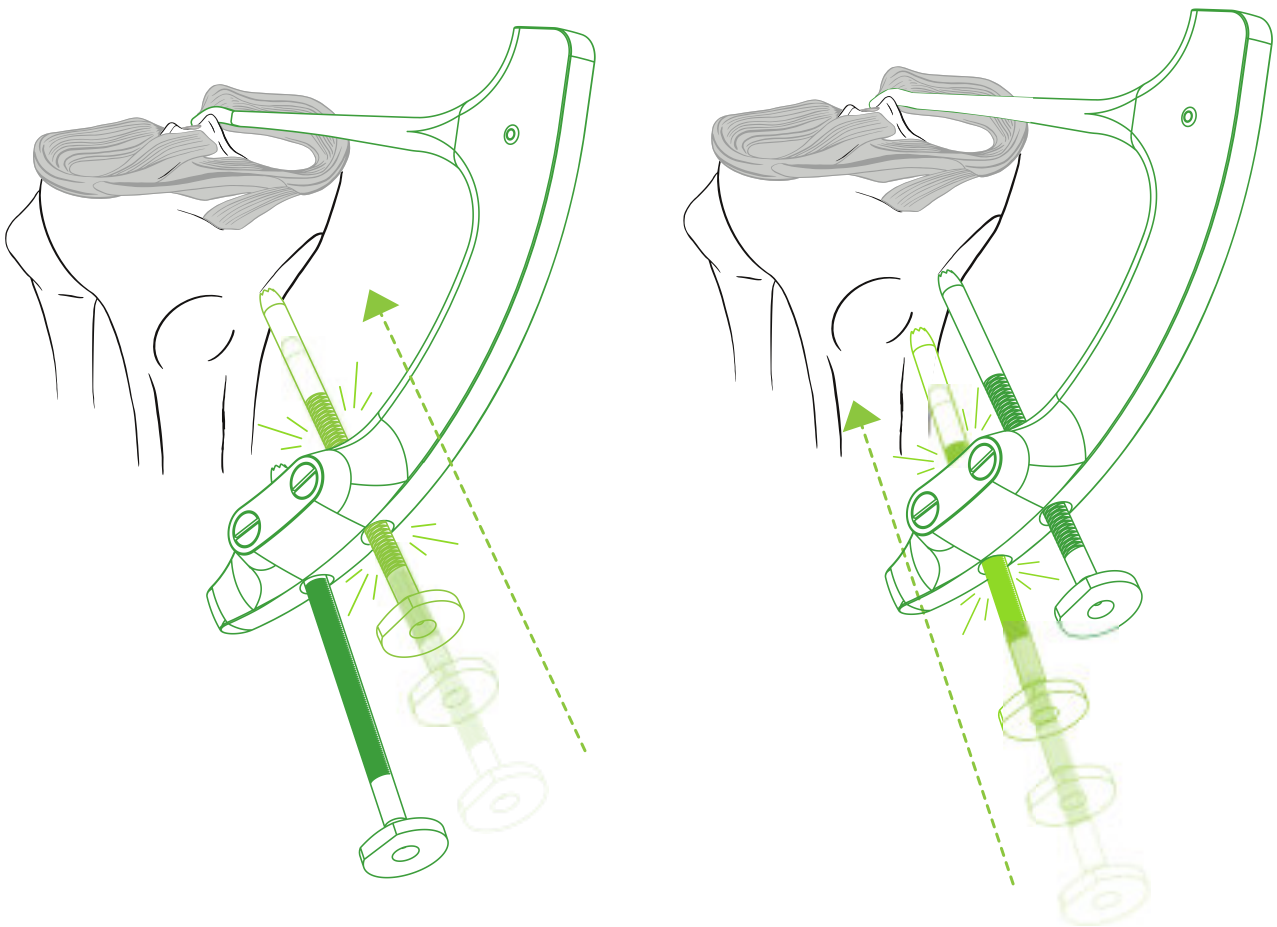
The aiming device is introduced through the anteromedial portal. Slight tilting relative to the tibial axis allows smooth insertion of the arm and tip into the posterior compartment. The device is oriented so that its axis forms a 20–40° angle with the tibial axis, depending on anatomy and portal position.

The tip is placed on the anterior margin of the footprint and gently engaged into bone (Fig. 4). Through a 1.5 cm mini-incision, the drill sleeves are advanced to bone and sequentially seated – first cranial, then caudal (Fig. 5). A ratchet lock on each sleeve secures the device firmly to the tibia.

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**Fig. 4:** Position of the aiming device and its tip



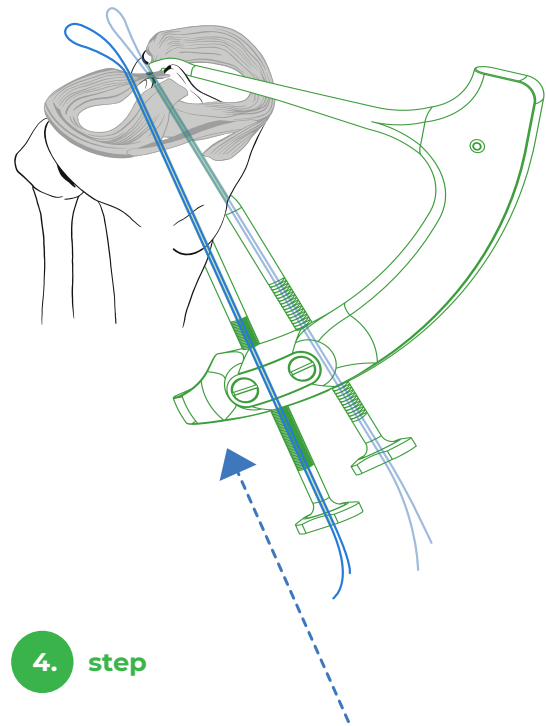
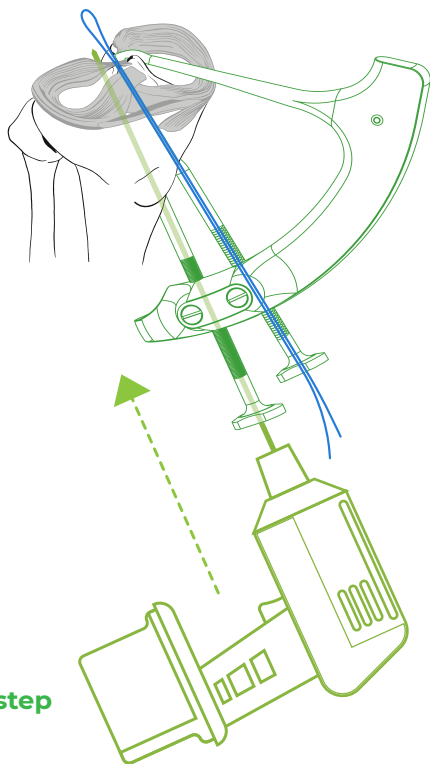
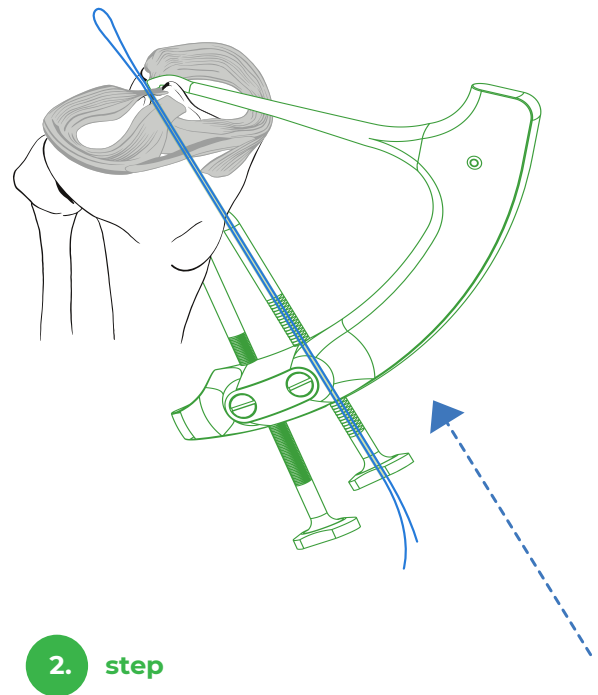
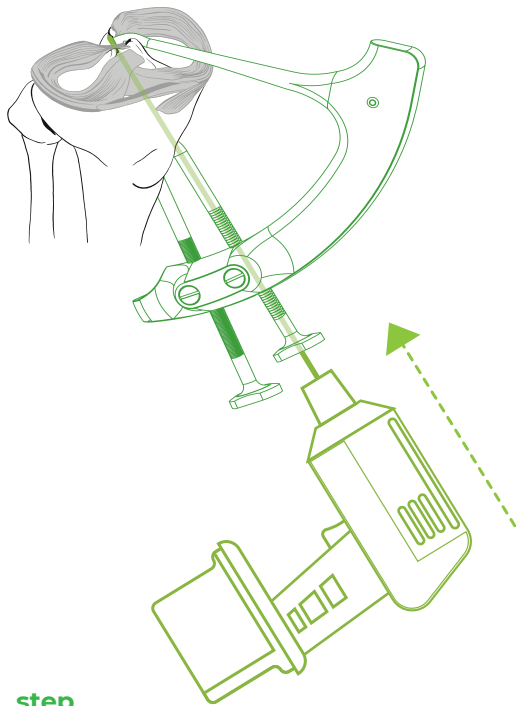
**Obr. 5:** *Securing the device to the bone using drilling sleeves*

## 8. Tunnel Drilling and Loop Insertion

Under arthroscopic control, two tunnels are drilled using a 2 mm K-wire or drill. The intra-articular exits are at the margins of the footprint: the cranial tunnel at the anterior edge, the caudal tunnel at the posterior edge. Their connecting line is perpendicular to the axis of the posterior horn, ensuring maximum footprint coverage.

After drilling the cranial tunnel, the first Drillbone Loop is introduced through the sleeve until visible intra-articularly. The caudal tunnel is then drilled, and a second Drillbone Loop is inserted (Fig. 6).

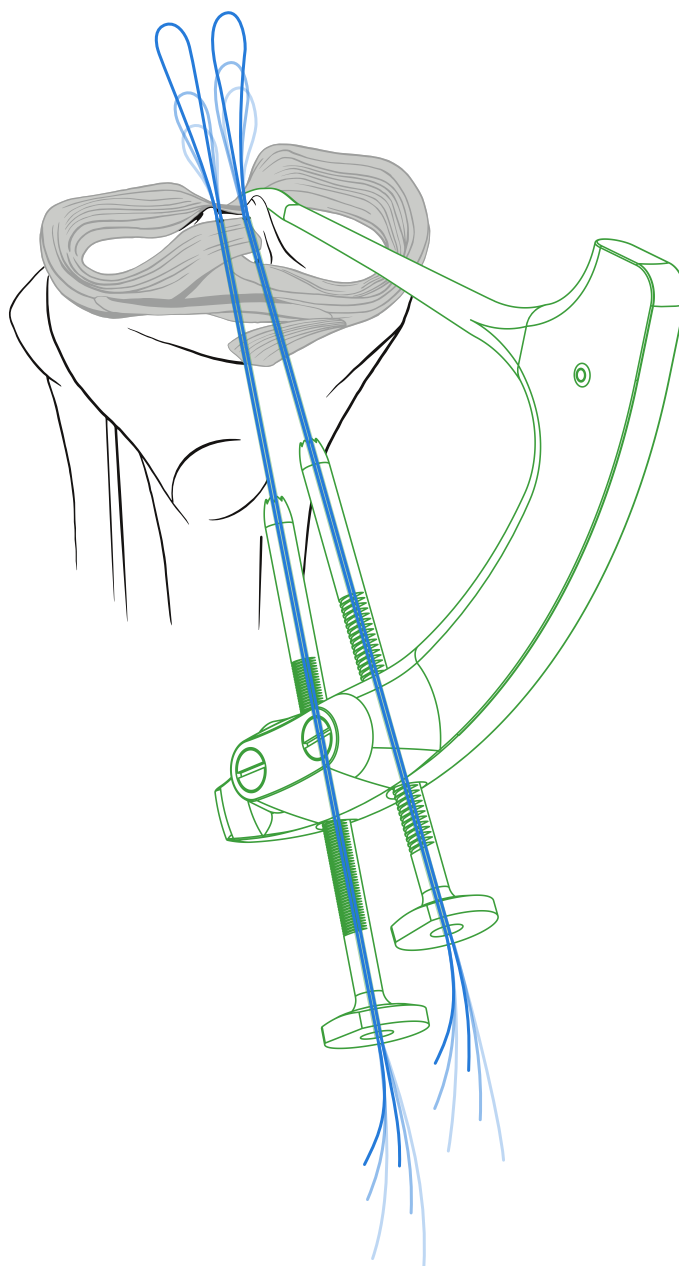
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**Obr. 6:** Drilling tunnels and inserting loops

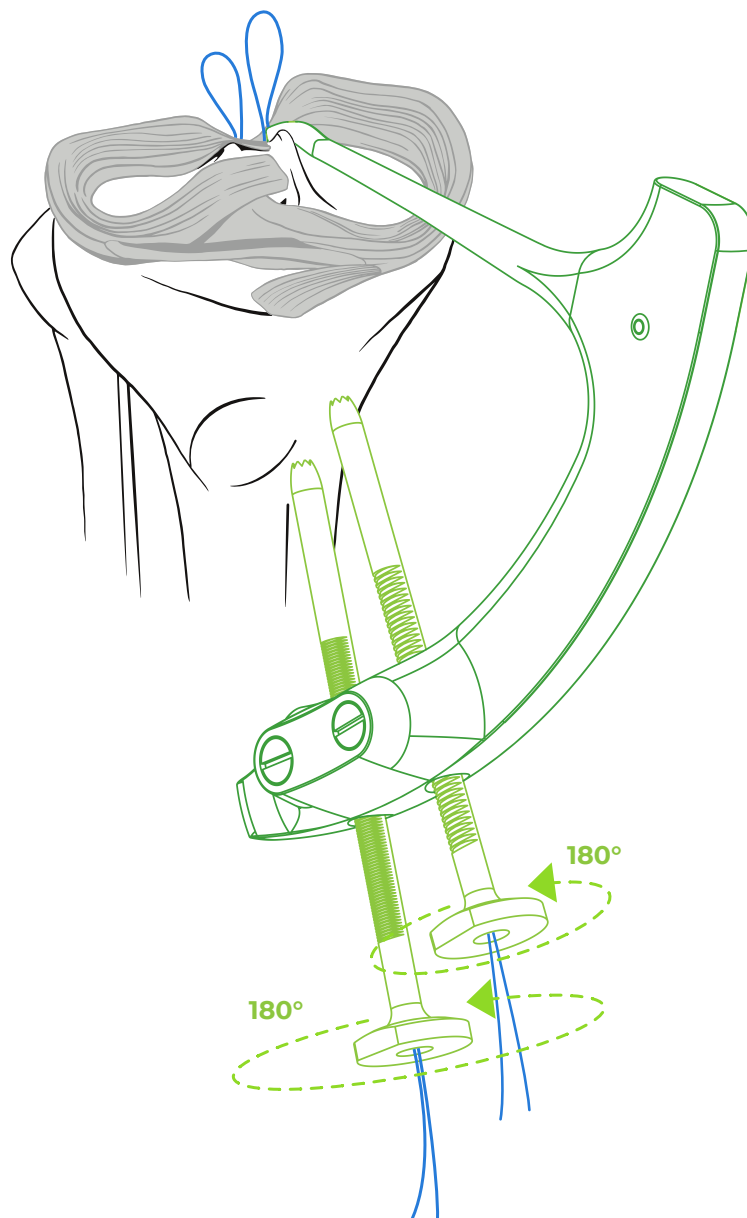
## 9. Releasing the Aiming Device and Suture Passage

Once both loops are placed (Fig. 7), the device can be released. Rotating the drill sleeves disengages the ratchets, freeing the device from bone (Fig. 8). The sleeves are withdrawn and the device removed (Fig. 9). If loops retract into the tunnels, they can be advanced again until visible in the joint and then retrieved through the anteromedial portal.



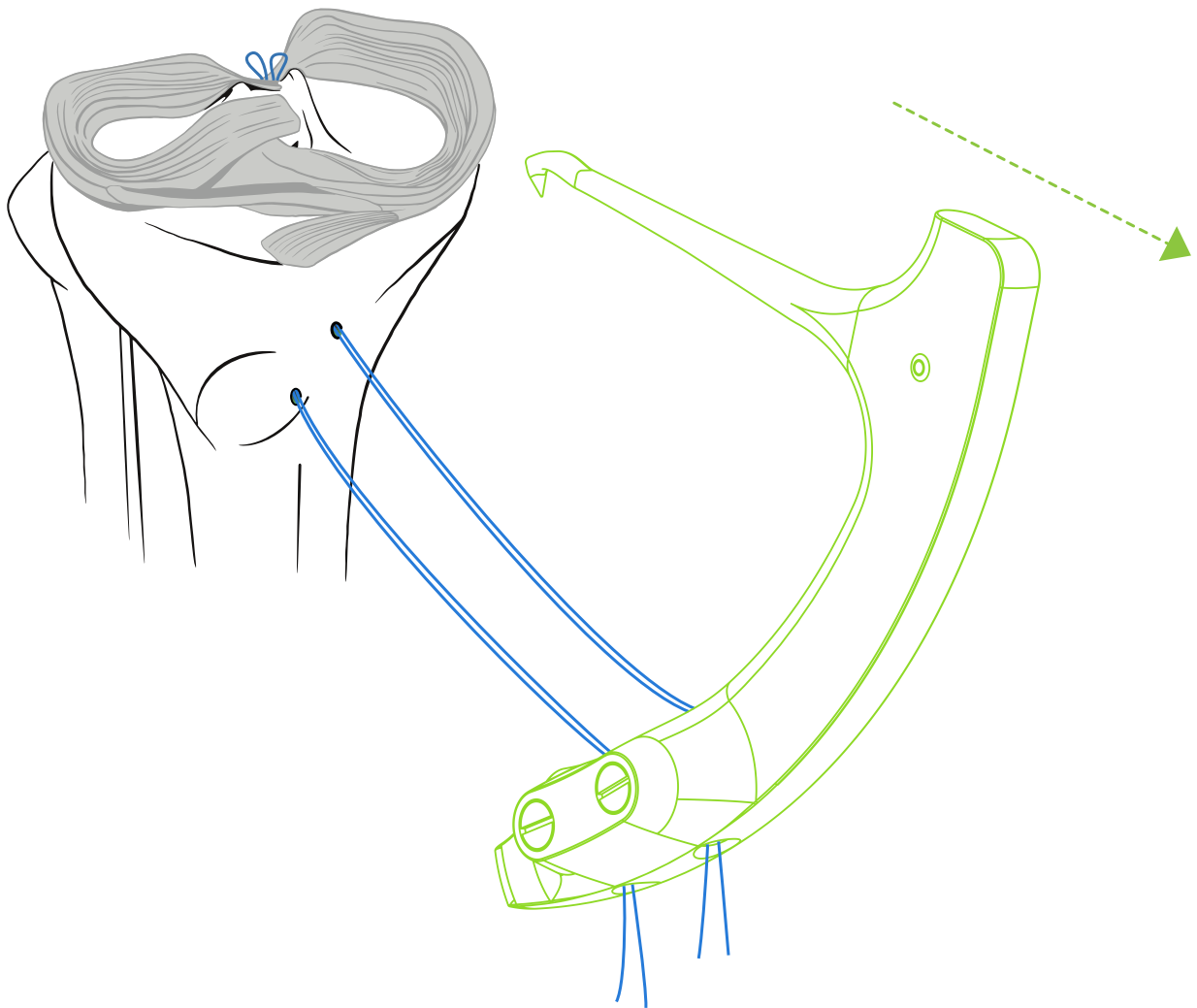
**Obr. 7:** Both loops passed

The sutures from the dorsal portion of the meniscus are loaded into the caudal loop and shuttled through the posterior tunnel. The ventral sutures are loaded into the cranial loop and shuttled through the anterior tunnel. Several cycles of flexion–extension with tension on all sutures seat the meniscus securely in the bone bed.



**Obr. 8:** *Releasing the device*

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**Obr. 9:** Device removal

## 10. Suture Tying

Two fixation methods are available:

**Implant-assisted fixation:** A four-hole button is positioned between the tunnel exits. Corresponding sutures from the cranial and caudal tunnels are tied over the button. Arthroscopic control is used to confirm adequate meniscal root compression.

**Bone-bridge fixation (implant-free):** Sutures from the caudal tunnel form the post. Sliding knots are not used. Sutures from the cranial tunnel are tied to the post using half-hitches (e.g., Revo). A knot pusher facilitates tightening, with arthroscopic confirmation of root compression into the bone bed.

After knot tying, the meniscal root is firmly secured. With adequate mobilization, correct suture placement, and proper tunnel orientation, anatomical repair with full footprint coverage is achieved.

## 11. Postoperative Care

Patients remain non-weightbearing on crutches for 6 weeks. Knee flexion is limited to 90° for the first 3 weeks, then increased as tolerated. At 6 weeks, full weightbearing and range of motion are progressively allowed, along with strengthening exercises.

Deep squatting, leg press >70°, jumping, and landing are restricted for 4 months. Return to full activity is permitted after 5–7 months.

## 12. Special Cases

### Lateral meniscus root repair

For LM repair, only the footprint and aiming device position differ. The lateral meniscus attaches 4–5 mm posterior to the lateral intercondylar eminence apex and is often associated with ACL rupture. The surgeon may aim from medial or lateral tibia depending on anatomy. The tip is positioned at the anterior footprint margin, and both sleeves are pressed into bone for fixation. All other steps are identical.

### Single-tunnel technique

When anatomical or technical conditions preclude a double-tunnel repair, a single-tunnel technique is used. Only the cranial tunnel is drilled, which lies immediately behind the tip of the device. The tip is therefore aimed just anterior to the footprint center, creating a tunnel at its midpoint. Sutures are secured with an implant, either over a button or with a suture anchor.

### Combined root repair and ACL/PCL reconstruction

When root repair is performed together with cruciate ligament reconstruction, tunnel conflict must be avoided. The ACL tunnel should be positioned above and the PCL tunnel below the meniscal root tunnels. Cruciate tunnels are drilled first, followed by root repair and then ligament reconstruction. In combined ACL and PCL reconstructions with root repair, the single-tunnel root repair technique is preferable.

### **Combined root repair and high tibial osteotomy (HTO)**

In cases of malalignment  $>5^\circ$ , isolated HTO is indicated without root repair. If both procedures are indicated simultaneously, potential conflict between root tunnels and the osteotomy line or screws must be considered. Tunnels should be placed above the osteotomy. The osteotomy line is first marked as distally as possible, then the device is positioned. A thin wire loop is recommended for shuttling. The tibial osteotomy is performed with intraoperative fluoroscopic control of tunnel, screw, and osteotomy positions. After fixation, root repair is completed by passing and tying sutures over a button or bone bridge.

## 13. Tips and Tricks

Adequate release of the posteromedial compartment is mandatory for medial root repair, improving access and reducing risk of iatrogenic cartilage injury.

Anatomical footprint localization ensures tension-free repair and minimizes risk of failure.

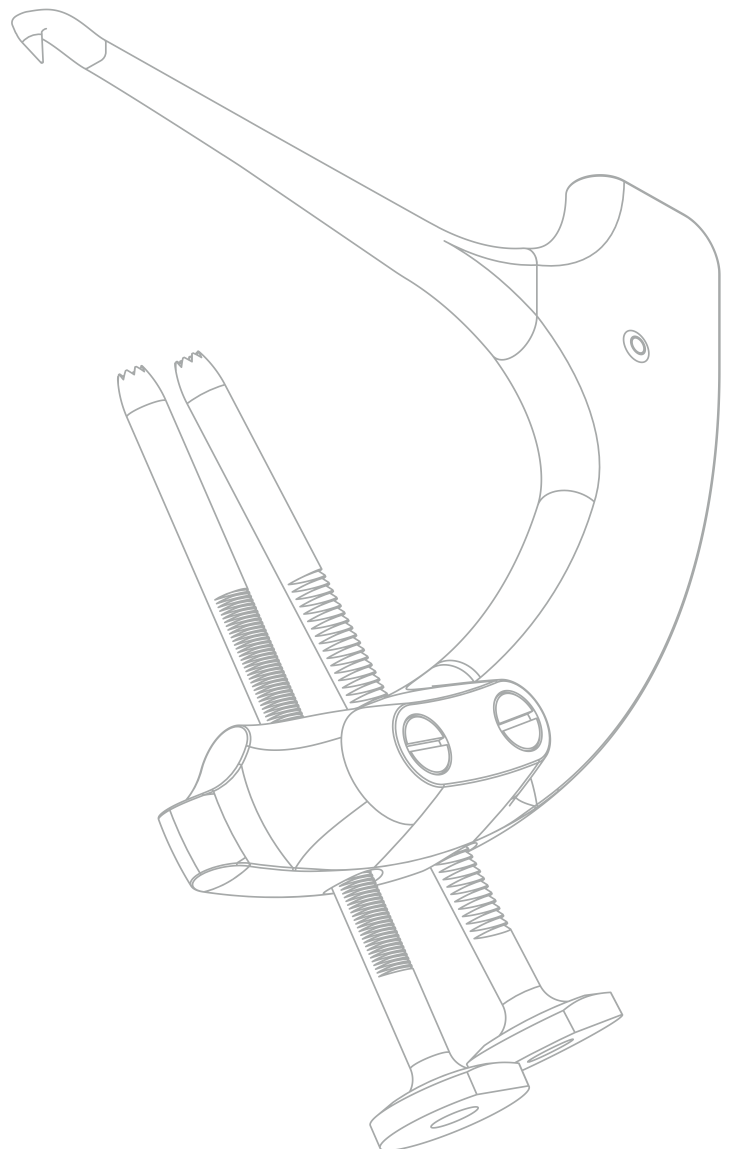
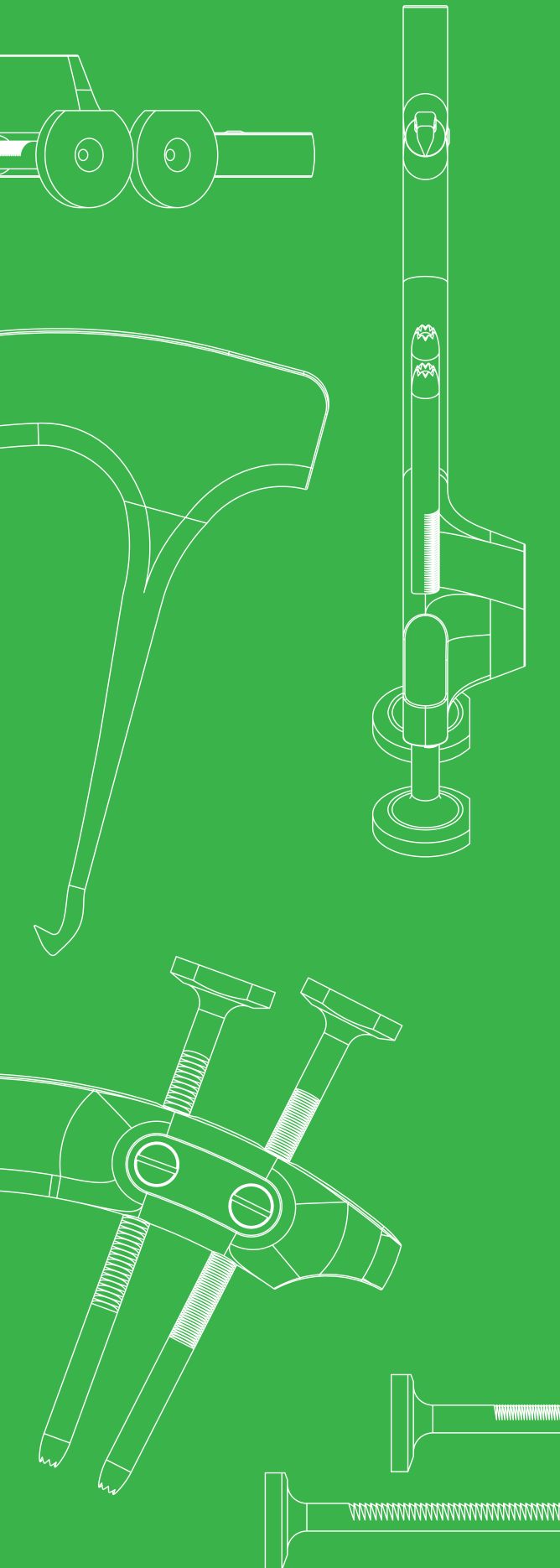
Accessory medial or lateral portals created under arthroscopic guidance improve access to the posterior horn and allow additional instrumentation.

Strict adherence to postoperative restrictions prevents premature meniscal loading and reduces risk of repair failure.

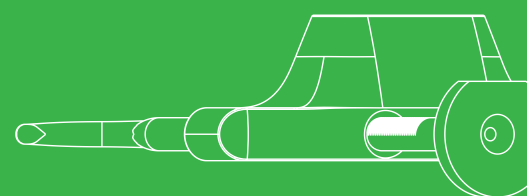
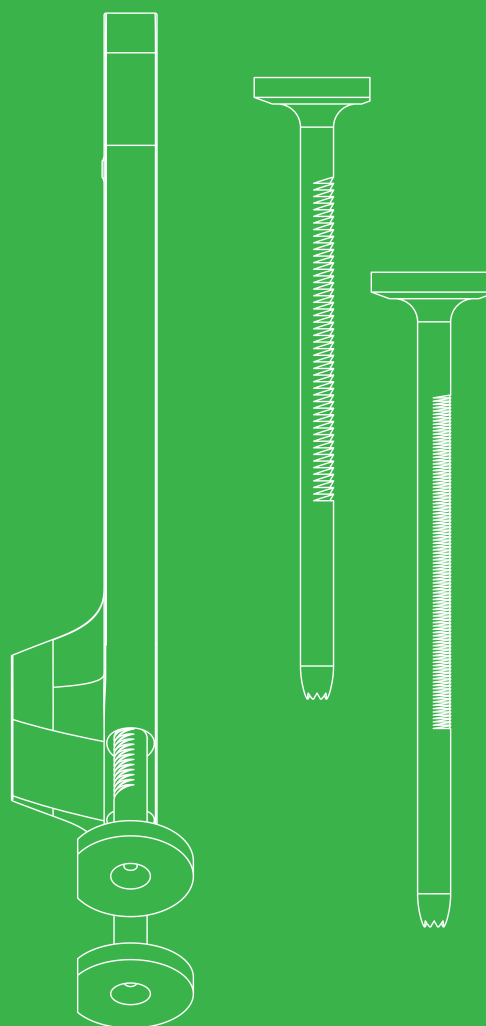
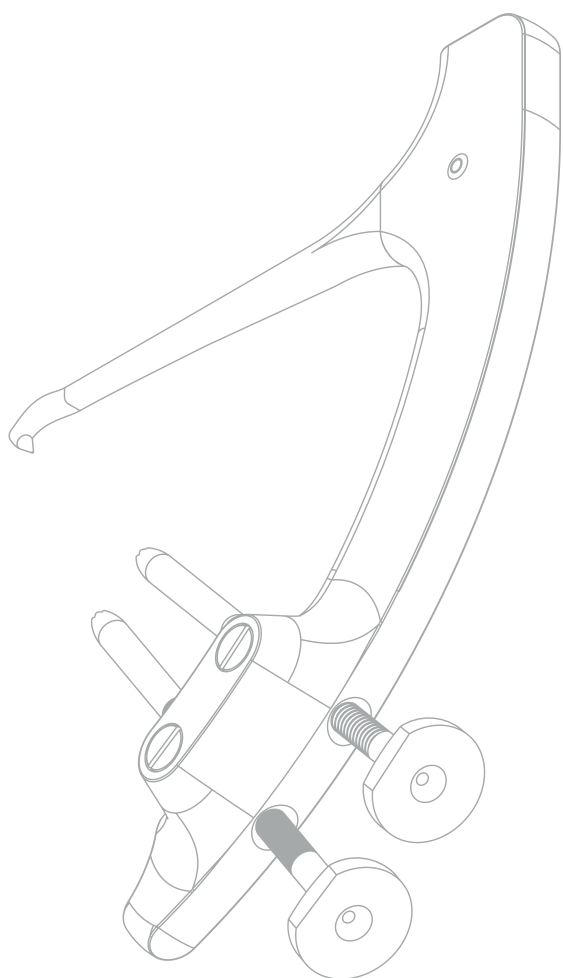
# SURGICAL TECHNIQUE

## Drillbone Root Repair

### Guide for Meniscal Root Repair



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Product  
Website



Surgical  
Technique  
3D Animation

CE

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