Medial Patello Femoral Ligament (MPFL) reconstruction with autologous gracilis tendon using the two bone tunnel technique

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This surgical technique was prepared under the guidance of Prof. Elvire Servien and Prof. Philippe Neyret. Created under close collaboration with the physician, it contains a summary of medical techniques and opinions based upon their training and expertise in the field, along with their knowledge of Smith & Nephew’s BIOSURE™ PK interference screw.

Smith & Nephew does not provide medical advice and recommends that surgeons exercise their own professional judgement when determining a patient’s course of treatment. Smith & Nephew does not recommend any particular product or surgical technique for a specific patient. This surgical technique is presented for educational purposes only. For more information on the products in this surgical technique, including indications for use, contraindications, effects, precautions and warnings, please consult the products’ Instructions for Use (IFU).
For illustrative purposes only. Results may vary.
Scope / Introduction

Scope

The aim of the medial patello femoral ligament (MPFL) reconstruction is to re-establish the alignment of the patella in the trochlear groove across the entire range of motion, particularly when approaching full extension. The technique herein described is a mini-open procedure using a free gracilis tendon graft and applying the two bone tunnel technique for anatomical reconstruction of the MPFL.

Introduction

Patellofemoral instability can be caused by congenital anomalies or through traumatic patellar dislocations\textsuperscript{1-4} with the latter being associated with rupture of the MPFL in over 96\% of patients\textsuperscript{5,6}. In patients with recurrent dislocations, an increasing insufficiency of the medial patellar restraints can be observed. The combination of MPFL insufficiency with instability predisposing factors, such as trochlea dysplasia or patella alta, results in recurrent and continuous patellar dislocations\textsuperscript{7,8}. It is therefore crucial to restore sufficient function of the MPFL.

Previously the focus was to correct the extensor mechanism by re-establishing proper alignment of the patella, or by arthroscopically tightening the medial joint capsule either alone or in combination with a lateral release. However, anatomical, biomechanical and clinical studies have shown that these procedures are not able to reliably restore patellofemoral stability\textsuperscript{9-13}, especially in the presence of dysplastic trochlea\textsuperscript{14}. MPFL reconstruction maintains patellofemoral function even in the presence of dysplastic trochlea\textsuperscript{15,16} and provides good mid and long-term stability, with significant improvements in knee function\textsuperscript{17,18}.

This guide illustrates mini-open MPFL reconstruction using the two bone tunnel technique. The patellar fixation used in this technique provides good restoration of the MPFL through the wide insertion at the patella, which mimics that of the native MPFL\textsuperscript{19}.
Patient Preparation

Supine position, arthroscopy table, lowered position of contralateral leg for improved access to medial side of the operated leg.

The knee should be positioned at 90° of flexion.

**Tip:**
The lowered contralateral leg allows for easy access when imaging.
Surgical Technique

The surgical technique is composed of 6 surgical steps.

1. Graft harvest and preparation

   a. Harvest the gracilis tendon in the standard fashion. A length of 16–20 cm is sufficient for MPFL reconstruction.

   b. Whip-stitch the proximal end of the graft using high strength #2 ULTRABRAID™ sutures.

   c. The graft is then doubled over a passing suture, and the limbs are sutured together at a length of 2 cm at the looped end ([Fig 1]). The graft produced is Y shaped, with two free whip-stitched limbs and a doubled end with a passing suture.

2. Patella Preparation

   a. Position the knee in 90° of flexion.

   b. A 2–3 cm vertical incision allows exposure of the medial border of the patella.

   c. The incision is made to bone using a #15 blade.

   d. The patella periosteum is divided with a blade ([Fig 2]).

   e. While keeping the knee capsule intact, layer 2 is separated using a Kocher clamp, creating a pocket between the original MPFL and joint capsule.
f. Two tunnels are created 10 mm apart in the proximal third of the patella by sequential drilling using a 3.2 mm and 4.5 mm drill bit. Each tunnel begins on the medial border of the patella and exits on the anterior face 8–10 mm from the medial border (Fig 3).

3. Femoral Tunnel Preparation

a. Position the knee in 30° of flexion.

b. A 1–2 cm vertical incision is made over the peak of the medial femoral epicondyle and the adductor tubercle. The location is identified by palpation with the knee in varus. The tendon of the adductor magnus and the epicondyle are generally easy to identify. The dissection is carried out to bone.

c. A guide wire pin with an eyelet is directed from medial to lateral, proximal to the epicondyle and beneath the adductor tubercle, through the metaphysis of the lateral femur and out through the skin of the lateral thigh (Fig 4).

Tip:
Use an image intensifier as a control to avoid gross errors.

d. Using a 7 mm endoscopic cannulated drill reamer over the guide pin, a blind tunnel is created in the medial epicondyle (Fig 5). This tunnel must be of sufficient length (25 mm) to accommodate the folded and sutured end of the graft (20 mm).
4. Femoral graft fixation

a. The passing suture is then pulled through the femur using the eyelet of the guide pin, and then used to pull the graft into the tunnel (Fig 6 and 7).

b. Once adequate insertion has been confirmed, the graft is fixed using a BIOSURE® PK interference screw (7 mm x 25 mm) (Fig 8).
5. Positioning the graft

a. A pair of artery forceps is then passed from the patella incision to the posterior incision. It is passed in the plane between the residual MPFL fibres and the capsule (between the second and third capsuloligamentous layers) (Fig 9).

b. Pass the artery forceps through the patellar tunnel from the anterior entrance. Use the artery forceps to catch the suture of the free limbs of the graft. The free limbs of the graft are passed in the sub capsular plane and pulled into the patella tunnels one-by-one (Fig 10).

Note:
The passage of the limbs into the medial patella tunnels is often difficult. The tunnel entrances must be well prepared.

c. Once through the tunnels, the graft limbs are sewn back onto themselves using an absorbable suture material e.g. vycril (Fig 11). The graft is sutured with the knee in 30° of flexion.

d. The patella must be central whilst the suturing is performed, to obtain proper graft tension.

Important:
This is the least reproducible step. The risk is to over-constrain the patella, which should remain mobile but not subluxatable. Lateral movement of between 7 and 9 mm suggests correct tensioning.

6. Suturing

The skin is closed where possible using subcuticular closure. A combination of Monocryl, Dermabond and suture strips may be used.
# Ordering Information

To order the instruments used in this technique contact an authorised Smith & Nephew representative. Prior to performing this technique, consult the Instructions for Use documentation provided with individual components – including indications, contraindications, warnings, cautions and instructions.

<table>
<thead>
<tr>
<th>Endoscopic Drill</th>
<th>Description</th>
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<tbody>
<tr>
<td>013499</td>
<td>Endoscopic drill 6 mm</td>
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<tr>
<td>013660</td>
<td>Endoscopic drill 7 mm</td>
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<tr>
<td>7207315</td>
<td>Endoscopic Cannulated Drill bit, 4.5 mm</td>
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<tr>
<th>Graft Harvesting/Preparation Instruments</th>
<th>Description</th>
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<tr>
<td>7207179</td>
<td>Large Tendon Stripper, closed, 7.4 mm I.D. x 13.5&quot; working length</td>
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<tr>
<td>013550*</td>
<td>Tendon Stripper, closed, 6.4 mm I.D. x 12&quot; working length</td>
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<tr>
<td>013554*</td>
<td>Tendon Stripper, slotted, 5 mm I.D. x 12&quot; working length</td>
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<tr>
<td>72202788</td>
<td>ACUFEX™ GRAFTMASTER™ III System</td>
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<td>72202452</td>
<td>ACUFEX GRAFTMASTER III Preparation board</td>
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<tr>
<td>72202316</td>
<td>ACUFEX GRAFTMASTER III Sliding base (2)</td>
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<td>72202315</td>
<td>ACUFEX GRAFTMASTER III Tissue grasper (2)</td>
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<td>72202317</td>
<td>ACUFEX GRAFTMASTER III Cutting strip</td>
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<td>72202453</td>
<td>ACUFEX GRAFTMASTER III BTB Holder</td>
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<td>72202319</td>
<td>ACUFEX GRAFTMASTER III Slotted Sizing block</td>
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<td>72202441</td>
<td>ACUFEX GRAFTMASTER III System Tray</td>
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<tr>
<th>Drill-Tip Passing Pins with eyelet for graft passage</th>
<th>Description</th>
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<tr>
<td>7208678</td>
<td>2.4 mm x 15&quot; (38 cm) Graduated Drill-Tip Passing Pin, sterile, single use</td>
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<tr>
<td>7210914</td>
<td>ULTRABRAID™ #2 white suture + needle assembly, 38&quot;, single package, sterile (10 per box)</td>
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<tr>
<td>7210915</td>
<td>ULTRABRAID #2 COBRAID™ suture + needle assembly, 38&quot;, single package, sterile (10 per box)</td>
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<th>Interference Screw and Other</th>
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<tr>
<td>72202263</td>
<td>7 mm x 25 mm BIOSURE™ PK Screw</td>
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<tr>
<td>7211138</td>
<td>BIOSURE Guide Wire, 1.2mm x 9” (5 per box)</td>
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<tr>
<td>72201887</td>
<td>BIOSURE driver</td>
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Indications for Use

BIOSURE® PK Screw

Indications for Use

The BIOSURE PK Screw is indicated for the reattachment of ligament, tendon, soft tissue, or bone to bone during cruciate ligament reconstruction surgeries of the knee. All screws with a diameter of 9 mm or less and a length of 25 mm or less are also intended for use in the following procedures:

Knee

• ACL repairs
• PCL repairs
• Extra-capsular repairs
  – Medial collateral ligament
  – Lateral collateral ligament
  – Posterior oblique ligament
• Patellar realignment and tendon repairs
  – Vastus medialis obliquus advancement
• Iliotibial band tenodesis

ULTRABRAID® Suture

Indications for Use

The Smith & Nephew ULTRABRAID Suture is indicated for use in approximation and/or ligation of soft tissues, including allograft tissue for orthopedic surgeries.
References
