

Posterior Oblique Ligament Repair Concomitant to Anterior Cruciate Ligament Reconstruction



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Abstract: The associated lesion of the posterior oblique ligament (POL) in the setting of anterior cruciate ligament rupture is quite frequent due to the same rotational mechanism. The diagnosis of POL lesions is challenging, and physical examination is delicate; moreover, they can be easily missed on magnetic resonance imaging. Once recognized, POL lesions must be repaired to restore posteromedial corner kinematics. The aim of this Technical Note is to present a safe and effective method for POL repair in the set of an anterior cruciate ligament reconstruction.

Over the past few years, attention has been brought to peripheral lesions concomitant to anterior cruciate ligament (ACL) lesions.¹ If anterolateral lesions have been found frequently associated with ACL ruptures, it is logical to consider posteromedial lesions during the same rotational mechanism.¹ The origin of these lesions seems to be the reflex contraction of the semi-membranosus (SM), which counteracts the anterior tibial translation secondary to ACL rupture.^{2,3} The associated lesion of the posterior oblique ligament (POL) during the rupture of the ACL can be explained by the distal insertion of one of the branches of the SM on this important stabilizer element.⁴

The diagnostic of POL lesions is challenging, and physical examination is delicate; moreover, they can be easily missed on magnetic resonance imaging (MRI). Coronal proton-density fat-saturated images are most specific in

detecting lesions to POL attachments to the superior and inferior medial meniscus surface, just posterior to the superficial medial collateral ligament (MCL). The axial view at the level of the medial femoral epicondyle and the sagittal view lateral to the body of the meniscus are also used to locate the lesion.^{4,5} (Fig 1).

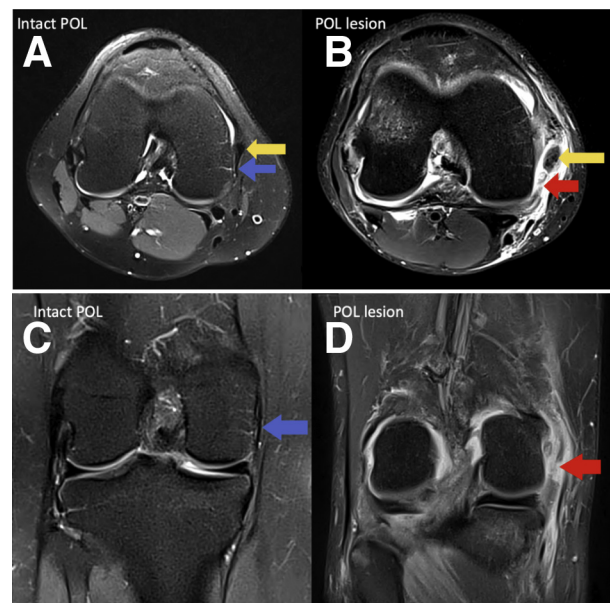


Fig 1. (A) Right-knee axial-view MRI at the level of the medial epicondyle showing both intact MCL (yellow arrow) and POL (blue arrow). (B) Right-knee axial-view MRI at the level of the medial epicondyle showing MCL (yellow arrow) and a POL lesion (red arrow). (C) Right-knee coronal view MRI showing an intact POL (blue arrow). (D) Right-knee coronal view MRI showing a POL lesion (red arrow). (ACL, anterior cruciate ligament; MCL, medial collateral ligament; MRI, magnetic resonance imaging; POL, posterior oblique ligament.)

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Table 1. Pearls and Pitfalls

Surgical Step	Pearls	Pitfalls
Surgical approach	Perform the POL repair before any arthroscopic gestures for easier tissue identification Use a Mixer forceps for MCL testing	Careful dissection is mandatory to prevent saphenous nerve damage during subcutaneous incision
POL identification	The POL is at the same level of the dMCL, merging with the posteromedial capsule Fluid effusion can help identify the rupture site	Careful dissection to prevent damage to the SM insertion at this level.
POL repair	POL must be tight in full extension No medial gapping must persist on valgus stress test in full extension	Overtightening the POL in flexion can result in medial overstrain on full extension

dMCL, deep medial collateral ligament; MCL, medial collateral ligament; POL, posterior oblique ligament; SM, semimembranosus.

Once recognized, POL lesions must be repaired in order to restore posteromedial corner (PMC) kinematics. The aim of this Technical Note is to present a safe and effective method for POL repair in the set of an ACLR reconstruction (ACLR).

Surgical Technique (With Video Illustration)

The clinical examination of the POL under general anesthesia before ACLR and the surgical technique are presented in [Video 1](#). The gapping showed in the testing was related to the POL lesion on the MRI, since the MCL had no partial/complete rupture ([Fig 1](#)). This section does not describe the ACLR technique used, and any ACLR technique can be associated to the POL repair described in this paper. Risks and limitations for each step of this technique are described on [Table 1](#).

Patient Setup

The patient is placed supine on the operative table in the standard arthroscopy position, with a fixed lateral post to the mid thigh at the level of the padded tourniquet to block external rotation of the hip and facilitate valgus strain during knee manipulation. A foot roll is placed at the level of the heel to maintain flexion at 90° throughout the procedure ([Fig 2](#)).

Step 1: Surgical Approach and POL Identification

The skin incision is an approximately 5 cm longitudinal incision, centered on the medial femoral epicondyle posteriorly to the MCL ([Fig 3](#)). Subcutaneous tissue is dissected with care to protect the saphenous nerve ([Fig 4A](#)). Sartorial fascia is easier to identify in 90° flexion, so it can be reflected posteriorly along with the hamstring tendons. A large retractor (B Braun Aesculap, Tuttlingen, Germany) is used to elevate the vastus medialis muscle ([Fig 4B](#)). Deep dissection then follows and identification of the superficial MCL (sMCL) is the first step. The deep MCL can be found at the posterior margin of the sMCL, just deeper to it and merging with the posteromedial capsule. A Mixer forceps is hooked underneath both MCL layers from flexion to extension to ensure they are intact ([Fig 4B and C](#)). The POL is then dissected just posterior to the MCL and just anterior to the SM tibial attachment ([Fig 5](#)). The SM tendon is palpated and its extension to the posteromedial capsule is followed. Capsule incision at this level often reveals the POL as a capsular thickening. Fluid effusion can be helpful to determine the site of rupture ([Fig 4D](#)). Care must be taken not to damage the SM attachment zone.

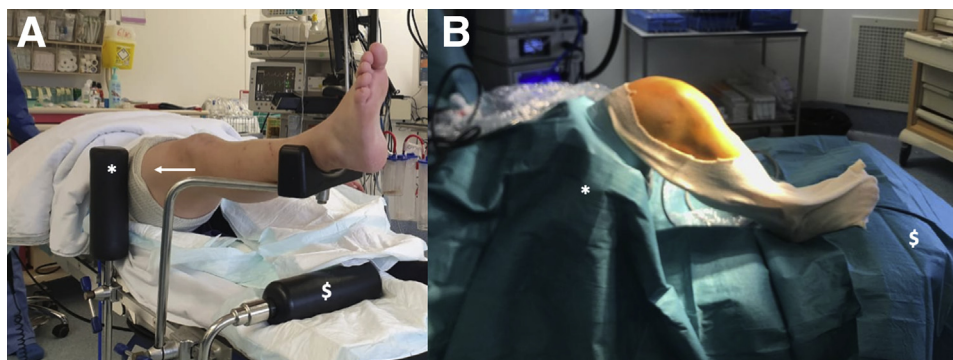


Fig 2. Patient setup for POL repair and ACLR. (A) A lateral post (*) is positioned proximal to the right knee at the level of the padded tourniquet (white arrow). A foot roll (\$) is used to keep the knee flexion at 90°. (B) Patient setup for POL repair and ACLR: right knee in 90° of flexion (lateral post [*] and A foot roll [\$]). (ACLR, anterior cruciate ligament reconstruction; MCL, medial collateral ligament; POL, posterior oblique ligament.)

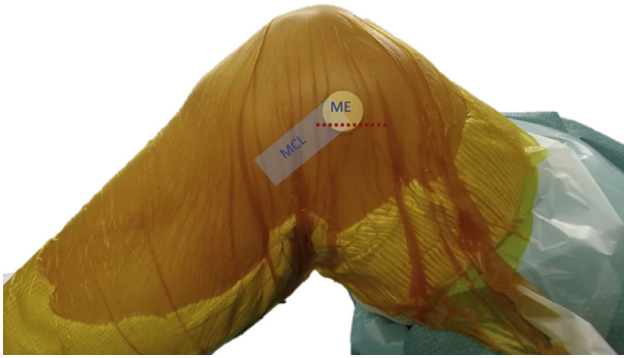


Fig 3. Medial aspect of right knee. Landmarks for POL repair incision (red dashed line). (MCL, medial collateral ligament; ME, medial epicondyle; POL, posterior oblique ligament.)

Step 2: POL Repair

Careful identification of both POL edges should prelude any attempt to repair. With the knee in 90° of flexion, the POL is reattached to its femoral insertion

site (visible in acute cases slightly posterior and distal to the adductor tubercle) by a 2.9-mm bioabsorbable SutureTak suture anchor (Arthrex, Naples, FL) (Fig 4E). In our experience, it is easier to repair POL in 90° of flexion and it must be tested in extension when it should be tight and no medial gapping should persist when valgus stress is applied (Table 1).

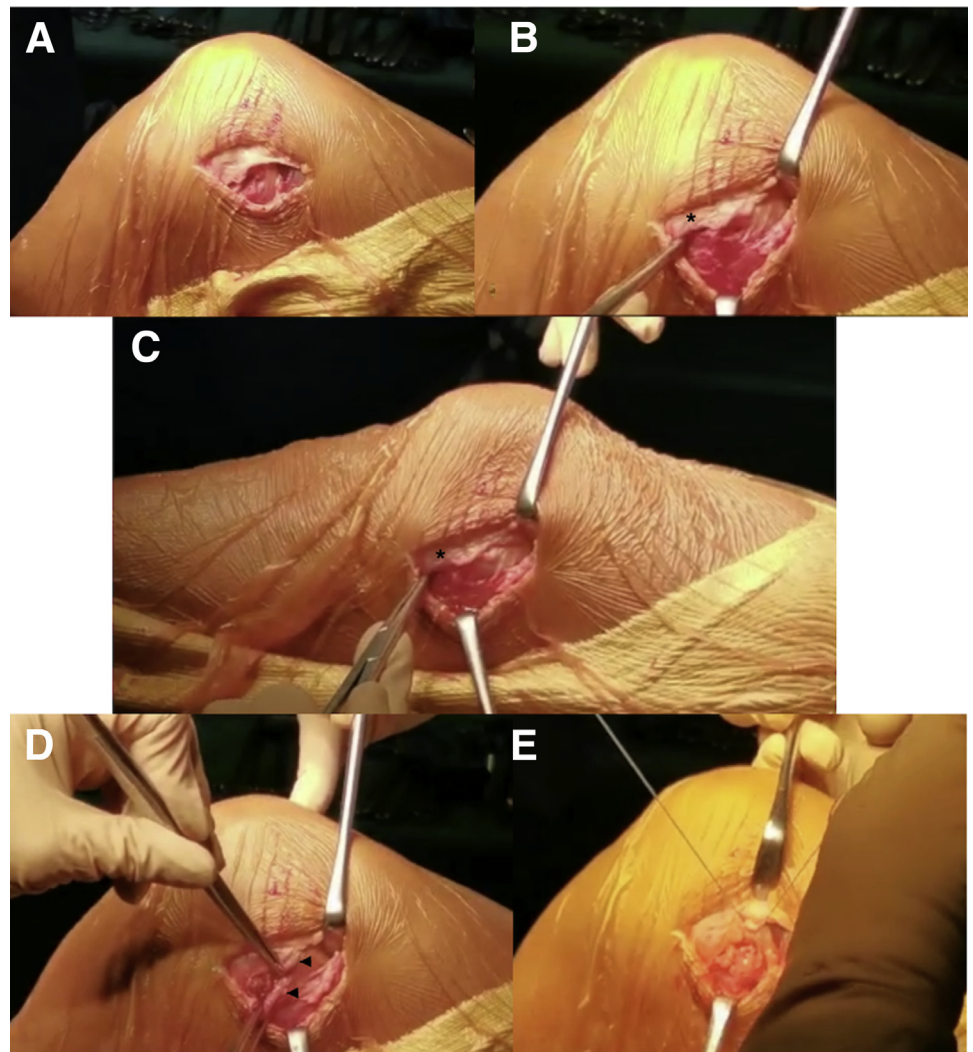
Step 3: Closure

The capsule, subcutaneous tissue, and skin are closed according to the surgeon's preference.

Postoperative Course

The postoperative course is similar to a primary ACLR. Patients are discharged home fully weight bearing on the same day following surgery. Active and passive range of motion of the knee limited to 90° is permitted in the first 6 weeks. Progressive return to sports starts around the sixth month, with prohibition of pivoting sports until the ninth month.

Fig 4. Surgical steps for POL repair. Right knee in 90° of flexion. (A) Medial incision centered on the medial epicondyle and just posterior to the MCL. (B) MCL (*) identification and palpation of both layers in flexion and in extension (C) using a Mixer forceps. (D) POL edges (black arrowheads) identification just posterior to the MCL. The POL distal edge is held by the DeBakey forceps clamp as shown. (E) Suture of both edges using a horizontal mattress type suture with a VICRYL 0 coated absorbable suture (Ethicon, Somerville, NJ). Suture is tied in full extension. (MCL, medial collateral ligament; POL, posterior oblique ligament.)



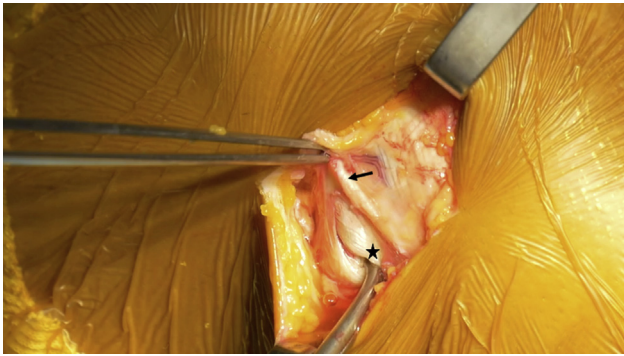


Fig 5. Intraoperative image. Right knee in 90° of flexion. Approximately 5-cm longitudinal incision, centered on the medial femoral epicondyle posteriorly to the MCL. POL dissection just posterior to the posterior border of the superficial MCL. (POL: black star; MCL: black arrow). (MCL, medial collateral ligament; POL, posterior oblique ligament.)

Discussion

The main objective of this study is to describe a POL repair technique in the set of an ACLR. The POL is the most important PMC structure⁶; however, surgical treatment of acute POL lesions has only been reported concomitantly with MCL injuries.^{7,8} This Technical Note presents a POL repair concomitant to ACLR.

Hughston and Eilers⁹ were the first to describe the POL. It is now widely recognized as a separate ligament, beginning just proximal and posterior to the medial epicondyle, running obliquely and posteriorly to the sMCL, with a wide attachment on the medial meniscus and the tibial plateau.⁴ Biomechanically, the POL is a main stabilizer against internal rotation in early flexion angles (0°-30°) and is responsible for restraining valgus rotation in extension, whereas the MCL is the major restraint in higher flexion angles.^{10,11}

Nevertheless, clinical examination remains challenging. Most authors agree that finding of valgus laxity at 0° in an ACL deficient knee indicates a concomitant injury of the posteromedial structures including the POL.^{4,6,12} As a consequence, valgus laxity in full extension that disappears on 30° flexion is highly indicative of a POL lesion and MRI identification helps confirming the clinical suspicion.

Failure to recognize and treat PMC injuries in the setting of an ACL rupture may lead to unsatisfactory outcomes following ACLR.⁵ Surgical exploration of the PMC through a separate medial approach is required and careful dissection is important before attempting to repair the POL or any neighboring structure. It is preferred to perform this surgical step before any arthroscopic gesture for easier POL identification.

Previous authors reported that in the set of a reconstruction the POL should be fixed in full extension¹³; however, our attempt to reattach the POL in flexion is based on the fact that the present technique is a repair of a

isometric structure which doesn't have the same biomechanical repercussions as in a reconstruction (Table 1).

In summary, with a high index of suspicion, POL injury can be diagnosed at the same time as an ACL rupture. MRI can be helpful in detecting this specific injury, but clinical examination is the key as POL distinction from the MCL is crucial to testing. Residual valgus laxity in full extension following an ACLR is a sign of a POL injury and an unstable PMC, that could potentially increase tension on the ACL graft in a weight-bearing knee. Any injury to the POL must therefore be recognized and repaired to restore PMC kinematics.

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