Easy Surgical Approach of the Posterolateral Corner of the Knee

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Background: The anatomy of the posterolateral corner (PLC) of the knee is complex. The approach of the PLC can be a challenging and stressful surgical time.

Indications: The indications are posterolateral meniscal repair, open lateral meniscus allograft transplantation, posterolateral tibial plateau fracture, and PLC reconstruction for grade III sprains.

Technique Description: The skin incision is straight, realized with the knee positioned at 90° of flexion, passing slightly posterior to the lateral epicondyle, anterior to the fibular head (FH), and ending on Gerdy's tubercle. The subcutaneous tissues are dissected posteriorly so as to expose the FH and the biceps femoris (BF) tendon. The aponeurosis of the peroneus muscles is incised vertically opposite to the anterior side of the FH. The common fibular nerve is exposed at the neck of the fibula. Metzenbaum scissors are then inserted subaponeurotically, posteriorly, and parallel to the BF tendon, superficially to the nerve. An incision is made opposite the scissor's blades, freeing the common fibular nerve. The BF tendon is spread forward and the lateral gastrocnemius is pulled posteriorly. Metzenbaum scissors are inserted in a closed position between the lateral gastrocnemius and the posterolateral joint capsule, and then spread to create a triangular door with a proximal base. The base consists of the BF tendon, the posterior side of the lateral gastrocnemius, and the anterior side of the posterolateral joint capsule. A counter-angled Hohmann retractor can now be applied against the posterior tibial plateau to retract the lateral gastrocnemius posteriorly and medially, exposing the PLC of the knee.

Results: Noble structures are easily exposed and protected. The common fibular nerve is dissected and reclined posteriorly, and the popliteus vessels are reclined posteriorly and medially, protected by the lateral gastrocnemius. Passing under the BF tendon allows a better vision of the PLC along with less constraint than passing above, as the working window is further away from the femoral insertion of the lateral gastrocnemius.

Discussion/Conclusion: The present surgical approach allows a simple, safe, and reproducible exposure of the PLC of the knee.

Keywords: posterolateral approach; posterolateral corner; popliteus tendon; tibial plateau fracture; meniscus repair; meniscus allograft transplantation.

VIDEO TRANSCRIPT

The posterolateral corner of the knee is a complex anatomical area. Its surgical approach is difficult and can be stressful. However, surgical access to this compartment is necessary for various surgical procedures, such as "in out" sutures of the posterior horn of the lateral meniscus, fractures of the lateral tibial plateau, or posterolateral corner (PLC) reconstructions. Mastery of this approach is therefore essential.

The aim of this video is to present a simple and safe method for approaching the posterolateral compartment of the knee.

The patient is placed supine on an operative table in the standard arthroscopy position with a lateral post proximal to the knee at the level of the padded tourniquet.

A good anatomical knowledge of this area is essential.

Three palpable anatomical landmarks, the lateral epicondyle (GT), Gerdy's tubercle (GT) and the fibula head

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Bracketed and italicized text indicates information not included in the video narration.

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TABLE 1
Tricks and Tips[a]

Step	Tricks	Tips
Surgical identification of the CPN	Risk of iatrogenic injury to the CPN	1. Knee at 90° moves the CPN away from the posterolateral compartment 2. Opening of the peroneal aponeurosis for identification of the CPN
Surgical exposure of posterolateral corner of the knee	Risk of iatrogenic vascular lesions	Use a counter-angled Hohmann retractor to recline the vessels posteriorly and medially where they will be protected by the lateral gastrocnemius
Popliteus tendon reconstruction	Misplacement of the tibial pin	Check the positioning of the pin with the index finger or by arthroscopy before making a tunnel to ensure the anatomical positioning of this tunnel

[a]CPN, common peroneal nerve.

(FH), will guide the correct positioning of the skin incision in the shape of a hockey stick. On the lateral side of the knee, the skin incision is straight, performed with the knee positioned at 90° of flexion, passing slightly posterior to the LE, anterior to the FH, and ending on GT.

After dissection of the subcutaneous tissue, the position of the FH, GT, and LE is confirmed. The biceps femoris is identified as well as the lateral collateral ligament (LCL) running between the fibula to the LE. The use of a varus stressor can facilitate its identification. Finally, it will be useful for anatomical reconstructions of the posterolateral corner to identify the fascia lata that covers the femoral insertions of the LCL and the popliteus tendon.

After making the skin incision and dissecting the subcutaneous tissue, the femoral biceps that will be inserted on the FH can be easily identified on this example, as well as the fascia lata. At the level of the fibula, it is important to locate the neck of the fibula because the common peroneal nerve runs about 1 cm below the head-neck junction.

The identification of the common peroneal nerve (CPN) is a crucial time in the posterolateral approach; to locate it, a vertical incision of about 1 cm is made in the aponeurosis of the peroneal muscle. This incision is then enlarged with the dissecting scissors; the CPN is often directly visible or identifiable after careful blunt dissection. The scissor is then inserted into the incision, remaining superficial to the CPN and following the femoral biceps. This instrument will protect the CPN during the incision which will be made with the surgical knife. The CPN is then easily identifiable over a large portion and can be individualized if necessary.

The posterolateral approach to the joint is then performed. To access this area, the dissecting scissors will be passed through a space limited by the posterior border of the biceps femoris, by the aponeurosis of the gastrocnemius posteriorly, and by the joint capsule anteriorly. Dissection will result in a triangular access chamber. The objective is to be able to palpate the popliteal muscle through this approach to move proximally toward the joint and palpate the "popliteal fossa." This can be performed through a less important approach. The space between the femoral biceps, the aponeurosis of the gastrocnemius, and the posterolateral capsule is opened using the dissecting scissors. The base of the triangular access chamber is opened with the scissors and then with the index finger; moving up the popliteal muscle, the relief of the popliteal fossa is palpated. Thus, the fibers of the aponeurosis of the gastrocnemius posteriorly, the posterolateral capsule anteriorly, and the femoral biceps superiorly are the anatomical landmarks allowing a triangular door to be made to access the posterolateral compartment and the popliteal fossa.

Access to this popliteal fossa is fundamental when reconstructing the static portion of the popliteus tendon. Indeed, for these reconstructions, a tunnel must be made from the anterolateral surface of the tibia to the popliteal fossa. In this example, a tibial guide is introduced through the posterolateral approach. The target of the guide is positioned in the popliteal fossa, while the starting point on the anterior aspect of the tibia is slightly medial to GT. After the guide pin has been inserted, its correct positioning is checked by palpating the emergence of the pin. Alternatively, the positioning of the pin can be checked by arthroscopy.

A transeptal approach must then be performed. The scope is introduced through the posteromedial arthroscopic portal and then pushed through the transeptal portal to visualize the posterolateral compartment. The posterolateral portal is then created. A radiofrequency device can be introduced through the posterolateral portal to open the capsule behind the posterior horn of the lateral meniscus at the menisco-synovial junction, as if creating a "ramp lesion" of the lateral meniscus. One can then progress distally along the posterior wall of the lateral meniscus, with the radiofrequency probe always facing the posterior edge of the lateral meniscus. Debridement with the probe is performed until the posterior edge of the lateral tibial plateau is visualized. In this way, the guide pin and its positioning can be highlighted and visualized just below the lateral tibial plateau.

For this 34-year-old patient, a posterolateral approach is performed as part of a reconstruction of the static part of the popliteus tendon to correct residual posterolateral laxity. A much more limited cutaneous incision than in the previous examples will be made, guided by the 3 anatomical landmarks previously palpated: the LE, GT, and FH. Once the FH has been located, the aponeurosis of the peroneal muscle is incised vertically on 1 cm. After opening the aponeurosis, the common peroneal nerve is quickly identified using short blunt dissection. The closed scissors are then inserted into the incision, remaining superficial to the CPN and following the femoral biceps. Once the scissors are interposed between the femoral biceps and the CPN, the incision can be safely performed by remaining in contact with the dissecting scissors to obtain a wide exposure of the CPN.

The femoral biceps is then slightly reclined anteriorly to locate the gastrocnemius. Blunt dissection is extended anteriorly and proximally along the gastrocnemius. The space is then enlarged with the dissecting scissors so that the popliteal fossa can be palpated with the index finger. The approach can be slightly enlarged anteriorly with the dissecting scissors to facilitate access to the posterolateral compartment.

Potential complications of this surgical approach are the risk of arthrogenic injury to the CPN. This risk can be limited by performing this approach with the knee at 90° in order to move the CPN away from the posterlateral compartment. The opening of the peroneal aponeurosis also allows rapid and safe identification of the CPN. Another risk is the misplacement of the tibial pin in the context of tibial tendon reconstruction. It is imperative to check the position of the pin with the index finger or by arthroscopy before making a tunnel to ensure the antomical position of this tunnel and to avoid any risk of arthrogenic lesions (particularly, vascular lesions). Tips and tricks for this approach are listed in Table 1.

In the present technique, noble structures are easily exposed and protected. Moreover, passing unthe BF tendon allows a better vision of the PLC. *[In this case, the postoperative management consisted of the use of a PCL brace for 3 months, partial weightbearing for 6 weeks, range of motion exercises, and quadriceps strengthening exercises on postoperative day 1. However, the conduct to be followed will depend on the surgical indication and technique that were combined with the surgical approach described.]*

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