



# Allograft Options in Posterolateral Corner Reconstructions

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This article describes the indications, technique, and allograft rationale for reconstruction of the posterolateral corner injury. In chronic or nonreconstructable grade III posterolateral corner injuries, allograft reconstruction is the preferred technique. We prefer an anatomic reconstruction of the fibular collateral ligament, the popliteus tendon, and the popliteofibular ligament. Our allograft of choice is achilles tendon with proximal bone attached. We believe that it is the most appropriate for two reasons. The first is length, 23 cm of allograft is needed to perform this reconstruction, and this allograft has ample length to perform this reconstruction. The second is strength; the achilles has more than 3 times the tensile strength of the gracilis and 2.5 times the tensile strength of semitendinosus. This allograft also allows for bony tunnels that are not overstuffed while also providing a bone to bone surface to heal.

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The posterolateral corner of the knee contains 3 main structures that prevent posterolateral instability and varus instability. These stabilizers are the fibular collateral ligament, the popliteus tendon, and the popliteofibular ligament.<sup>1-4</sup> Injuries to the ligamentous structures of the posterolateral aspect of the knee have profound effects on the biomechanics of the knee. An unrecognized posterolateral corner injury may lead to such functional problems such as anterior cruciate ligament graft failure and a varus thrust gait.<sup>5-8</sup> Recently, more orthopaedic surgeons understand this injury, and recognition of both acute and chronic injuries is increasing.

If a posterolateral corner injury is appreciated in the acute setting, grades I and II injuries usually can be treated nonoperatively. For a grade III injury, primary repair usually can be attempted and is preferred.<sup>2,9,10</sup> However, if the grade III injury is discovered late or if the acute injury is not repairable, an allograft reconstruction is the most preferred option because these injuries have a very low incidence of nonoperative healing.

The key to treating patients with this injury is having an understanding of the anatomy and mechanics of the knee. A careful physical examination with gait evaluation must be

performed to determine whether the patient has proper alignment and the knee is not in varus. Also, varus stress radiographs and the use of magnetic resonance imaging (MRI) are important adjuncts to evaluation. If a varus alignment issue is appreciated, a proximal tibial opening wedge osteotomy should be performed to correct alignment, or the posterolateral reconstruction will have a high rate of stretching.<sup>2,11</sup> The bony alignment reconstruction and the soft-tissue reconstruction should be done as a staged procedure with healing of all surgical wounds between surgeries.

If the patient has normal alignment, a soft-tissue reconstruction of the fibular collateral ligament, popliteofibular ligament, and popliteus tendon can be attempted. Our technique uses an anatomic reconstruction developed by the senior author (R.F.L.).

## Equipment

Standard cruciate ligament reconstruction instruments are used along with cannulated metal and bioabsorbable screws. Small bone staples are also used to secure fixation of the grafts. Adsen point hemostat is used for the dissection and the peroneal neurolysis.

## Operative Technique

A lateral hockey stick approach centered over Gerdy's tubercle (Fig. 1). The incision is carried down to the superficial

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**Figure 1** Lateral hockey stick incision centered over Gerdy's tubercle.

iliotibial band and anterior compartment fascia. The posterior aspect of the flap is obtained by dissecting down to the long head of the biceps femoris. It is at this point that the common peroneal nerve should be found, decompressed and mobilized (Fig. 2). If there is any ambiguity of the anatomy, especially in a scarred chronic injury, the surgeon may need to find the nerve at approximately 2 cm distal to the fibular head. Once the nerve is mobilized, the dissection should continue through the interval between the lateral gastrocnemius and the soleus to gain entry to the posterolateral structures. At this point, the surgeon will be able to palpate the popliteofibular ligament attachment to the fibula and also appreciate the posterior cruciate ligament attachment on the tibia.

Next, the fibular collateral ligament (FCL) attachment sites should be identified, which is most easily done by making a horizontal incision 1 cm proximal to the fibular head through the anterior arm of the long head of the biceps femoris. The FCL is nearly always found within the biceps bursa. A tag suture should be placed in the FCL, and its insertion should be found on the fibular head. The anatomic position of the FCL is approximately 40% back from the anterior border of the fibula along the lateral fibular head.<sup>12</sup> The popliteofibular attachment site on the posteromedial downslope of the fibular styloid is next identified. At this time, the fibular tunnel can be drilled. A guide pin should be inserted at the insertion of the FCL, and it should exit along the posteromedial fibular head. The fibular tunnel can then be reamed with a cannulated 7 mm reamer over the guide pin. Be certain to protect the common peroneal nerve at this juncture while keeping in mind the posterior neurovascular bundle while reaming.

Creating a tibial tunnel is next. The tunnel should be made from anterior to posterior on the tibia. The optimal anatomic location for the anterior starting point is just slightly distal and medial to Gerdy's tubercle. There is a flat spot on the tibia at this location which allows for a stable tunnel. The optimal position for the posterior aspect of the tibial tunnel is at the location of the musculotendinous junction of the popliteus.

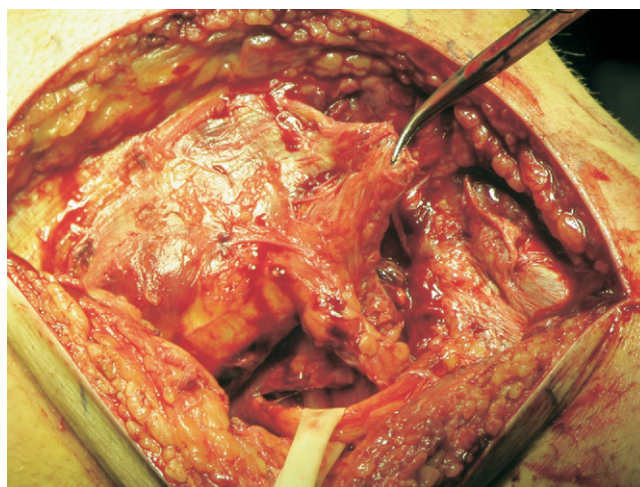
This is 1 cm proximal to the fibular tunnel. Care should again be taken to protect the neurovascular structures when drilling this tunnel.

The surgeon is now ready to identify the femoral attachments of the FCL and popliteus and ream the femoral bone tunnels. The approach is through the posterior aspect of the iliotibial band with care taken to dissect each layer as to not damage intact structures. Usually, the popliteus tendon is the first structure identified. If it is intact, the surgeon should simply follow it to the attachment on the femur. If the tendon is ruptured, the femoral attachment should be at the proximal 20% of the popliteal sulcus. Often, the popliteus will have an intrasubstance tear and needs to be released from the femoral attachment to drill the femoral tunnel. The FCL can be identified by following its course from the more distal, intact ligament, or by knowing that its anatomic location is in a small sulcus slightly posterior and lateral to the lateral epicondyle.<sup>3,12</sup> Now that both femoral attachments are appreciated, cannulated drill guides and islet-tipped pins are used to create the tunnels. The pins should angle such that they exit the medial femur anteriorly and just proximal to the adductor tubercle. This will ensure that the notch is avoided. At this point, it is important to verify the position of the pins before the tunnels are drilled. The distance between the 2 pins should be 18.5 mm,<sup>11</sup> and the popliteus guide should be a few millimeters anterior to the FCL pin when the knee is extended fully.

### Preparing the Graft

To perform this technique, it is essential to obtain a quality allograft. If possible, an achilles tendon allograft with a calcaneous attachment is preferred, which allows bony fixation of the femoral tunnels for interference fixation. The optimal graft length to allow for graft passage is 23 cm.<sup>11</sup>

To prepare the graft, split the Achilles bone plug in half along with the tendon so that 2 equal halves of tendon and bone remain. This will allow one allograft to suffice for reconstruction of both ligaments. The bone plugs should be



**Figure 2** The common peroneal nerve shown retracted with a Penrose drain.

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