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Surgical Approaches for Medial and Lateral Meniscal Repair

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Summary: Many peripheral meniscal tears are amenable to repair. An important aspect of these repairs is a safe, reproducible surgical approach for effective meniscal repair, retractor placement, and, most important, minimization of the potential for a neurovascular complication. This article reviews surgical approaches for medial and lateral meniscal repair. **Key Words:** Peripheral meniscal tears—Medial meniscal repair—Lateral meniscal repair—Surgical approaches.

ANATOMY

The posterolateral corner of the knee (Fig. 1) has been studied by Seebacher et al. (35). They identified, in 35 cadaveric dissections, three discrete layers. The most superficial layer (Layer I) comprises two parts: the iliotibial band with its anterior expansion and the superficial portion of the biceps with its posterior expansion. The common peroneal nerve lying posterior to the biceps tendon is deep to Layer I. Layer II is an incomplete layer posterior, with fiber attachments to the lateral intermuscular septum, fabella (when present), insertions of the posterolateral capsular reinforcements, the lateral head of the gastrocnemius on the femoral condyle, and the patellomeniscal ligament. Layer III is made up of the deepest layer and includes the joint capsule as well as the fabellofibular and arcuate ligaments. Seebacher et al. (35) noted three anatomical variations: reinforcement of the capsule by the arcuate ligament in 13%, reinforcement of the capsule by the fabellofibular ligament in 20%, and the combined reinforcement of the capsule by both the arcuate and the fabellofibular ligaments. The authors noted that if a fabella was present, the fabellofibular ligament was large and no arcuate ligament would be present. If a fabella was not noted, only the arcuate ligament was present. In clinical practice, these variations have not altered our approach for lateral meniscal repair.

The anatomical relationship between the popliteal artery and tibial nerve within the popliteal space must always be of primary consideration when performing meniscal repairs of the posterior third of the lateral or the medial meniscus (Fig. 1). The posterior tibial neurovascular bundle courses between the popliteus muscle and the heads of the gastrocnemius. The common peroneal nerve lies posterior to the common tendon of the biceps femoris and distally winds around the head of the fibula. A retractor placed anterior to the short head of the biceps will protect the common peroneal nerve, but does not necessarily protect the neurovascular bundle. When it is placed anterior to the lateral head of the gastrocnemius, both the neurovascular bundle and the common peroneal nerve are protected. These observations must be kept in mind when surgically approaching the posterolateral corner for lateral meniscal repair.

POSTEROLATERAL SURGICAL APPROACH

After diagnostic arthroscopy has verified that there is a repairable lateral meniscal tear, the arthroscope is transferred to the inferomedial portal, and an arthroscopic probe is inserted into the inferolateral portal. Through this portal, the blunt end of the probe is placed along the lateral joint line, and mild pressure is applied so that its tip may be palpated through the subcutaneous tissues posterolateral in the 10 o'clock position (right knee). This method aids the surgeon in

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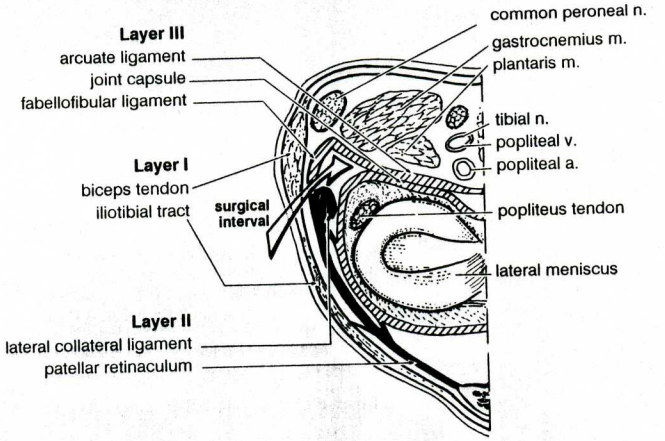

FIG. 1. Seebacher et al. (35) studied the posterolateral corner of the knee joint in 35 cadaveric knees and developed a three-layered picture of its anatomy. Layer I comprises the iliotibial band and the enveloping superficial fascia of the biceps. The common peroneal nerve is enveloped within Layer I posterior to the biceps tendon. Layer II includes, laterally, the vastus lateralis and its expansions and the patellofemoral and patellomeniscal ligaments. Layer III is made up of superficial and deep laminae, including the posterior capsule; envelopes the lateral collateral ligament; and ends at the variably sized fabellofibular ligament. The inferior geniculate artery courses within the interval between the superficial and deep laminae of Layer III. This diagram depicts the cross-sectional anatomy of the knee with reference to the neurovascular bundle, the popliteus, and lateral head of the gastrocnemius. Reproduced from Bach and Bush-Joseph (6) with permission. © Pat Thomas and Bernard Bach.

placement of the posterolateral incision for repair and reduces the possibility of a misplaced surgical incision. The tendency is to make the incision too proximal, and it is critical to place this incision properly so that all meniscal repair needles will easily exit within the confines of the meniscal repair retractor. A 1.5- to 2-inch vertically oriented incision is made parallel and posterior to the lateral collateral ligament with the knee flexed 30°–45° (Fig. 2). The dermis is infiltrated with 1:300,000 epinephrine for hemostatic purposes while the tourniquet is deflated. Sharp dissection is extended down to the fascia with exposure aided by the use of small retractors (Senn or Ragnell). Next, the fibular head is palpated for orientation, and the most anterior edge of the biceps femoris tendon inserting onto the fibular head is noted. The fascia directly anterior to the edge of the biceps femoris is incised in the direction of the tendon (Fig. 3). The

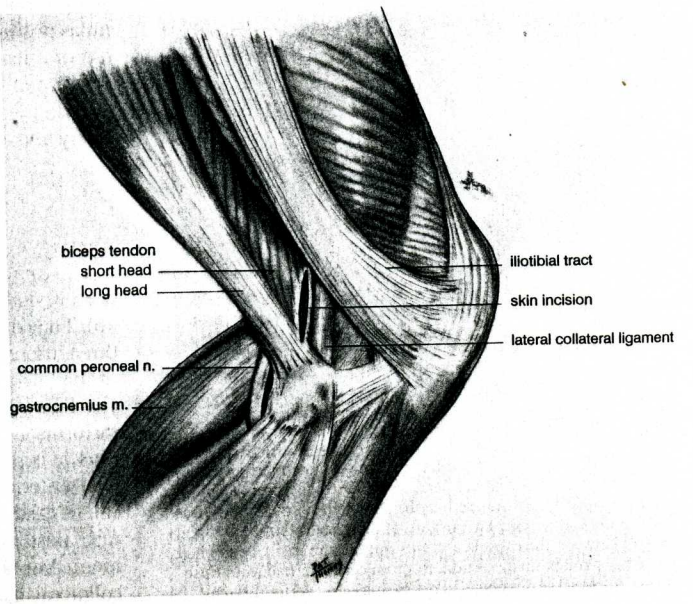

FIG. 2. A 1.5-inch incision is used to expose the anterior edge of the biceps femoris tendon. The incision is made posterior and parallel to the lateral collateral ligament at the level of the joint line. Reproduced from Bach and Bush-Joseph (6) with permission. © Pat Thomas and Bernard Bach.

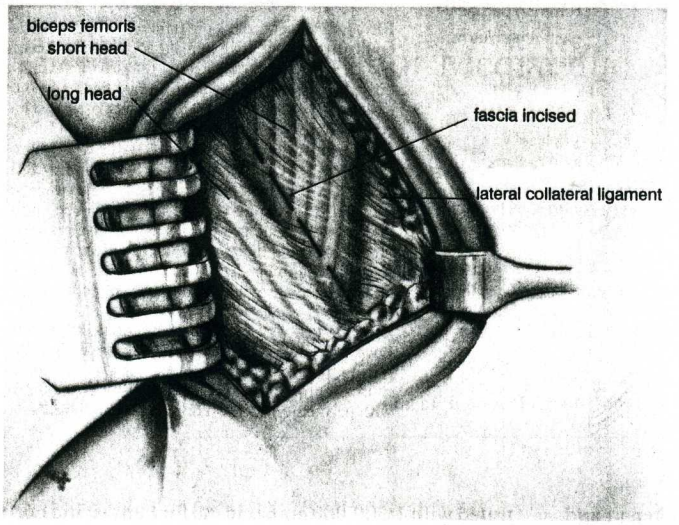

FIG. 3. Once the biceps fascia is exposed, a fascial incision is made oblique to the skin incision and anterior and parallel to the biceps femoris tendon. Reproduced from Bach and Bush-Joseph (6) with permission. © Pat Thomas and Bernard Bach.

muscular fibers of the short head of the biceps are thus exposed and retracted posteriorly (Fig. 4). The tendinous fibers of the lateral head of the gastrocnemius may be visualized. The thin fascia lateral to the tendon is incised creating an entrance that allows placement of the surgeon's finger around the posterolateral corner of the knee in the interval between the lateral head of the gastrocnemius and the capsule (Fig. 5). Dorsiflexion of the foot with the leg in extension will result in a discernible tightening of this space, and confirmation of this sensation will reassure the surgeon of appropriate surgical exposure. At this point, a meniscal repair retractor may be placed (Fig. 6), the arthroscope reinserted, and the meniscal repair cannulas positioned. Placement of sutures (via an inside-out or outside-in suture placement technique) is then performed (Fig. 7). If these steps as outlined are followed, it is unlikely that the needles will exit inadvertently above or below the retractor.

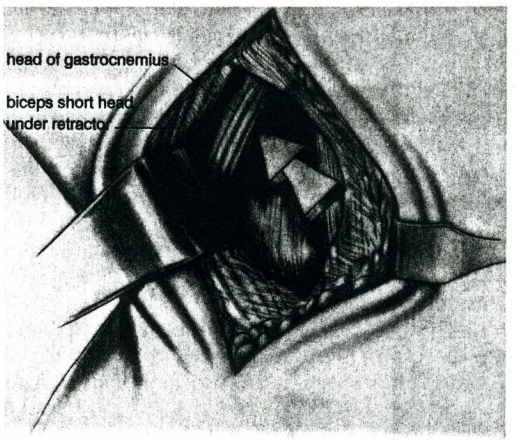

FIG. 4. The short head of the biceps femoris is retracted posteriorly, thus exposing the lateral head of the gastrocnemius. The tendinous portion of this muscle may be palpated. A small incision is made in the fascia of the lateral head of the gastrocnemius, and the interval between the capsule and this muscle can easily be defined with scissor and blunt dissection. Reproduced from Bach and Bush-Joseph (6) with permission. © Pat Thomas and Bernard Bach.

MEDIAL MENISCUS

Anatomy

The anatomy of the medial side of the knee has been reviewed by Warren and Marshall (Fig. 8) (45, 46). They dissected 154 fresh cadavers and established three discrete layers similar to those of the lateral side of the knee. Layer I consisted of a deep or crural fascia. This layer is defined by the investing fascia of the sartorius muscle, and, in fact, the insertion in the muscle is through this fascia. It extends from the patella anteriorly to the popliteal space posteriorly. It can be easily separated from the deeper Layer II structures posterior to the superficial medial collateral ligament, but slightly anterior to the superficial medial collateral ligament, Layer I blends with the deeper