Anatomy and Biomechanics of the Posterolateral Corner of the Knee

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INTRODUCTION

A source of confusion in sports medicine is the anatomy and functional biomechanics of the posterolateral corner of the knee. A large majority of this is the result of varying dissection techniques and different nomenclature for the same structures as reported during the past century. To understand these individual structures well and successfully perform repairs or reconstructions of them, it is important to understand the history of nomenclature for the posterolateral corner of the knee and how it fits in with the current nomenclature.

Evolutionary changes in the anatomic relationships between the fibular head, popliteus tendon, and biceps femoris muscle have resulted in posterolateral knee anatomy being more complicated than other areas of the knee. In lower animal species, the fibular head articulated with the femur and the popliteus muscle originated on the fibula.[4,7,9,12] In higher-order mammals, the fibula migrated distally and the popliteus tendon acquired a femoral attachment, which appears to have resulted from the development of the remnant of the fibulofemoral meniscus into the popliteus tendon.[3,4,12] To complicate matters, the popliteus also maintained an attachment to the fibula in the course of developing an attachment to the lateral aspect of the femur. Contributing to the complexity of this anatomy is the fact that the biceps femoris attaches to the fibula only in humans and that man is the only species with an iliotibial band over the anterolateral aspect of the knee.[1,13,26]

Despite these evolutionary changes, one of the largest sources of confusion regarding the posterolateral knee is the arcuate ligament. A review of previous publications reveals several structures located in close proximity to each other have been called the arcuate ligament. Over time, it was recognized the popliteofibular ligament (Figures 1 and 2), which many authors had been calling the arcuate ligament, was a distinct structure. To further compound the confusion, some centers have identified portions of the capsular arm of the short head of the biceps femoris or the fabellofibular ligament as the arcuate ligament.* In actuality, the arcuate ligament is not a distinct separate structure, but rather most older articles and textbooks did not recognize the popliteofibular ligament and instead referred to this structure as the arcuate ligament. Consequently, we recommend the term arcuate ligament no longer be used to describe posterolateral knee anatomy to prevent further confusion in the future.

POSTEROLATERAL ANATOMIC STRUCTURES

Iliotibial Band

The iliotibial band, also commonly known as the iliotibial tract, has four different attachments at the knee.[37,38] The main structure is the superficial layer that covers the majority of the lateral aspect of the knee with its distal attachment at Gerdy's tubercle. Its anterior expansion to the patella is called the iliopatellar band. The iliopatellar band has an important role in patellofemoral tracking. The deep layer of the iliotibial band attaches the medial aspect of the superficial layer to the distal aspect of the lateral intermuscular septum of the distal femur. Deep and posterior to this layer is a sling of tissue called the capsulo-osseous layer, which also attaches to the lateral head of the gastrocnemius and the short head of the biceps femoris and courses distally to attach just posterior to Gerdy's tubercle. In the past, reconstruction of this lateral-based sling is what was at-

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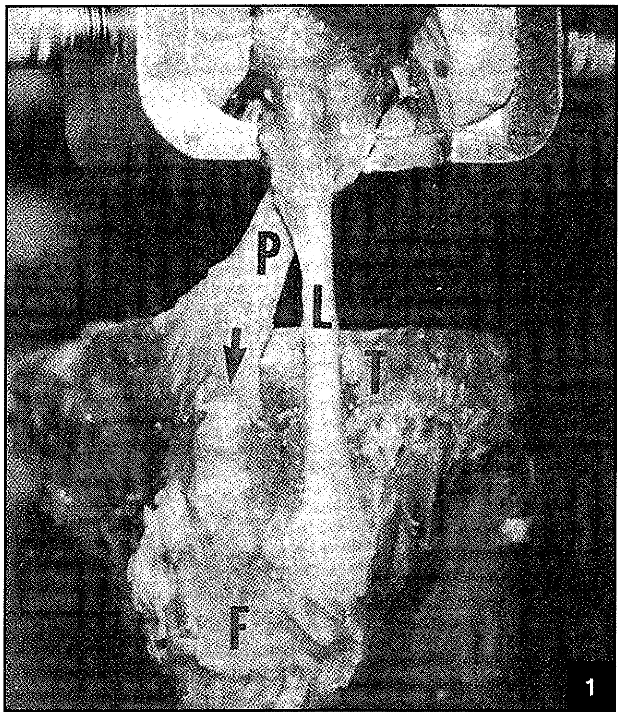

Figure 1. Relationships of the popliteal tendon, popliteofibular ligament and lateral collateral ligament are demonstrated in this cadaveric right knee specimen. Anterior is to the right. (L=lateral collateral ligament, P=popliteus tendon, T=tibia, F=fibula, arrow=popliteofibular ligament.) (Reprinted with permission from Maynard MJ, Deng XH, Wickiewicz TL, Warren RF. The popliteofibular ligament: rediscovery of a key element in posterolateral instability. *Am J Sports Med.* 1996;24:313. Copyright © 1996, American Orthopaedic Society for Sports Medicine. Reprinted by permission of Sage Publications Inc.)

tempted in extra-articular anterior cruciate ligament (ACL) reconstructions.

Long Head of the Biceps Femoris

The long head of the biceps femoris forms the posterior aspect of the sheet of tissues that covers the lateral aspect of the knee.[39] Its main attachments at the knee include a direct arm attachment to the fibular head, an anterior arm that crosses over the lateral aspect of the fibular head, and fascial attachments to the fibular collateral ligament and the posterior aspect of the iliotibial band.[39] The anterior arm of the long head of the biceps femoris forms an important bursa where it crosses the fibular collateral ligament, called the fibular collateral ligament-biceps bursa.[15] This bursa serves as a clinical landmark as a small horizontal incision placed through it, 1 cm proximal to the fibular head, allows for direct and consistent access to the distal quarter of the fibular collateral ligament. This is useful in the face of both acute repairs of the fibular collateral ligament as well as reconstruction procedures.

Short Head of the Biceps Femoris Muscle

The short head of the biceps femoris originates off the femur, and its main muscle fibers course down at approximately a 40° angle to attach to the common biceps tendon.[39] A thick capsular arm courses from the short head of the biceps to attach to the posterolateral joint capsule, a fabella or fabella-analog, and the lateral gastrocnemius complex. This capsular arm forms a large fascial sheath that attaches to the posterolateral corner of the knee. In some studies, this portion of the short head of the biceps has been called a part of the arcuate ligament.[11,27,35,36] By definition, the distal edge of the capsular arm of the short biceps is the fabellofibular ligament. Further distal, there is a direct arm attachment of the short head of the biceps femoris that inserts just lateral to the tip of the fibular styloid. In addition, an anterior arm of the short head of the biceps femoris courses just proximal to the fibular styloid attachment and passes medial to the fibular collateral ligament to insert on the tibia approximately 1 cm posterior to Gerdy's tubercle. The clinical importance of this anterior arm attachment on the tibia is that it occurs at the same location as soft-tissue avulsion or bony Segond fractures.[20]

Fibular (Lateral) Collateral Ligament

The fibular or lateral collateral ligament is one of the three main structures that provides stability to the posterolateral corner of the knee. The fibular collateral ligament is a cord-like structure approximately 4 to 5 mm in width that originates from the femur with a fan-like attachment site and is on average slightly proximal (1.4 mm) and posterior (3.1 mm) to the lateral femoral epicondyle.[17] It is important to recognize that the fibular collateral ligament does not have a direct attachment to the lateral epicondyle.[17,38]

From its attachment site on the femur, the fibular collateral ligament courses over the lateral aspect of the knee, deep to the superficial layer of the iliotibial band and the reflected arm of the long head of the biceps femoris, to attach slightly anterior to the midportion of the lateral aspect of the fibular head. It attaches at an average of 38% of the width of the fibular head from anterior to posterior along its lateral aspect.[17] As noted previously, the distal quarter of the fibular collateral ligament is exposed along both its lateral and anterior aspect within the fibular collateral ligament-biceps bursa.[14]

It is important to recognize these anatomic attachment sites to the fibular collateral ligament to help explain why attempted isometric reconstructions of the fibular collateral ligament in the past have not worked well. These isometric attempts at reconstruction have not placed the reconstruction grafts into the anatomic positions and help to explain the difference in graft excursion found at these nonanatomic reconstruction sites.

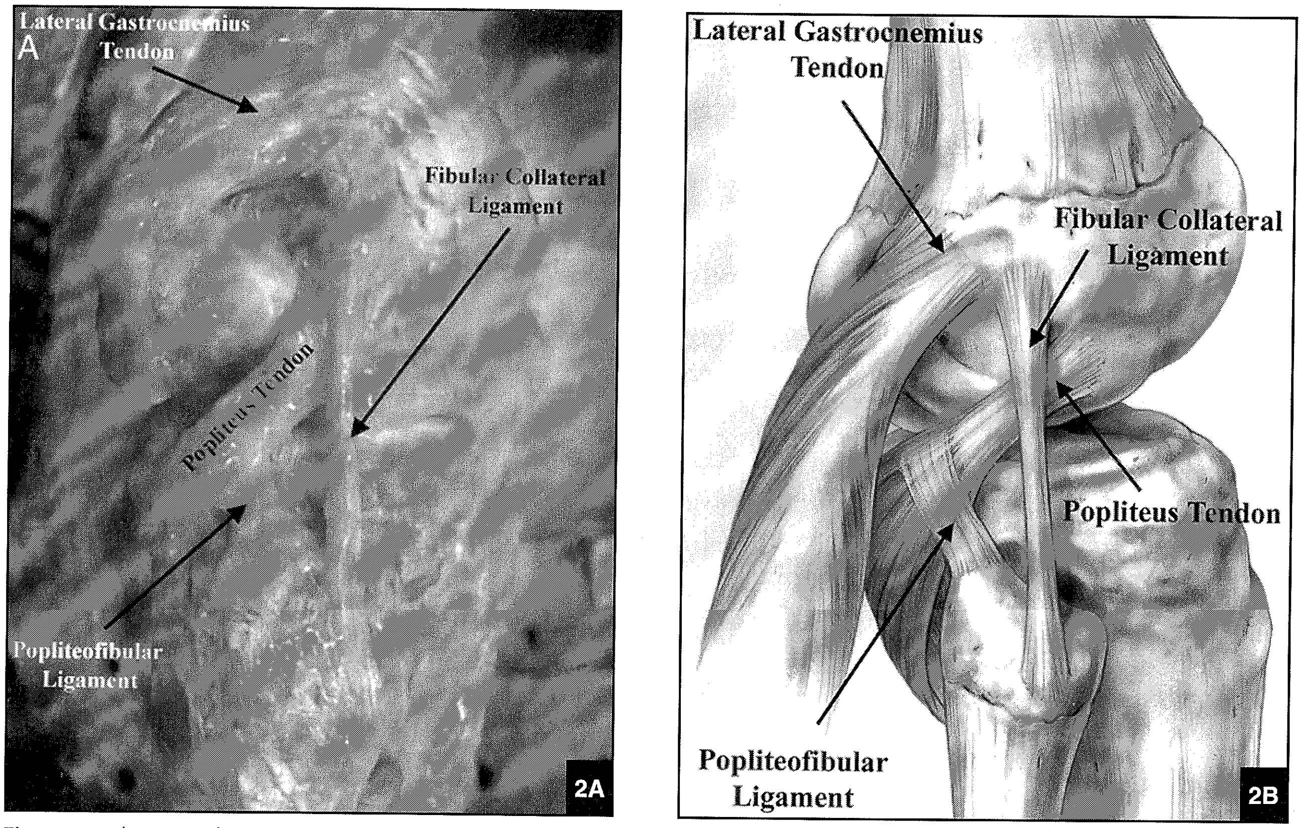

Figure 2. Photograph (A) and illustration (B) demonstrating anatomy and relationships of the fibular collateral ligament, popliteus tendon, popliteofibular ligament, and lateral gastrocnemius tendon (lateral view of a right knee). (Reprinted with permission from LaPrade RF, Ly TV, Wentorf FA, Engebretsen L. The posterolateral attachments of the knee: a qualitative and quantitative morphologic analysis of the fibular collateral ligament, popliteus tendon, popliteofibular ligament, and lateral gastrocnemius tendon. *Am J Sports Med.* 2003;31:854-860. Copyright © 2003, American Orthopaedic Society for Sports Medicine. Reprinted by permission of Sage Publications Inc.)

Mid-Third Lateral Capsular Ligament

The mid-third lateral capsular ligament is the portion of the capsule that attaches to the femur and courses down to the tibia.[38] Its attachment site on the femur is formed along a rough line from just anterior and proximal to the lateral epicondyle posteriorly to the supracondylar process of the lateral femoral condyle. This thickened capsule courses down to attach to the meniscus and then courses down to attach to the tibia between just posterior to Gerdy's tubercle at its anterior aspect. It then courses posteriorly along the tibia and ends at the anterior edge of the popliteal hiatus.

The clinical significance of this thickened capsule is that it is equivalent to the deep medial collateral ligament on the medial aspect of the knee. The meniscotibial portion of the mid-third lateral capsular ligament is important clinically as a site of either soft-tissue or bony Segond avulsions in the face of posterolateral corner injuries (which are easily seen on coronal MRI scans).[14]

Popliteus Muscle Complex of the Knee

The popliteus muscle has a large series of interactions to multiple structures at the knee. In addition to the popliteus tendon attachment on the femur, there are three popliteomeniscal fascicles, the popliteofibular ligament, a thick aponeurotic attachment to the posterior capsule and posterior horn of the lateral meniscus, and the popliteus muscle belly attachment on the tibia itself.[17,35,38] Both the popliteus tendon and the popliteofibular ligament are two of the three main structures essential to providing static stability to the posterolateral corner of the knee.[5,6,27,41]

The popliteus tendon attachment on the femur is always anterior to the fibular collateral ligament attachment.[17] It attaches at the most proximal and anterior fifth of the popliteal sulcus. Quantitative studies demonstrated the average distance between the midpoints of the femoral attachment sites of the popliteus tendon and the fibular collateral ligament is 18.5 mm.[16,17] Recognizing the large distance between these two attachment sites is important during either a primary repair or a reconstruction procedure of these two structures, as one can see that one repair site or reconstructive bone plug would create more of a sling procedure than an actual reconstruction for these two structures.[16]

After the popliteus tendon attaches on the femur, it then courses intra-articularly into the popliteal hiatus. The popliteus tendon does not actually engage into the full confines of the popliteal sulcus until the knee is flexed to 112°.[17] As the popliteus tendon courses into the popliteal hiatus, it attaches to the lateral meniscus via anteroinferior, posterosuperior, and posteroinferior popliteomeniscal fascicles. These fascicles form the hoop-like appearance to the popliteal hiatus and are important in providing stability to the lateral meniscus and preventing medial entrapment of the lateral meniscus with functional varus forces to the knee.[34]

Just distal to the popliteomeniscal fascicles, the popliteofibular ligament originates at the popliteus musculotendinous junction.[17,35] The popliteofibular ligament then courses distally and laterally to attach to the medial aspect of the fibular head and styloid. The popliteofibular ligament has two distant divisions. The more anterior division, which is smaller, attaches on the anteromedial downslope of the fibular styloid. It also blends with the distal edge of the anteroinferior popliteomeniscal fascicle and has some attachments to the tibia. The larger posterior division of the popliteofibular ligament attaches to the posteromedial downslope of the fibular styloid. The posterior division of the popliteofibular ligament is almost twice as large as the anterior division and is believed to provide a more important function to static stability of the posterolateral corner of the knee than the anterior division.[17,35]

Slightly distal to the musculotendinous junction of the popliteus complex is a broad, thick sheet of tissue that extends from the popliteus muscle belly to the posterolateral joint capsule and the posterior horn of the lateral meniscus.[38] This structure has been termed the popliteal aponeurosis to the lateral meniscus, and in some studies in the past has been called the arcuate ligament.[21] This structure is important in reinforcing the posterolateral capsule and also provides some importance in preventing a positive reverse pivot shift test.

Fabellofibular Ligament

The fabellofibular ligament is another misunderstood structure over the posterolateral aspect of the knee. This structure is tight in full knee extension but becomes quite lax when the knee is flexed, which may explain why it has not always been found in all knees in some published dissection studies. In addition, it is difficult to isolate in formalin-preserved knees.

By definition, the fabellofibular ligament is the distal edge of the capsular arm of the short head of the biceps femoris.[38,39] It originates along the lateral aspect of the fabella, or the cartilaginous fabella-analog, and then descends distally and laterally to attach just lateral to the tip of the fibular styloid. While this structure is present in all knees, the structure is more substantial in knees with a bony fabella. The clinical significance of the fabellofibular ligament is that it appears to be important for providing stability of the knee close to extension. Biomechanical studies have not been performed specifically on the fabellofibular ligament.

Coronary Ligament of the Lateral Meniscus

The coronary ligament is different than the mid-third lateral capsular ligament. It is the meniscotibial portion of the posterior joint capsule that attaches the posterior horn of the lateral meniscus to the tibia.[38] It originates medially just lateral to the posterior cruciate ligament (PCL), and its lateral border is at the edge of the popliteal hiatus. The coronary ligament is reinforced along its entire length by the aponeurotic attachment of the popliteus muscle to the lateral meniscus. The coronary ligament is important clinically in providing resistance to hyperextension and posterolateral rotation of the knee.

Lateral Gastrocnemius Tendon

The lateral gastrocnemius tendon forms at the lateral edge of the lateral gastrocnemius muscle belly. In the region of the fibular head, the lateral gastrocnemius tendon can be easily identified by blunt dissection distal to the long head of the biceps femoris in the interval between the lateral gastrocnemius and the soleus muscle. As the lateral gastrocnemius tendon courses proximally, it attaches either to a bony fabella or a cartilaginous fabella-analog.[38] Proximal to the fabella region, the lateral gastrocnemius tendon becomes inseparable from the meniscofemoral portion of the posterior capsule. It then attaches to the femur in the region of the supracondylar process. The lateral gastrocnemius tendon has an average attachment site 13.8 mm posterior to the fibular collateral ligament's femoral attachment site.[17]

Understanding the anatomy of the lateral gastrocnemius tendon complex is clinically important as one tries to dissect along this layer for either a lateral meniscus repair or other approaches to this portion of the knee. In effect, it is impossible to split the lateral gastrocnemius tendon away from the posterior capsule proximal to the fabella, and if one attempts to do so, there is a high likelihood of either entering the joint or separating the tendon away from the main fibers of its muscle belly.

Inferior Lateral Genicular Artery

The inferior lateral genicular artery is important to understand as a landmark structure for the posterolateral corner of the knee. The inferior lateral genicular artery originates off the popliteal artery and courses along the posterior joint capsule just proximal to the superior aspect of the lateral meniscus. It then courses laterally and passes posterior to the popliteofibular ligament and anterior to the fabellofibular ligament.[12,33,35,38] It then courses anterior to pass directly along the lateral aspect of the lateral meniscus within the substance of the mid-third lateral capsular ligament.

By understanding where this artery courses, one can interpret previous literature and identify it on MRI scans[14] to differentiate between the attachment sites of the fabellofibular ligament and popliteofibular ligament on the fibular head and styloid. In addition, one can identify this artery during a surgical approach so that it can be properly coagulated to prevent postoperative hematoma.

BIOMECHANICS OF THE POSTEROLATERAL KNEE

The majority of biomechanical studies on the posterolateral knee have been cadaveric sequential sectioning studies. In these studies, the knee was subjected to joint loading both before and after sectioning of a specific posterolateral structure. The overall change in joint motion to an applied load was then measured and used to assess for the contribution of the cut structure to knee stability. More recent studies have examined the actual forces applied to specific structures through the use of robotic testing, force transducers, and buckle transducers.

Most of the specific structures of the posterolateral knee have a primary and secondary restraint role. In those structures that are primary restraints for a specific motion, the specific instability tested found that structure needed to be cut or injured to result in instability. Structures that are secondary restraints provide backup restraint to particular motions when the primary restraint structure is torn.

Role of the Posterolateral Structures to Varus Motion

One of the main roles of the posterolateral knee is in preventing abnormal varus opening to applied forces. One constant finding from all biomechanical cutting studies is that the fibular (lateral) collateral ligament is the primary restraint to varus motion at all positions of knee flexion.[5,6,25,28,31] In fact, varus rotation is not increased with other posterolateral structure sectioning when the fibular collateral ligament is still intact.[6,31]

Once the fibular collateral ligament is sectioned, many other structures are important in providing secondary varus restraint to the knee. The popliteus tendon has an important secondary role to preventing abnormal varus opening, as well as the popliteofibular ligament, the popliteal aponeurosis to the lateral meniscus, and the fabellofibular ligament.[28,31] Both the ACL and PCL also are recruited to help resist varus moments when the fibular collateral ligament and other posterolateral structures are absent.[5,6,30] Once again, isolated ACL or PCL sectioning does not increase varus rotation of the knee.[5,6,30,43]

Therefore, across multiple different experimental studies, the main structure demonstrated to provide knee stability with application of a varus force is the fibular collateral ligament. In addition, the popliteus tendon, the popliteofibular ligament, the posterolateral capsule and its associated attachments, and both cruciate ligaments also have an important secondary role to preventing varus instability when the fibular collateral ligament is torn. This means that if a knee has an increase in varus opening on clinical examination, one must first suspect an injury has occurred to the fibular collateral ligament. Further significant increases in varus opening would mean possible injury to the popliteus complex or the possible presence of a combined cruciate ligament tear.

The posterolateral structures do not play any role in preventing increased valgus motion. Several studies have demonstrated valgus angulation of the tibia is unaffected by sectioning of the fibular collateral ligament and the posterolateral structures.[5,31,43]

Role of the Posterolateral Structures in Preventing Anterior Tibial Translation

Several biomechanical cutting studies demonstrated cutting the posterolateral structures results in no significant increase in primary anterior tibial translation,[5,6] indicating the posterolateral structures have little role in preventing anterior tibial translation of the knee. Clinically, if one would expect an isolated posterolateral corner injury to be present, there should not be any increase in anterior translation on a true Lachman's test. However, some increase has been found in posterolateral motion that may make it feel like there is an increased amount of relative anterior translation (a "pseudo" Lachman's test). It is important to recognize that in this instance, there should be a solid endpoint to an anterior Lachman test clinically.

The posterolateral structures have an important secondary role in preventing anterior tibial translation when the ACL is torn.[28,41,43] Sectioning of the fibular collateral ligament, popliteus tendon, and other associated posterolateral structures results in a significant increase in anterior translation, which is primarily near extension. Therefore, it is important to recognize increases in anterior tibial translation seen in light of a combined ACL and posterolateral corner injury should result in a significant increase in anterior tibial translation and be detected clinically on Lachman's test. In a knee with a +3 or +4 Lachman test and no other obvious ligament instability, especially including an intact posterior horn of the medial meniscus, it is important the examiner establish that a concurrent posterolateral corner knee injury is not present.

Role of the Posterolateral Structures in Preventing Posterior Tibial Translation

Though often not recognized, the posterolateral structures of the knee do have a primary, but somewhat minor, role in restricting posterior tibial translation.[5,6,40] Isolated

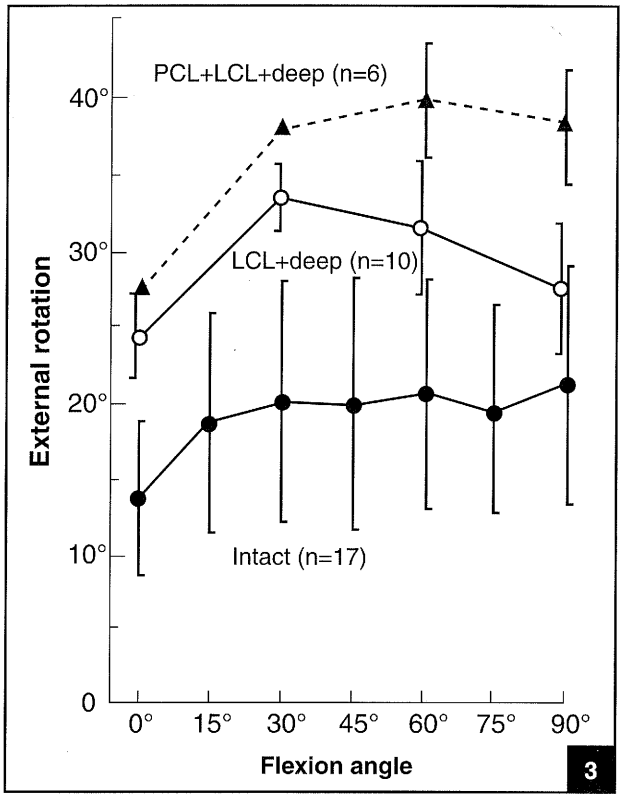

Figure 3. Increased external rotation occurred at all angles of knee flexion with combined sectioning of the lateral collateral ligament (LCL), popliteus, and deep posterior structures. The maximal increase was observed at 30° knee flexion (the rationale for "dial" test at 30°). Additional increases in external rotation were observed between 60° and 90° if posterior cruciate ligament (PCL) section was added. (Reprinted with permission from Gollehon DL, Torzilli PA, Warren RF. The role of the posterolateral and cruciate ligaments in the stability of the human knee. A biomechanical study. *J Bone Joint Surg Am.* 1987;69:233-242. Copyright © 1987, Journal of Bone and Joint Surgery.)

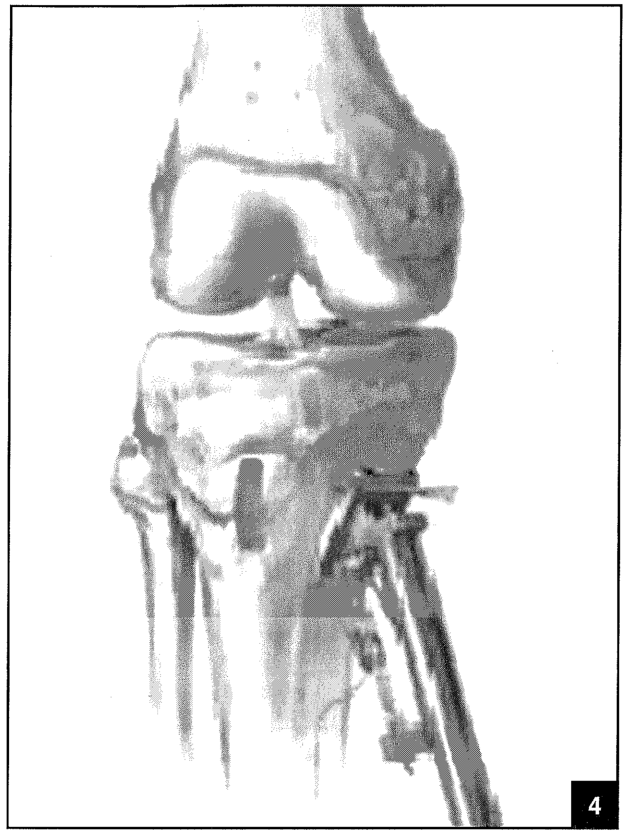

Figure 4. The force-measuring jig for loading and force measurement on the anterior cruciate ligament graft during tests. Reprinted with permission from LaPrade RF, Resig S, Wentorf FA, Lewis JL. The effects of grade III posterolateral knee complex injuries on anterior cruciate ligament graft force. A biomechanical analysis. *Am J Sports Med.* 1999;27:469-475. Copyright © 1999, American Orthopaedic Society for Sports Medicine. Reprinted by permission of Sage Publications Inc.)

sectioning of the posterolateral corner structures can result in a slight increase in posterior tibial translation at all angles of knee flexion. The maximal increases of posterior translation with isolated posterolateral corner sectioning occur between 0° and 30° of knee flexion. In fact, at this position, there is no difference between an isolated posterolateral corner injury and an isolated PCL injury in terms of the amount of posterior translation that can occur.

While the posterolateral structures play a minor primary role in resisting posterior tibial translation, they play an important secondary role in providing posterior stability to the knee in the face of PCL deficiency.[5,6,29] Multiple studies demonstrated combined cutting of the PCL and posterolateral structures results in a marked increase in posterior tibial translation, which is most important at 90° of knee flexion. One study demonstrated the popliteus tendon was the structure that had the largest increase on resisting posterior tibial translation, up to 90°of knee flexion, when sectioned.[28]

Role of the Posterolateral Structures in Preventing Internal Knee Rotation

The posterolateral structures play a small role in preventing primary internal rotation of the knee.[23] In addition, in the face of an ACL-deficient knee, the posterolateral structures assume an important role as a secondary restraint to internal rotation, especially with the knee close to extension.[6,31,32] However, there is a large amount of variability in internal rotation changes between different knees, and this particular knee instability has not demonstrated much clinical significance in clinical examination testing.

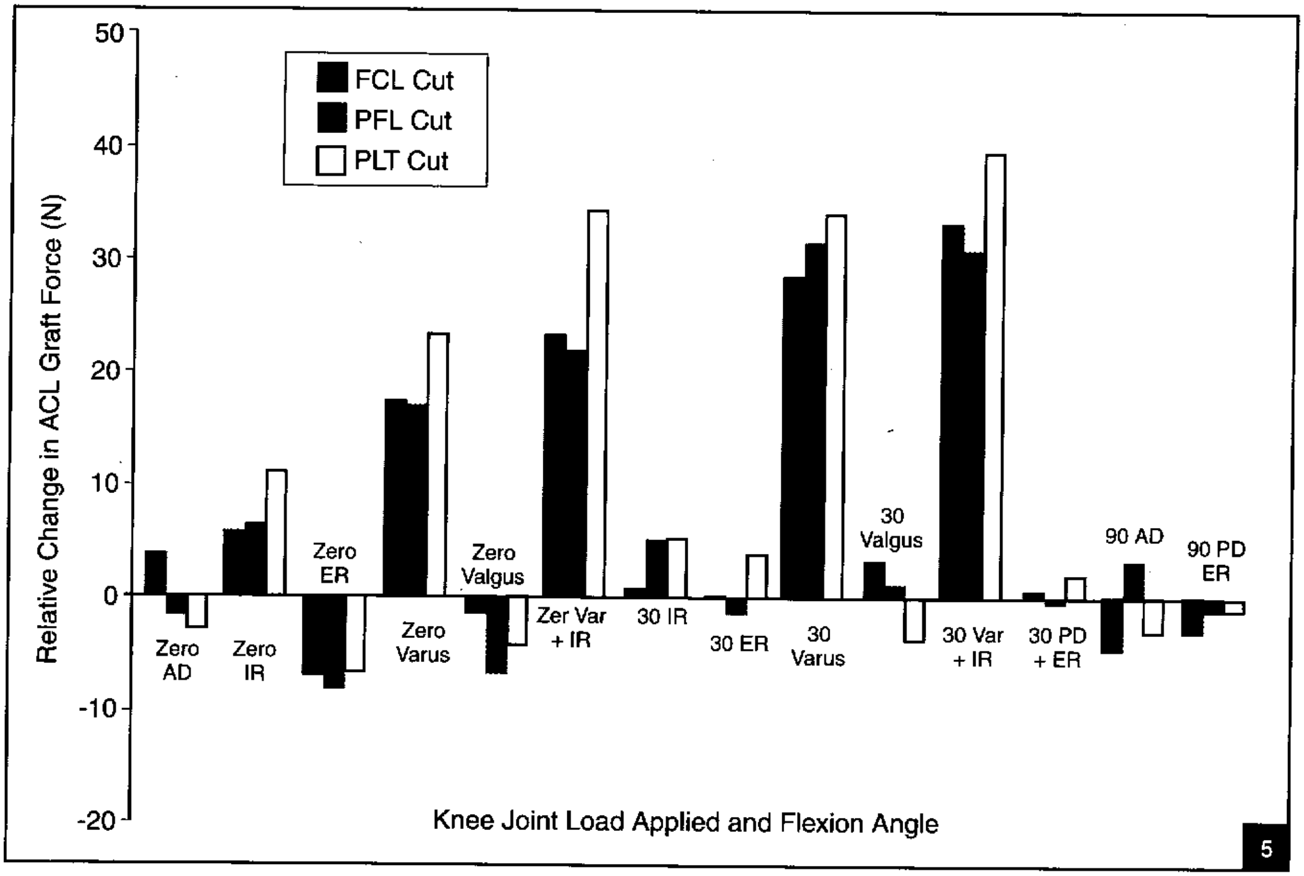

Figure 5. Change in anterior cruciate ligament (ACL) graft found relative to the same load applied to the joint with the posterolateral structures intact and after cutting the fibular collateral ligament (FCL), popliteofibular ligament (PFL), and popliteus tendon. These changes show a dramatic increase in ACL graft forces in the face of untreated posterolateral instability. This is postulated to be the mechanism of ACL graft failure when associated posterolateral instability is missed or not treated. Reprinted with permission from LaPrade RF, Resig S, Wentorf FA, Lewis JL. The effects of grade III posterolateral knee complex injuries on anterior cruciate ligament graft force. A biomechanical analysis. *Am J Sports Med.* 1999;27:469-475. Copyright © 1999, American Orthopaedic Society for Sports Medicine. Reprinted by permission of Sage Publications Inc.)

Role of the Posterolateral Structures in Preventing External Knee Rotation

The posterolateral structures play an important role in preventing primary external rotation of the knee.[5,6,28,31] The popliteus tendon, popliteofibular ligament, and fibular collateral ligament are the primary stabilizers to external rotation, with the largest increase in external rotation for isolated posterolateral corner injuries seen at 30° of knee flexion (Figure 3). The average amount of increased external rotation at this position is between 13° and 16°.[5,6,28,31,41] By the time the knee is flexed to 90° in the face of an isolated posterolateral corner injury, the average increase in external rotation is between 5° and 6°.[6]

In addition to the role of the posterolateral structures in preventing external tibial rotation, both the PCL and the ACL are important secondary stabilizers to external tibial rotation of the knee at 90° of knee flexion.[5,6,43] At 90° of knee flexion with either the ACL or PCL sectioned, the amount of external rotation seen in the face of a combined posterolateral corner injury would be approximately equal to that seen at 30° of knee flexion.

Clinically, the dial test has been based on these biomechanical sectioning data. For an isolated posterolateral corner knee injury, there should be an increase in external rotation at 30° of knee flexion, with a subsequent decrease in external rotation when the dial test is repeated at 90° of knee flexion and compared to the contralateral knee. While an isolated ACL or PCL injury will not increase external tibial rotation at any knee flexion angle, there will be an increase in external rotation at 90° of knee flexion when there is a concurrent posterolateral corner injury. The clinical importance of this is that any increase of external rotation on the dial test at 30° or 90° of knee flexion in the face of an ACL or PCL injury would indicate the presence of a probable concurrent posterolateral corner knee injury.

Tibiofemoral Orientation From Differential Cruciate Ligament Tensioning in Posterolateral Injuries

A significant increase in the external rotation of the tibia occurs with tightening of the ACL graft in the face of a posterolateral corner knee injury compared to when the posterolateral structures are intact.[42] One of the authors (R.F.L., unpublished data, 1999) suggested:

> With this in mind, it is recommended to repair or reconstruct the posterolateral corner knee injuries first, prior to stabilizing an ACL graft on the tibia, to reduce the risk of an external rotation deformity in the knee in the face of these combined injuries. In addition, no difference has been found in tibiofemoral orientation when a PCL graft was tensioned at 90° of knee flexion with the posterolateral corner structures either intact or sectioned.

Therefore, in the face of combined PCL and posterolateral corner injuries, it is recommended the PCL graft be secured first to provide restoration of the central pivot to the knee, and the posterolateral corner structures either be repaired or reconstructed after the PCL graft has been fixed on the tibia.

Effects of Posterolateral Injuries on Forces in Cruciate Ligament Reconstructions

The ACL graft force is significantly higher in the face of posterolateral corner knee injuries at 0° and 30° of knee flexion[19] (Figures 4 and 5). In addition, combined coupled loading of varus and internal rotation moments at 0° and 30° of knee flexion further increases the force on an ACL graft beyond that found with varus moments alone.[19] In light of this, it is recommended either a repair or reconstruction of torn posterolateral structures be performed at the time of an ACL reconstruction to reduce the risk of an ACL graft failure. In addition, it is recommended a decision to repair or reconstruct a posterolateral corner injury be made prior to ACL graft fixation at the time of an examination under anesthesia. This is because a tightened ACL graft will overconstrain the knee and mask the amount of abnormal motion from a posterolateral corner knee injury once it has been fixed in both of its tunnels.[19]

The posterolateral corner structures also play an important role in the success of PCL reconstructions. Significant increases in force have been demonstrated on PCL reconstruction grafts when the popliteofibular ligament, popliteus tendon, and fibular collateral ligament were cut for both varus moments and a coupled posterior drawer and external rotation torque.[8,18] Similar to the findings with ACL grafts, it is recommended knees with PCL tears and combined posterolateral corner knee injuries undergo a concurrent posterolateral corner knee repair or reconstruction at the same time as the PCL reconstruction to reduce the risk of PCL graft failure. It is also essential that a decision to either repair or reconstruct the posterolateral corner injury be made prior to PCL graft fixation (either with the examination under anesthesia or possibly with a concurrent arthroscopic evaluation of the lateral compartment of the knee), because fixing the PCL graft in both of its tunnels will result in the knee being overconstrained and masking the amount of abnormal posterolateral joint motion present. Failure to recognize this will lead to significant amounts of extra force on the PCL graft, which could potentially lead to failure of the PCL reconstruction.[8,18]

CONCLUSION

The posterolateral corner of the knee is characterized by the iliotibial tract, biceps femoris, fibular collateral ligament, mid-third capsular ligament, popliteus muscle complex, and the lateral head of the gastrocnemius. The surgically important structures from biomechanical analysis seem to be the fibular collateral ligament and popliteus complex. Failure to adequately address these structures in surgical reconstruction increases forces at the ACL and PCL graft or repair site and may predispose to ultimate failure of the repair or reconstruction. Knowledge of the anatomy and biomechanics of the posterolateral corner are the cornerstones for examination, imaging, and ultimately repair or reconstruction of these structures in the face of injury.

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