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Arthroscopic Evaluation of the Lateral Compartment of Knees With Grade 3 Posterolateral Knee Complex Injuries

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ABSTRACT

The purpose of this study was to evaluate prospectively the arthroscopic findings in the lateral compartment of knees with posterolateral knee complex injuries, to help identify individual injured anatomic structures, and to assist in the clinical identification of these injuries. Thirty of 33 consecutive knees noted to have grade 3 posterolateral knee complex injuries on preoperative evaluations and examinations under anesthesia underwent arthroscopic evaluation concurrently with open reconstruction. The arthroscopic evaluation revealed a significant number of pathologic changes in the lateral compartment that may have gone undetected if only an open reconstruction had been performed. Tears were identified arthroscopically in 25 (83%) of the anteroinferior, 22 (73%) of the posterosuperior, and 14 (47%) of the posteroinferior popliteomeniscal fascicles. Injuries to the coronary ligament (80%) and meniscotibial portion of the midthird lateral capsular ligament (73%) were also frequently seen. Other structures injured included the meniscofemoral portion of the posterior capsule (37%), the ligament of Wrisberg (33%), and the meniscofemoral portion of the midthird lateral capsular ligament (10%). Ten avulsions (33%) of the popliteal tendon origin off the femur were also identified. Identification of these injured components greatly facilitated open reconstruction of injuries to the posterolateral complex of the knee. All 30 knees were noted to have greater than 1 cm of lateral joint laxity with application of a varus stress. When an unexpected amount of lateral joint laxity is seen arthroscopically (a "drive-through" sign) in a patient with suspected ligamentous instability, one should consider a diagnosis of posterolateral knee complex injury.

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Posterolateral rotatory instability (PLRI) of the knee is a complex and often unrecognized form of knee instability.[3,5] The diagnosis and management of knees with PLRI presents a difficult challenge for the physician. Until rather recently, the anatomic structures of the posterolateral knee were not well defined. Recent publications of studies by Stäubli et al.,[15,16] Terry et al.,[17] and Terry and LaPrade[18,19] have further defined the anatomic structures on the posterolateral aspect of the knee. Although these structures were previously recognized, the exact origins, insertions, and the specific fine details of many of these anatomic structures were represented only in sketches or illustrations.[10,12] Failure to repair grade 3 posterolateral knee complex injuries has resulted in poor results.[7] In addition, unrecognized posterolateral knee injuries have been noted to be the cause of a large number of ACL reconstruction failures.[11]

Apparently, there have been no studies to date focusing on the intraarticular lateral compartment lesions associated with posterolateral knee complex injury. The purpose of this prospective study was to identify with the arthroscope the intraarticular anatomic structures injured in the lateral compartment of the knee with PLRI. This should further aid the clinician in the diagnosis, management, and treatment of knees with posterolateral knee complex injuries.

MATERIALS AND METHODS

A prospective evaluation was performed on 32 consecutive patients with 33 injured knees who were operated on for the first time for an acute (<3 weeks) or chronic grade 3 posterolateral knee complex injury.[1] Twenty-nine of these patients (30 knees) were evaluated with an arthroscope during their open posterolateral ligament reconstruction. The other three patients sustained either an acute open dislocation (two) or a complex knee dislocation (one). Concurrent arthroscopic evaluation was not possible in these three cases because fluid distention could probably not be maintained or fluid extravasation could have contributed to a compartment syndrome.

There were 25 male and 4 female patients with a mean age of 31.4 years (range, 20 to 44). Sixteen right knees and 14 left knees were evaluated, with 1 patient having bilateral acute injuries. There were 10 acute and 20 chronic posterolateral knee complex injuries. The mechanisms of injury were twisting accidents (9), varus injuries (8), motor vehicle accidents (4), motorcycle accidents (4), hyperextension (2), and an axial blow to the flexed knee (2). All patients noted significant disability due to their PLRI and other rotatory instability components.

None of these patients had had previous surgery for PLRI, but five patients had had previous surgeries without any known reinjury of the operative knee (Table 1). All patients had standing AP (when possible), lateral, and patellar sunrise view radiographs at the time of initial evaluation.

The diagnosis of posterolateral knee complex injury was determined both by the preoperative clinical examination and an examination under anesthesia that consisted of the following specific tests: the posterolateral drawer test at 80° of knee flexion,[3] posterolateral rotation of the knee at 30° of flexion, the external rotation-recurvatum test,[3] the reverse pivot shift test,[4] and the adduction stress test at 30° of knee flexion.[9] Initial clinical evaluation included observation of a varus thrust gait pattern when possible. Other examinations performed, but not pertinent to this report, include the abduction stress test at 0° and 30° of knee flexion, adduction stress test in full extension, Lachman test, anterior drawer test in both neutral and external rotation, pivot shift test, posterior drawer test at 80° of knee flexion (neutral rotation), and range of motion of the knee. All clinical testing results were compared with those from the uninjured contralateral knee (except in the patient with bilateral injuries).

After the diagnosis of posterolateral complex injury was confirmed by examination under anesthesia, the patient was positioned supine and a 10-pound sandbag was taped to the bed to allow stabilization of the knee for surgery. The open surgical approach was performed first to allow identification of specific anatomic components before possible fluid extravasation during the arthroscopic evaluation of the knee. Exposure of the lateral and posterolateral aspects of the knee was performed using a hockey stick incision centered over Gerdy's tubercle with the knee flexed to approximately 70°.[18,19] A posteriorly based skin flap was developed along the fascial planes over the iliotibial band and the long and short heads of the biceps femoris muscle. Three fascial incisions were used to provide surgical access to chronic injuries. For acute injuries, access was achieved through the plane of injury when possible.[8,19]

TABLE 1
Types of Previous Surgeries and Results in 30 Knees with Posterolateral Knee Complex Injury

Type of surgery	No. of patients	Outcome
PCL reconstruction	2	Both failed
ACL reconstruction	2	Both failed
Diagnostic arthroscopy	1	Initially thought to have an ACL tear because of a perceived positive Lachman test,[a] PLRI was unrecognized, disability persisted

[a] In actuality this positive Lachman test was posterolateral rotation around an intact ACL.

The first fascial-splitting incision split the iliotibial tract in line with its fibers, starting at Gerdy's tubercle and extending proximally. The second incision split the interval between the posterior border of the iliotibial tract and the short head of the biceps femoris muscle. The third incision was posterior to the tendinous components of the long head of the biceps femoris muscle and was performed concurrently with a common peroneal nerve neurolysis.

Injuries to extraarticular posterolateral structures were then identified. An arthroscopic examination was performed with special emphasis on identifying the appearance of the following structures: the ACL; PCL; lateral meniscus; coronary ligament of the lateral meniscus (meniscotibial portion of posterior capsule); popliteus tendon origin on the femur; the anteroinferior, posterosuperior, and posteroinferior popliteomeniscal fascicle; the popliteus tendon; the midthird lateral capsular ligament (including the meniscotibial and meniscofemoral ligaments); the ligament of Wrisberg; the meniscofemoral portion of the posterior capsule; the articular cartilage of the lateral femoral condyle and lateral tibial plateau; and the popliteofibular ligament.[9,15,16,19] Other pathologic changes in the medial compartment and patellofemoral joint were recorded, but these findings are not reported here.

A 4-mm, 30° arthroscope was used for visualization through a standard anterolateral parapatellar tendon portal. The lateral compartment was visualized by applying varus stress to the knee at approximately 30° to 45° of flexion and also by placing the knee into a figure-four position (flexing the knee to 90°, applying a varus stress, and positioning it over the contralateral knee). The popliteus complex was initially visualized with the knee in 20° of flexion and the tibia in neutral rotation (a slight amount of valgus was applied if necessary). Further evaluation of the popliteus complex was then performed by observing its dynamic interaction with the lateral meniscus while applying external rotation and varus forces. The ligament of Wrisberg was assessed by direct probing through the intercondylar notch, lateral to the ACL, with the foot in maximal internal rotation.

All lateral compartment structures were photographed through the arthroscope for archival purposes, and the video disk made during examination was saved. A specially designed data sheet was prepared for each patient to record the data. Each structure was classified as intact, lax, or torn based on its appearance and results of probing. All knees were evaluated arthroscopically by the same surgeon. The arthroscopic evaluation of the lateral compartment was supplemented with a lateral capsular arthrotomy incision, located 1 cm anterior to the fibular collateral ligament and through the midthird lateral

TABLE 2
Classification of Rotatory Instability Patterns in 30 Knees with Posterolateral Knee Complex Injuries

Type of instability[a]	Number of patients	
	Acute	Chronic
PLRI	0	5
PLRI-ALRI	5	9
PLRI-AMRI	0	1
PLRI-ALRI-AMRI	3	0
Straight lateral	2	5

[a] PLRI, posterolateral rotatory instability; ALRI, anterolateral rotatory instability; AMRI, anteromedial rotatory instability.

capsular ligament, in all 30 cases.[18,19] An open anatomic surgical reconstruction was performed in all knees,[8] and injuries to individual anatomic structures were recorded to confirm the findings on arthroscopic evaluation.

RESULTS

Examination under anesthesia revealed that 5 knees had isolated PLRI and 25 knees had combinations of posterolateral complex injuries with other ligament injuries (Tables 2 and 3). Abnormalities in the limits-of-motion evaluation were classified according to the Hughston classification of rotatory instabilities of the knee.[2]

Radiographic evaluation revealed that 21 knees had no obvious osseous lesions, 7 knees had Segond avulsion fractures,[13,18,19] and 3 knees had arcuate avulsion fractures[14,19] (one knee had both types of avulsion fractures). In no instance was there any problem with excessive fluid extravasation into soft tissues. In knees with acute injuries, fluid leaked through capsular rents and out through the surgically created fascial incisions. In knees with chronic injuries, fluid extravasation was usually limited to tissue planes along previously injured capsular components (coronary ligament or the meniscotibial portion of midthird lateral capsular ligament). In no case did sufficient fluid extravasation occur such that there was a concern of a compartment syndrome.

At the time of arthroscopic evaluation, visualization of the lateral compartment was facilitated by applying varus stress with the knee in 30° of flexion. The lateral compartment opening was greater than 1 cm, as measured grossly with a 4-mm arthroscopic probe, in all cases (Fig. 1). Arthroscopic evaluation revealed a wide spectrum of injuries involving the popliteus complex (Figs. 2 through 5), coronary ligament (Fig. 6), midthird lateral capsular ligament (Fig. 7), lateral meniscus, ligament of Wrisberg, lateral compartment articular surfaces, and cruciate ligaments (Table 4). Injuries involving the popliteus complex, coronary ligament, and midthird lateral capsular ligament seen arthroscopically were all verified at the time of open surgical exploration and repaired through the previously described fascial-splitting incisions.

Despite the surgeon's ability to directly visualize and probe the lateral compartment structures, arthroscopic evaluation did not pick up all injured structures of the popliteus complex. In three knees with chronic posterolateral complex injuries, the popliteomeniscal fascicles could not be visualized during arthroscopic evaluation because of scarring of the entire popliteal hiatus region caused by a retracted popliteus tendon that had avulsed off its femoral origin. At the time of open arthrotomy, the anteroinferior, posterosuperior, and posteroinferior popliteomeniscal fascicles[15,16,19] were seen to be torn from their attachments to the lateral meniscus in these three knees.

Arthroscopic evaluation of the popliteofibular ligament revealed an obvious injury in three knees (one with acute injury and two with chronic injuries) and a normal ligament in five knees. In the remaining 22 knees, the status of the ligament could not be determined arthroscopically. Five of these 22 knees had scarring in the region of the popliteofibular ligament, due to retraction of an avulsed popliteus tendon region on the femur, that prevented visualization. Twenty-three knees were subsequently found to have popliteofibular ligament tears at the time of open surgical exploration. Thus, in 20 of 23 knees with popliteofibular ligament tears, the status of the ligament could not be determined with the arthroscope.

TABLE 3
Injured Intraarticular Lateral Compartment Structures in 30 Knees with Posterolateral Injuries (Grade 3 Tear): A Comparison of Findings in ACL-Intact and ACL-Deficient Knees

Anatomic structure torn	ACL-intact knees (N = 10)		ACL-deficient knees (N = 20)	
	N	%	N	%
Anteroinferior popliteomeniscal fascicle	8	80	17	85
Coronary ligament	8	80	16	80
Posterosuperior popliteomeniscal fascicle	6	60	16	80
Midthird lateral capsular ligament-meniscotibial	8	80	14	70
Posteroinferior popliteomeniscal fascicle	5	50	9	45
Meniscofemoral portion of posterior capsule	3	30	8	40
Popliteus origin on femur	2	20	8	40
Lateral meniscal tear (outside of popliteal hiatus zone)	4	40	6	30
Ligament of Wrisberg	4	40	6	30
PCL	4	40	3	15
Lateral femoral condyle chondromalacia	1	10	6	30
Lateral tibial plateau chondromalacia	3	30	4	20
Midthird lateral capsular ligament-meniscofemoral	0	0	3	15
Popliteofibular ligament	3	30	0	0

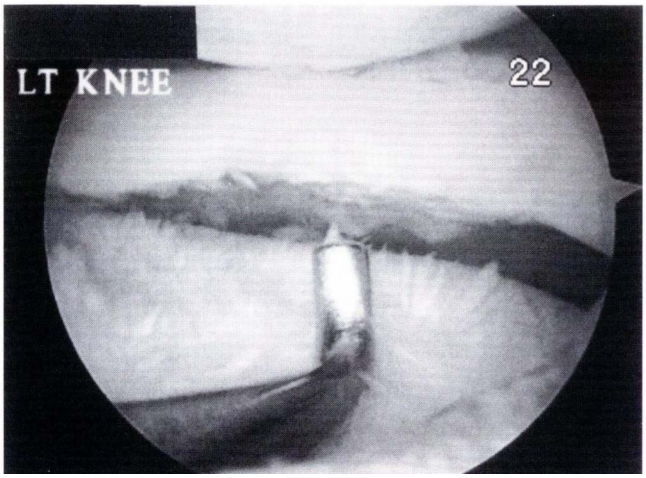

Figure 1. Arthroscopic view of the lateral compartment of a left knee with application of a varus stress. The lateral femoral condyle is seen at the top, above the lateral meniscus, and the lateral tibial plateau is at the bottom, beneath the probe. Greater than 1 cm of lateral joint laxity can be seen.

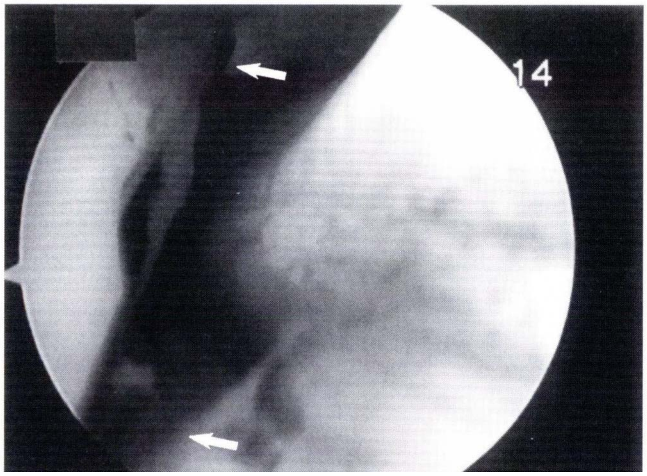

Figure 3. Tear of the anteroinferior and posterosuperior popliteomeniscal fascicles (arrows), with the popliteus tendon to the right and the lateral meniscus to the left (acute case, left knee).

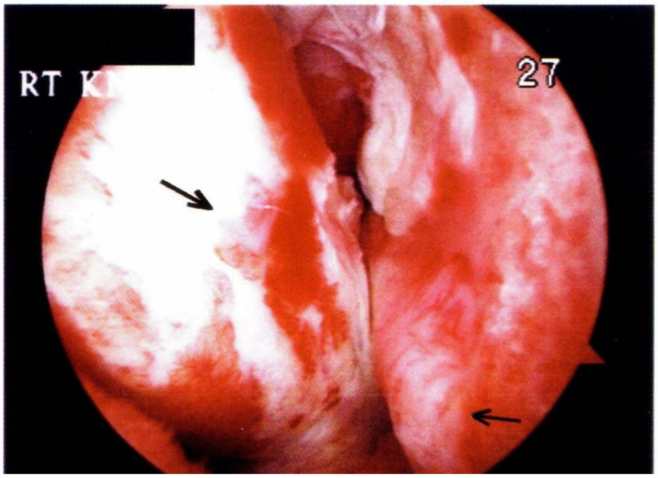

Figure 2. Tear of the popliteus tendon origin on the femur (large arrow), with the popliteal groove to the right (small arrow) (acute case, right knee).

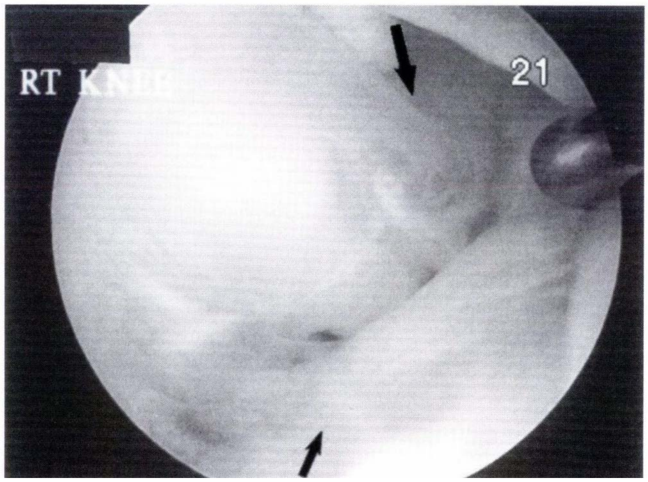

Figure 4. Tear of the anteroinferior (small arrow), posterosuperior (large arrow), and posteroinferior popliteomeniscal fascicles, with the lateral meniscus retracted by arthroscopic probe (chronic case, right knee).

DISCUSSION

Arthroscopic evaluation of knees with grade 3 posterolateral knee complex injuries was found to be effective in identifying the majority of injuries to the popliteus complex, coronary ligament (meniscotibial portion of the posterior capsule), lateral meniscus, and the midthird lateral capsular ligament. It allowed the surgeon to correlate anatomic injuries with functional findings, which assisted in the identification of the pathologic process in PLRI and straight lateral instability.[2,4,8]

One noticeable feature of all knees with a component of PLRI was the wide amount of lateral compartment laxity and the ease with which the arthroscope passed into the lateral compartment. Generally, the arthroscopic camera could pass, via a lateral parapatellar tendon portal, under the posterior horn of the lateral meniscus and be used to view the distal capsular attachment of the coronary ligament. In effect, there was a positive "drive-through" sign, such that the knee did not need to be placed into a figure-four position to view the lateral compartment structures well. The difference in the amount of lateral joint opening was similar to the amount of joint laxity often encountered during arthroscopic evaluation of acute and chronic anterior instability of the glenohumeral joint.[6]

When an unexpectedly large amount of lateral compartment laxity is seen in a patient with a major ligamentous injury, one should suspect the presence of PLRI, and a

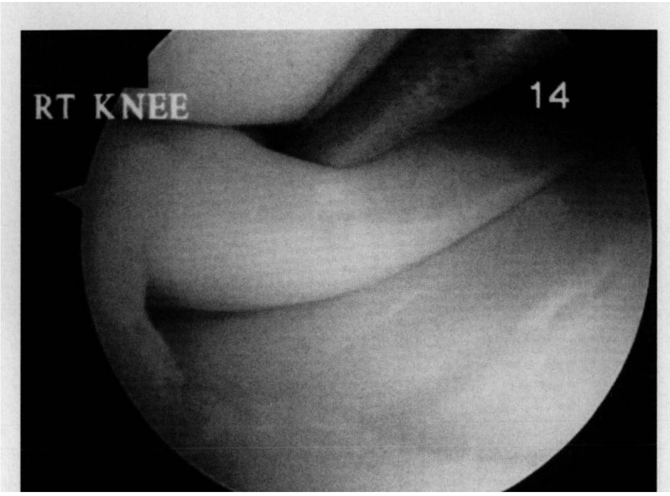

Figure 5. Subluxation of the lateral meniscus seen with a tear of the popliteomeniscal fascicles (chronic case, right knee, same patient as Figure 4).
knee, same patient as Figure 4).

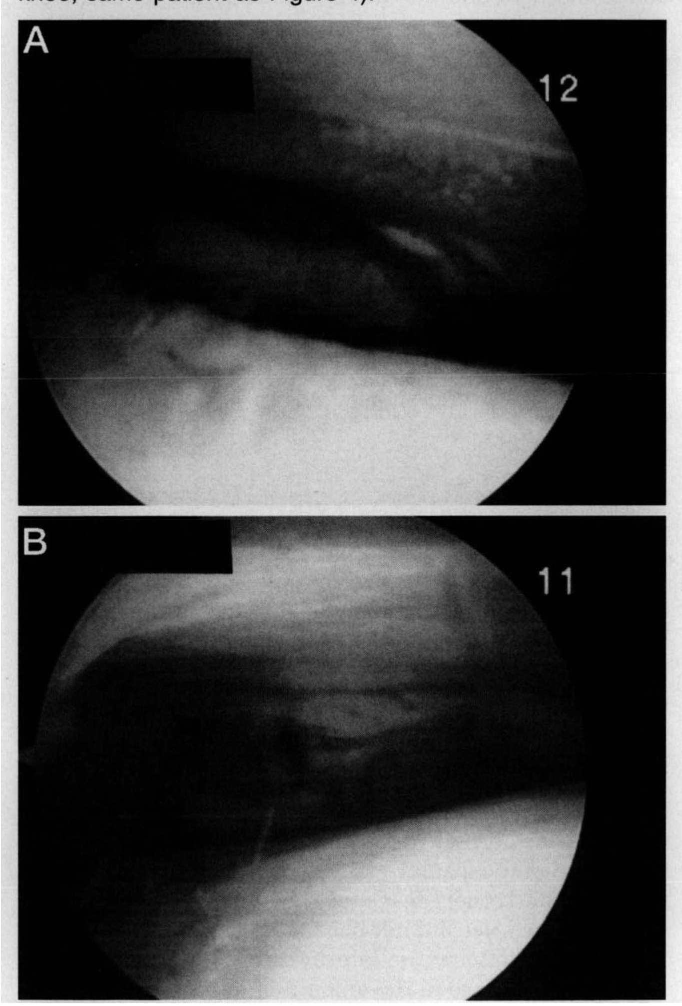

Figure 6. Coronary ligament (meniscotibial portion of posterior capsule) tears seen in association with posterolateral knee complex injuries. For both figures the lateral meniscus is superior and the lateral tibial plateau is inferior. A, acute injury, right knee; B, chronic injury, right knee.

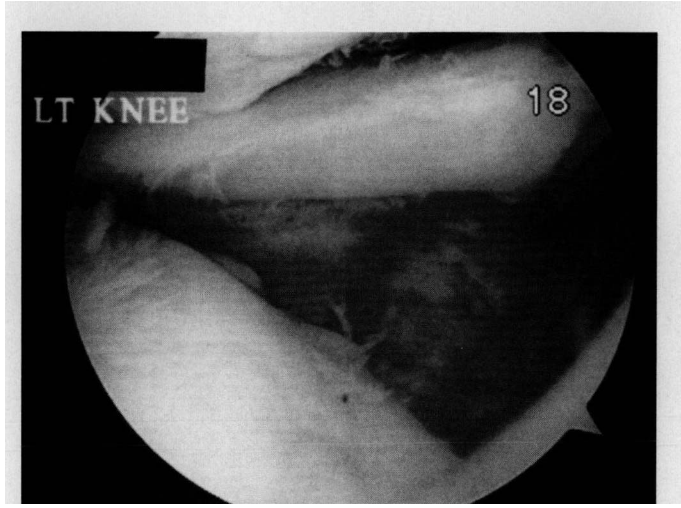

Figure 7. Midthird lateral capsular ligament injury seen in association with posterolateral knee complex injury. The arthroscopic probe demonstrates the laxity of the meniscotibial portion of the ligament (chronic injury, left knee, meniscotibial portion).

(re)evaluation for this instability pattern should be performed. Failure to identify the cause of this increased lateral compartment laxity could result in inaccurate diagnosis and treatment. Unrecognized PLRI has been reported to be a major cause of cruciate ligament reconstruction failures.[8,11] In addition, nonoperative treatment of grade 3 PLRI has been reported to yield poor results.[7]

Arthroscopic evaluation of and injuries to components of the popliteus complex have been described by Stäubli and Birrer[15] in patients both with and without ACL deficiency. In 40 knees with acute ACL tears, these authors found an isolated lesion of the anteroinferior popliteomeniscal fascicle in 25%, an isolated lesion of the posterosuperior fascicle in 7%, combined lesions of the anteroinferior and posterosuperior fascicles in 25%, and other combinations of injuries (not specified) in 35% of knees. There were 28 additional knees with chronic ACL deficiencies that had other injuries: 1 avulsion of the popliteus tendon origin, 1 isolated posterosuperior popliteomeniscal fascicle tear, 7 anteroinferior popliteomeniscal fascicle tears, 6 combined anteroinferior and posterosuperior popliteomeniscal fascicle tears, and 7 other injury combinations (not specified). Similar to the current study, Stäubli and Birrer also noted difficulty in visualizing the popliteofibular ligament during an arthroscopic evaluation.

This series had a higher percentage of popliteomeniscal fascicle and popliteus origin injuries than the series reported by Stäubli and Birrer. The severity of injuries to the popliteus complex was higher in these patients with posterolateral ligament complex injuries than that in patients with ACL instability in the Stäubli and Birrer study. However, a direct comparison is not possible because Stäubli and Birrer did not provide information on how many of their ACL-deficient knees also had other ligamentous instability patterns or abnormalities in limits-of-motion testing. It is recognized that in vivo

TABLE 4
Intraarticular Anatomic Injuries of the Lateral Compartment Seen Arthroscopically in 30 Knees with Posterolateral Knee Complex Injuries

Anatomic structure torn[a] (Grade 3)	Total	No. of acute cases (N = 10)	No. of chronic cases (N = 20)	Percentage of knees injured
Anteroinferior popliteomeniscal fascicle	25	10	15	83
Coronary ligament (meniscotibial)	24	8	16	80
Posterosuperior popliteomeniscal fascicle	22	9	13	73
Midthird lateral capsular ligament-meniscotibial	22	7	15	73
ACL	20	9	11	67
Posteroinferior popliteomeniscal fascicle	14	6	8	47
Meniscofemoral portion of posterior capsule	11	5	6	37
Popliteus tendon origin on femur	10	3	7	33
Lateral meniscal tear (outside of popliteal hiatus zone)	10	1	9	33
Ligament of Wrisberg	10	4	6	33
PCL	7	2	5	23
Lateral femoral condyle chondromalacia	7	1	6	23
Lateral tibial plateau chondromalacia	7	1	6	23
Midthird lateral capsular ligament-meniscofemoral	3	3	0	10
Popliteofibular ligament	3	0	3	10
Popliteus tendon (main substance)	0	0	0	0

[a] All 30 knees had injury to some component of the popliteus complex.

knee injuries involve a spectrum of injuries to many intra- and extraarticular static and dynamic stabilizers, and injuries have been reported to the components of the iliotibial band and biceps femoris complex in association with ACL tears.[17,18] It is also reasonable to assume that injuries to the popliteus complex component follow this pattern in knees with ACL ruptures and posterolateral complex injuries.

The comparison of arthroscopic findings in ACL-intact versus ACL-deficient (grade 3 tears) knees in this study revealed many similarities in the structures injured (Table 3). There did not appear to be any particular injury pattern specific to either group. However, the relatively small number of patients in either subset makes a direct comparison of the number of injured lateral compartment structures between ACL-intact and ACL-deficient knees not meaningful.

The importance of the dynamic interaction between the popliteus tendon and the lateral meniscus through the intact popliteomeniscal fascicles has been reported by Stäubli and Birrer. They reported that the intact popliteus tendon and popliteomeniscal fascicles restrained varus-valgus angulation, controlled medial-lateral meniscal displacement, and restrained external rotation of the posterior compartment. They suggested that combined extended lesions of the popliteomeniscal fascicles lead to a loss of integrity of the hoop tension of the lateral meniscus and that these lesions should be repaired. The findings from the present study support the observations and recommendations made by Stäubli and Birrer.

In the current report, all 30 knees with PLRI were noted to have either a combined popliteomeniscal injury pattern or an avulsion of the popliteus origin off the femur. Dynamic evaluation of the popliteal hiatus demonstrated posterolateral subluxation of the tibia on the femur and medial displacement of the lateral meniscus with application of an external rotation force. Arthroscopic evaluation facilitated the evaluation of these injuries to the popliteomeniscal fascicles and the dynamic evaluation of the pathologic motion that occurred with application of an external rotation coupled moment. Although identification of the injured components of the intraarticular popliteus complex was performed through the lateral capsular incision,[8,18,19] arthroscopic evaluation allowed for a better appreciation of the extent of injury, especially injuries to the posterosuperior and posteroinferior popliteomeniscal fascicles, which were difficult to visualize completely through the vertical lateral arthrotomy incision.

Arthroscopic evaluation also enhances the surgeon's ability to evaluate the integrity of the popliteus origin on the femur. Avulsion of the popliteus tendon origin was seen in 33% of knees. Components of the popliteus complex have been noted to be the main static stabilizers to prevent PLRI.[4,5] Avulsion of the popliteus tendon off the femur will result in laxity of the popliteomeniscal fascicles, popliteofibular ligament, and the popliteal aponeurotic attachment to the lateral meniscus.[10,19] For this reason, it is very important to determine the integrity of the popliteus tendon origin at the time of posterolateral knee complex reconstruction. Jakob and Warner[5] described a technique of popliteus tendon recession in the lateral femoral condyle to tighten up the popliteus complex and prevent PLRI. In this technique, they recommend also repairing the popliteomeniscal fascicles. In the current report, arthroscopic evaluation of the popliteus origin was found to be accurate, and it facilitated the open posterolateral reconstruction.

Analysis of the integrity of the popliteofibular ligament by arthroscopic evaluation was not successful in the majority of patients found to have this injury during open anatomic repair. The popliteofibular ligament could be identified by direct palpation through the fascial incision performed concurrently with a common peroneal nerve neurolysis. A finger placed through this incision could be used to palpate the attachment of this ligament on the anteromedial aspect of the fibular styloid and posteromedial fibular head. Arthroscopically, it could be seen grossly as the tip of the finger was used during ballotement of the distal aspect of the popliteofibular ligament (described by H. U. Stäubli, personal communication, 1995).

Early in this series, spinal needle localization and gross cadaveric dissections were performed to confirm the location of the popliteofibular ligament at the time of arthroscopic evaluation. However, it was still difficult to evaluate the integrity of this ligament arthroscopically. The discrepancy between the arthroscopic and open surgical findings may also be explained by the fact that only the more proximal aspect of the popliteofibular ligament can be visualized arthroscopically. In light of this, arthroscopic evaluation to determine injury to the popliteofibular ligament should be supplemented with other evaluation techniques if a tear is suspected.

In this series, arthroscopic assessment of injuries to the meniscotibial portion of the midthird lateral capsular ligament or the coronary ligament of the posterior horn of the lateral meniscus enhanced the surgeon's ability to define injury patterns in knees with chronic posterolateral complex injuries. In knees with acute injuries, obvious disruption of these structures could be seen both arthroscopically and during an open reconstruction. However, in knees with chronic injuries, the presence of an injury to these structures was determined arthroscopically by visualization of scar tissue, laxity to palpation with an arthroscopic probe, or persistent capsular rents in these structures. The increased amount of lateral compartment laxity seen with posterolateral knee complex injuries allowed for excellent visualization of the posterior surface of the lateral meniscus and its capsular (meniscotibial and meniscofemoral) attachments. Thus, in knees with chronic injuries, arthroscopic evaluation of these structures was found to be superior, especially for the coronary ligament, to evaluation during an open reconstruction because of the difficulty in accessing the far posterior aspect of the posterolateral knee during an open reconstruction. Because arthroscopic evaluation can be used to identify all acute and chronic injuries to the coronary ligament and meniscotibial portion of the midthird lateral capsular ligament in this report, it is the recommended primary form of evaluation of these two structures when they can be visualized and adequately probed.

Ten patients were noted to have chondromalacia of either the lateral tibial plateau or the lateral femoral condyle. Nine of these patients had chronic posterolateral complex injuries, and one patient with an acute injury had grade 1 chondromalacia of the lateral compartment. It could be postulated that these early arthritic changes were due either to injuries sustained in the initial trauma or to repeated instability episodes. In addition, 10 patients had radial flap or horizontal cleavage tears of the lateral meniscus, 9 of which were in knees with chronic injuries. Most of the lateral meniscal tears were assumedly caused by repeated episodes of instability.

As this prospective study has demonstrated, the arthroscopic evaluation of knees with posterolateral complex injuries enhanced the surgeon's ability to evaluate pathologic conditions within the lateral compartment. These findings could then be correlated with the preoperative clinical examination and the examination under anesthesia to assist in the decision-making process on whether to perform an open reconstruction. All 30 knees in this study, those with acute and those with chronic injuries, underwent direct anatomic repair of individual injured anatomic structures.[8,19] The ability to evaluate arthroscopically the integrity of the popliteomeniscal fascicles, the popliteus origin on the femur, and the coronary ligament of the lateral meniscus enhanced the surgeon's ability to perform this method of reconstruction.

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