

Meniscal Ramp Lesions – How to Recognize them and What to do About It

Richard Wardell, MD
Orthopaedic Sports Medicine

Outline

- Review of Anatomy and Function
- Definition
- Incidence and Risk Factors
- Diagnosis
- Treatment and Outcomes
- Conclusions

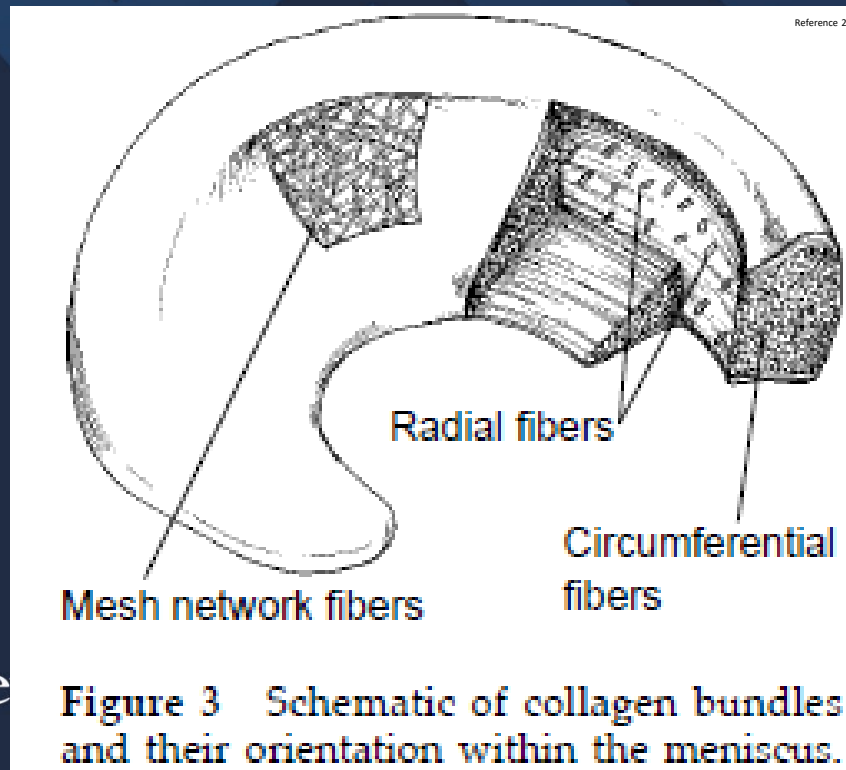
Anatomy

General Composition

- **Fibroelastic cartilage shock-absorbers** in the knee, located in the medial and lateral compartments, between the distal femur and proximal tibial plateaus
 - Network of collagen, proteoglycan, glycoproteins, and cellular elements
 - Structural component: **90% type I collagen**
 - **60-75% water content**¹

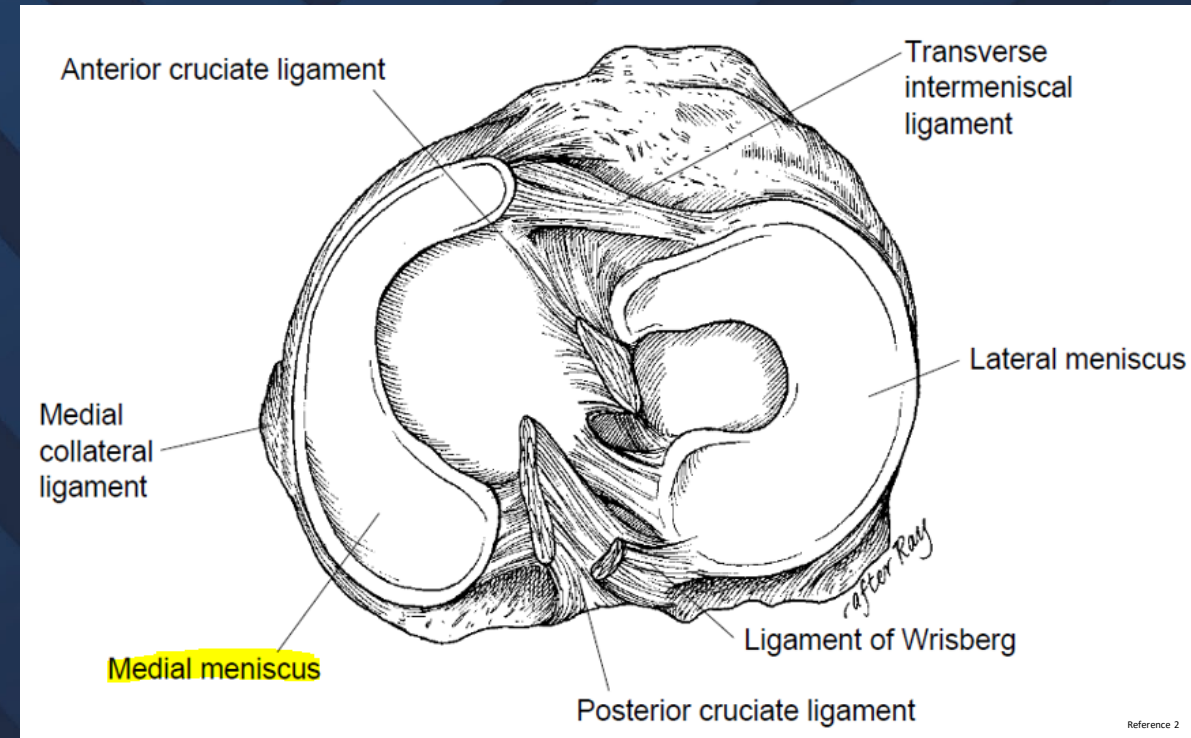
General Composition

- Composed of a fibrous network:
 - **Longitudinal** – disperses compressive loads and help dissipate hoop stresses
 - **Radial** – act as a tie to resist longitudinal tearing
- **Random meshwork configuration at the surface** – helps distribute shear stresses^{1,2}



General Structure of the Medial Meniscus

- Semilunar shape
- Broader posteriorly (~11mm)
 - Narrower toward the anterior root³
 - Average overall width: 9-10mm¹
- Covers ~50% of the medial tibial plateau³
- Average thickness: 3-5mm¹



Neurovascular Supply

- **Blood Supply**

- Posterior horns: middle genicular artery
- medial meniscus (peripheral 20-30%): medial inferior genicular artery
 - “red-red” zone
- Lateral meniscus (peripheral 10-25%): lateral inferior genicular artery
- Central portion: receives nutrition through diffusion
 - “white-white” zone¹

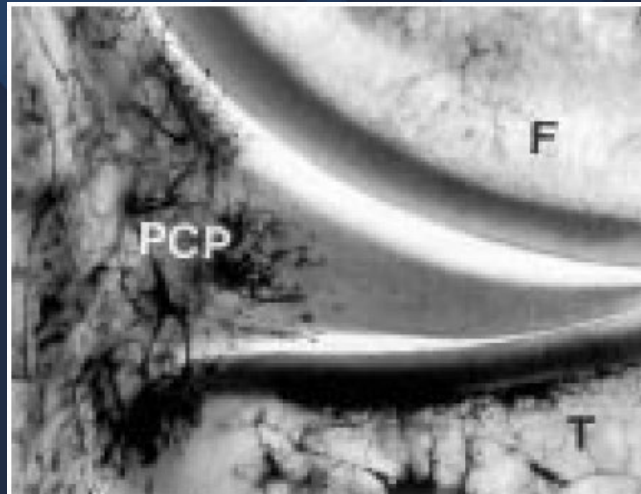
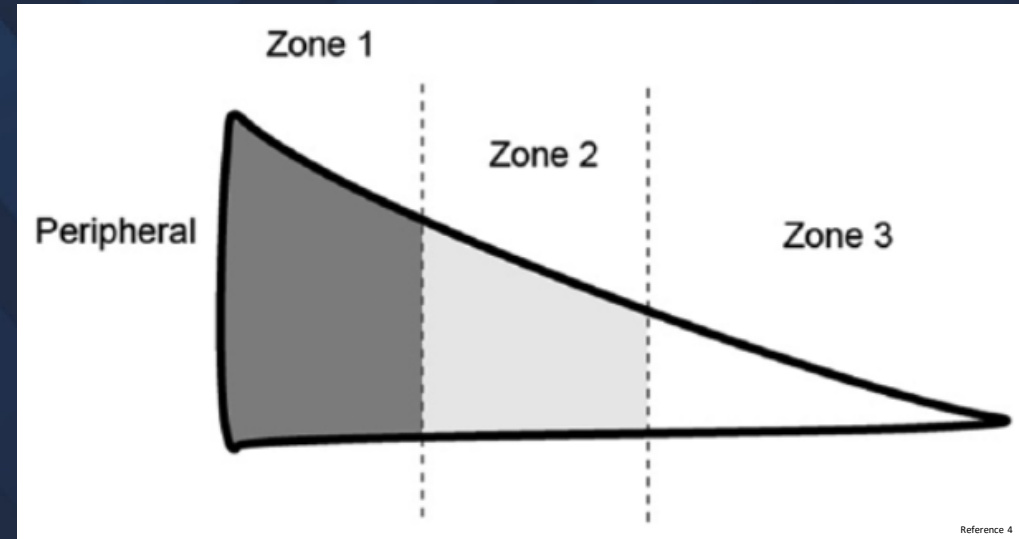


Figure 4 The microvasculature of the meniscus. F = femur, T = tibia, PCP = perimeniscal capillary plexus.

Reference 2



Reference 4

Neurovascular Supply

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- **Innervation**
 - Peripheral 2/3rds
 - Highest concentration of mechanoreceptors in the posterior horns¹

Medial Meniscal Attachments⁵

1. Intermeniscal ligament⁷
2. Anterior and posterior meniscal roots
3. Anteromedial meniscocapsular attachment
4. Deep MCL
5. Posterior Oblique Ligament (POL)
6. Semimembranosus tendon
- 7. Meniscotibial (coronary) ligament**
- 8. Posterior meniscocapsular attachment**

Implications

- All the meniscal attachments to the femur and tibia make it **less mobile** compared to the lateral meniscus
- Important for kinematics and injury patterns
 - Medial meniscus is **more susceptible to injury**
 - Especially during **deep flexion** and with **rotational** trauma
 - Less mobile with flexion past 30 degrees¹⁰
 - causes increased pressure in the posterior horn of the medial meniscus³

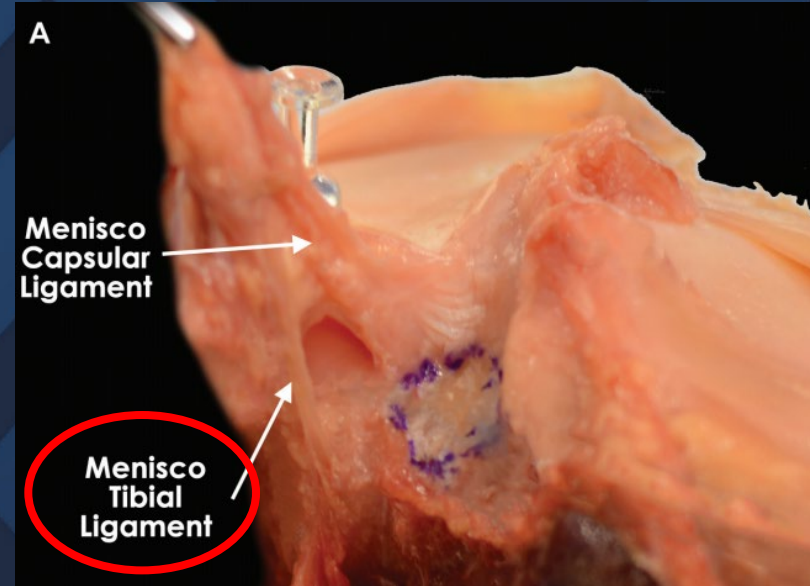
Attachments – Meniscotibial (Coronary) Ligament

Quantitative and Qualitative Assessment of the Posterior Medial Meniscus Anatomy

Defining Meniscal Ramp Lesions

Nicholas N. DePhillipo,^{*†} MS, ATC, OTC, Gilbert Moatshe,^{†‡§} MD, PhD, Jorge Chahla,[‡] MD, PhD, Zach S. Aman,[‡] BA, Hunter W. Storaci,[‡] MSc, Elizabeth R. Morris,[‡] BA, Colin M. Robbins,[‡] BA, Lars Engebretsen,[§] MD, PhD, and Robert F. LaPrade,^{*||} MD, PhD
Investigation performed at Steadman Philippon Research Institute, Vail, Colorado, USA

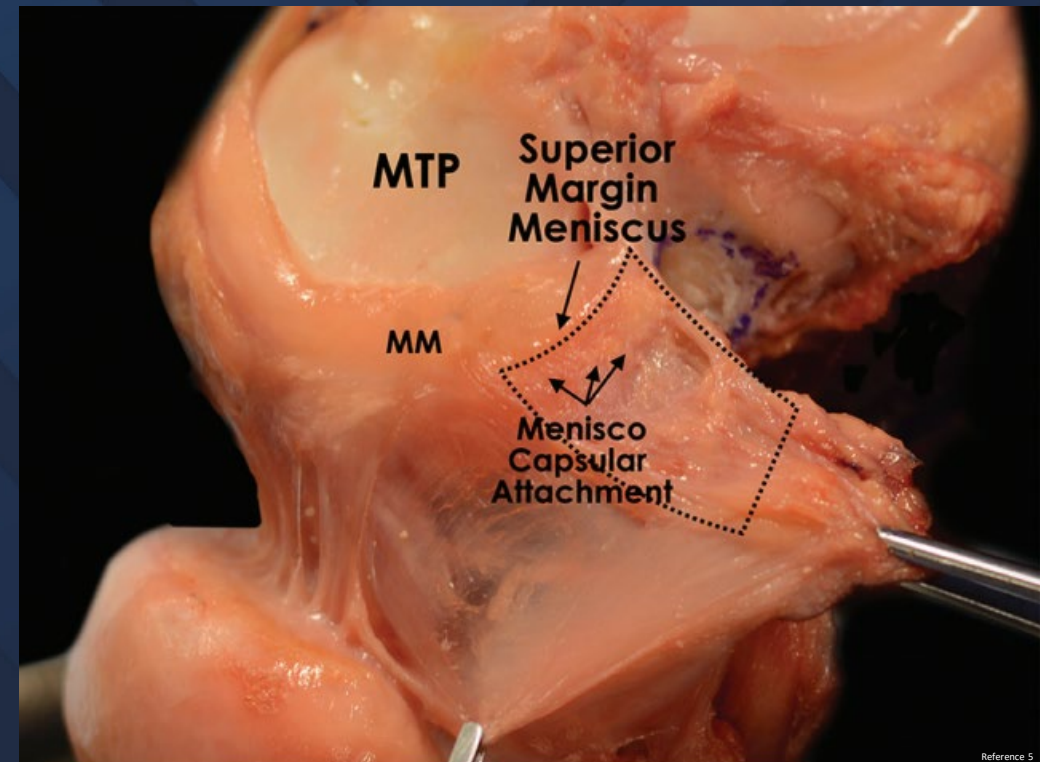
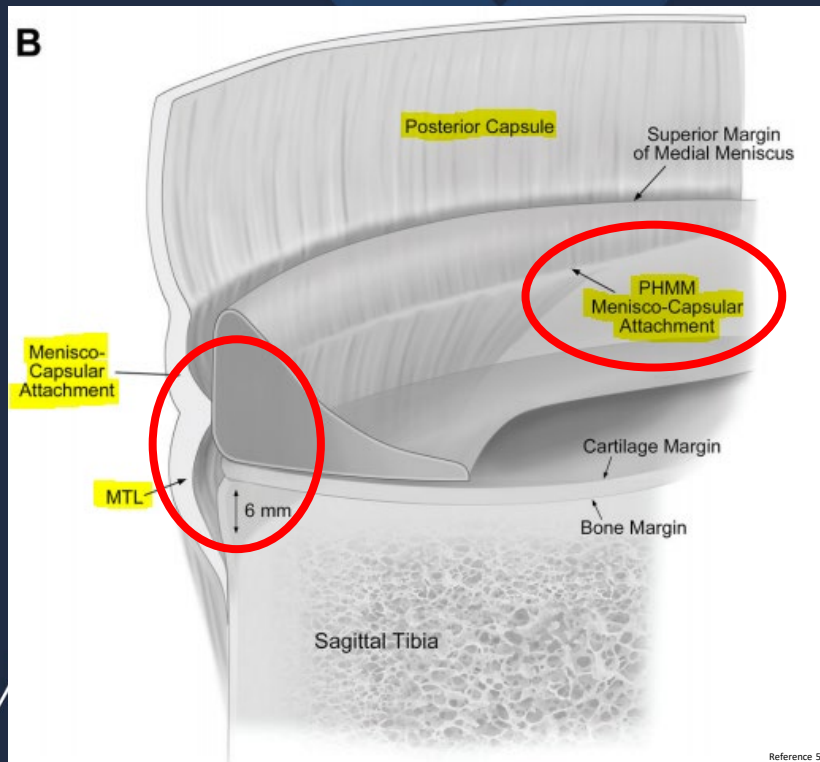
The American Journal of Sports Medicine
2019;47(2):372–378



- 14 male cadaveric specimens:⁵
 - Oblique angle from the posterior tibia to its insertion on the posterior medial meniscus
 - Mean length from posterior horn to tibial insertion: **14.0 +/- 5.4mm**
 - Tibial attachment
 - **Converges with the attachment for the adjacent joint capsule³**
 - **5.9 +/- 1.3mm inferior** to the articular cartilage margin of the posterior medial tibial plateau
 - Meniscal attachment
 - Proximal to the inferior edge of the meniscus
 - The most lateral (posterior) point
 - **7.7mm medial** and **16.5mm posterior** to the center of the posterior medial **meniscal root attachment**

Attachments – Posterior Meniscocapsular Attachment

- Mean length for PHMM: 21.2 +/- 2.0mm (range 17.6-24.5mm)
- Mean length for posterior meniscocapsular attachment: 20.2 +/- 6.0mm
 - **essentially matches the length of the PHMM**
- Attaches inferiorly on the meniscus, below its superior margin (which remains free)
 - mean of 36.4% of the total meniscal height
- **converges with the meniscotibial ligament** at the most posterior point of the meniscocapsular junction
 - Seen in all 14 cadaveric specimens⁵



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 - mean of 36.4% of the total meniscal height
- converges with the meniscotibial ligament at the most posterior point of the meniscocapsular junction in all 14 cadaveric specimens

- **no histological differences** observed between the **meniscocapsular and meniscotibial attachments** at the PHMM
 - Similar structure, cell density, fiber directionality
 - ...and no qualitative difference in the collagen matrices

- Conclusion:
 - These 2 posterior meniscal attachments merge at a common attachment on the PHMM
 - Theorize that they **function as a single anatomic unit**⁵

Function

Meniscal Function

- Load transmission and distribution
- Joint lubrication
- Proprioception
- Cartilage nutrition
- Secondary stabilizer
 - The posterior horn of the medial meniscus acts as a **secondary restraint to anterior tibial translation**
 - helps stabilize the knee in chronically ACL-deficient knees³

Definition

Definition

- No consensus
 - Different anatomical locations proposed as the site of injury³
- Original description (1988)¹¹
 - a specific type of meniscal injury **associated with ACL rupture**
 - involves the peripheral attachment of the posterior horn of the medial meniscus
 - More specifically: a <2.5cm longitudinal tear at the meniscocapsular junction

MICHAEL J. STROBEL

Manual of ARTHROSCOPIC SURGERY



Definition

- More recent studies define ramp lesions as a tear in the peripheral attachment of the PHMM of either:

1. meniscocapsular junction/synovium

OR

2. meniscotibial attachment^{5,42}

Ramp Lesion



Reference 3

Figure 1. Schematic diagram of a left knee (disarticulated from the femur) demonstrating the **location** of a ramp lesion in the **posteromedial meniscocapsular junction** of the **medial meniscus**.

Incidence and Risk Factors

Incidence/Epidemiology

- Almost exclusively described in association with an ACL tear
- ~43% of ACL tears are associated with some kind of meniscal injury
 - 56% lateral meniscus
 - 44% medial meniscus
 - More common with chronic ACL deficiency³
- **Ramp lesions:**
 - ~40% of all medial meniscal tears associated with ACL tears
 - *Sonnery-Cottet et al*: 50/125 with medial meniscal pathology in consecutive series of 302 ACL reconstructions (~16% of all cases)²⁴

Incidence/Epidemiology

> J Bone Joint Surg Br. 2010 Feb;92(2):222-3. doi: 10.1302/0301-620X.92B2.22974.

Posteromedial meniscocapsular injury associated with rupture of the anterior cruciate ligament: a previously unrecognised association

S R Bollen¹

In a prospective assessment of 183 consecutive reconstructions of the anterior cruciate ligament this injury was observed in 17 cases, giving it an incidence of 9.3%

- ~43% of ACL tears
- 56% lateral meniscus
- 44% medial meniscus
- More common

Arthroscopic prevalence of ramp lesion in 868 patients with anterior cruciate ligament injury

Xin Liu¹, Hua Feng, Hui Zhang, Lei Hong, Xue Song Wang, Jin Zhang

Methods: From April 2002 to October 2007, 868 consecutive knees were diagnosed as having an anterior cruciate ligament injury and received arthroscopic surgery for anterior cruciate ligament reconstruction. All the patients had verified tears of the ramp area under arthroscopy.

Results: Among 868 knees that underwent surgery for anterior cruciate ligament reconstruction, 144 knees were diagnosed as having a ramp lesion. The mean age was 24.7 years; there were 113 male

The prevalence of ramp lesions was 16.6%

• Ramp lesions:

- ~40% of all medial meniscal tears
- Sonnery-Cottet et al: 50/125 with medial meniscus tears after ACL reconstructions (~16% of all cases)
- ~9-24% of all ACL tears^{3,5}

ation with an ACL tear

cal injury

> Knee Surg Sports Traumatol Arthrosc. 2018 Apr;26(4):1080-1085. doi: 10.1007/s00167-017-4598-3. Epub 2017 Jun 21.

Ramp lesions associated with ACL injuries are more likely to be present in contact injuries and complete ACL tears

Romain Seil^{1,2}, Caroline Mouton^{3,4}, Julien Coquay⁵, Alexander Hoffmann³, Christian Nührenbörger³, Dietrich Pape^{3,4}, Daniel Theisen⁴

Methods: Two hundred and twenty-four patients undergoing a primary (n = 196) or revision (n = 28) ACL reconstruction were included. The presence of a ramp lesion was determined by a systematic

Results: Fifty-three out of 224 patients had a ramp lesion (24%)

Risk Factors

- 868 ACL reconstructions¹³
- 16.6% with associated ramp lesions

1. Sex

- **Males:** 18.56% (113)
- Females: 11.97% (31); P=0.01

2. Age

- ↑ prevalence in those **<30** (P<0.01)

3. Chronicity

- ↑ risk as time from injury to surgery increased
 - (up to 24 months, then plateaued)

> Am J Sports Med. 2011 Apr;39(4):832-7. doi: 10.1177/0363546510388933. Epub 2011 Jan 10.

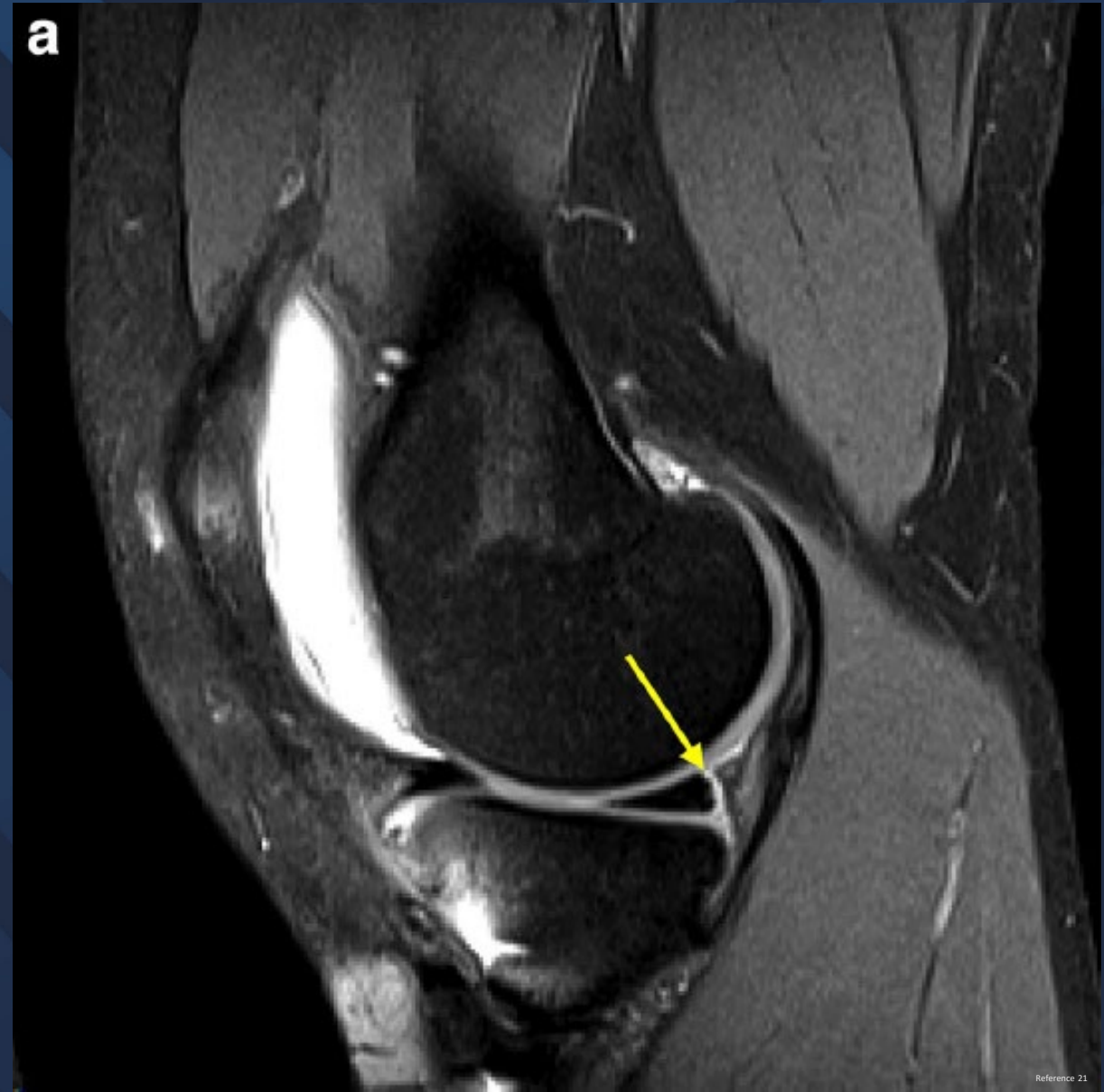
Arthroscopic prevalence of ramp lesion in 868 patients with anterior cruciate ligament injury

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Diagnosis

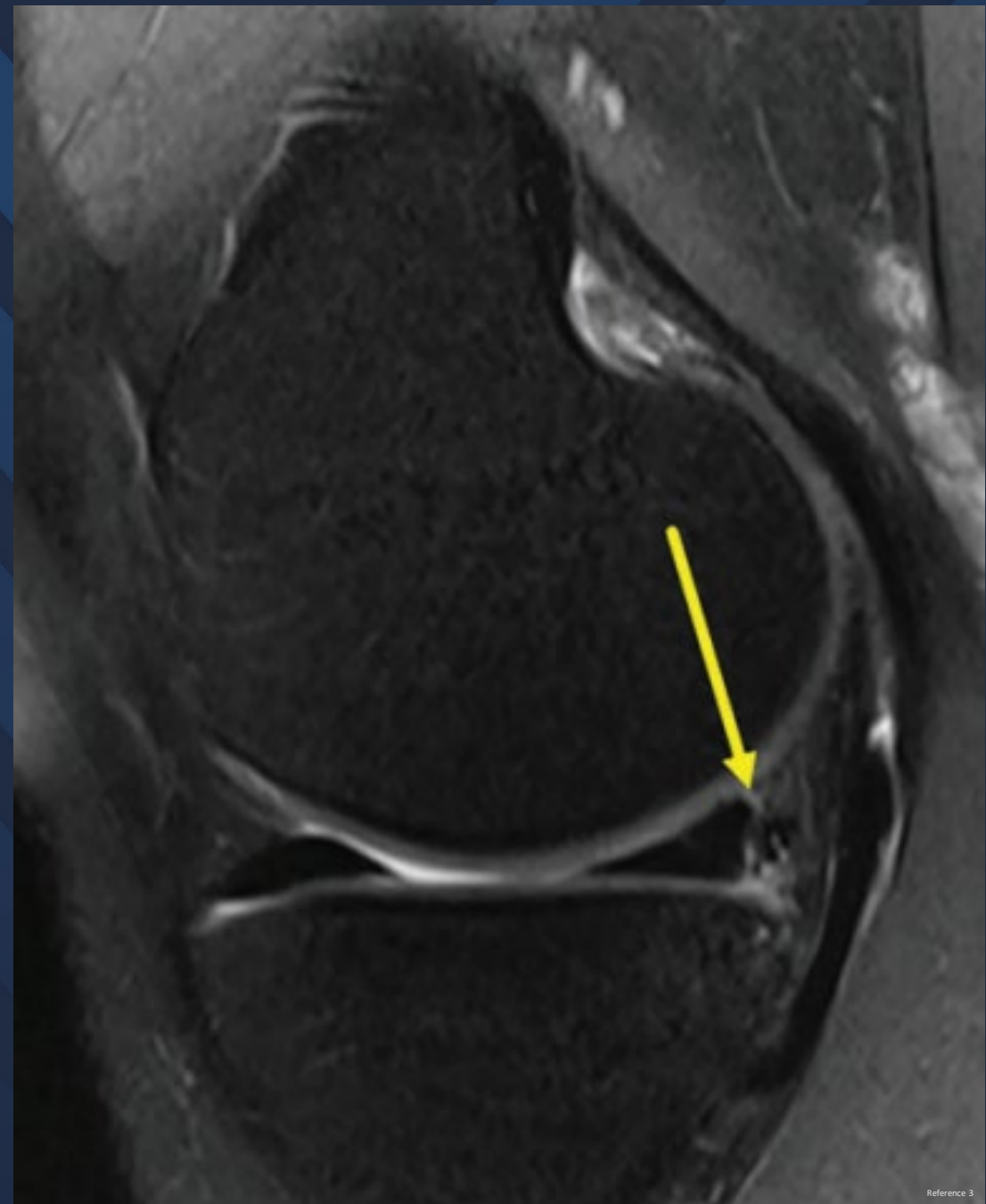
Diagnosis (Preoperative - MRI)

- Most specific finding:
 - **thin fluid line** seen between the posterior horn of the medial meniscus and the posteromedial capsule²⁰



Diagnosis (Preoperative - MRI)

- Most specific finding:
 - **thin fluid line** seen between the posterior horn of the medial meniscus and the posteromedial capsule²⁰
- T2 sagittal:
 - High signal irregularity of the capsular margin of the PHM²²



Diagnosis (Preoperative - MRI)

- However.....MRI is reported to have **low sensitivity** for detecting ramp lesions

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Posteromedial meniscocapsular injury associated with rupture of the anterior cruciate ligament: a previously unrecognised association

S R Bollen¹

previously been recognised as such. In a prospective assessment of **183 consecutive reconstructions** of the anterior cruciate ligament **this injury was observed in 17 cases**, giving it an incidence of 9.3%. Clinically, it was associated with a mild anteromedial rotatory subluxation and it is important not to confuse this with posterolateral rotatory subluxation. **In no case was this injury identified by MRI.** The

Diagnostic Performance of Magnetic Resonance Imaging for Detecting Meniscal Ramp Lesions in Patients With Anterior Cruciate Ligament Tears

CME

A Systematic Review and Meta-analysis

- 9 studies
- 833 patients with ACLR included
- Sensitivity: **71%**
- Specificity: **94%**

Boyeon Koo,* MD, Sun Hwa Lee,[†] MD, Seong Jong Yun,^{**§} MD, and Jae Gwang Song,^{||} MD
Investigation performed at G SAM Hospital, Gyeonggi-do, Republic of Korea

Diagnosis (Preoperative - MRI)

- However.....MRI is reported to have **low sensitivity** for detecting ramp lesions

MRI can accurately detect meniscal ramp lesions of the knee

Justin W. Arner¹ · Elmar Herbst¹ · Jeremy M. Burnham¹ · Ashish Soni¹ ·
Jan-Hendrik Naendrup¹ · Adam Popchak¹ · Freddie H. Fu¹ · Volker Musahl¹

Knee Surg Sports Traumatol Arthrosc (2017) 25:3955–3960

- **90 MRIs** in patients undergoing ACLR
 - 13 arthroscopically confirmed ramp lesions
 - 77 with “other meniscal pathology”
- **3 blinded reviewers** assessed MRIs x2 (2 months apart), specifically evaluating for ramp lesions

Table 1 Accuracy in identifying ramp lesions on MRI

		Sensitivity	95% CI	Specificity	95% CI	PPV	95% CI	NPV	95% CI	ICC	95% CI
Reviewer 1	First read	53.9	25–81	93.6	86–98	58.3	28–85	92.4	84–97	0.81	73–87
	Second read	46.0	19–75	92.3	84–97	50.0	21–79	91.1	83–96		
Reviewer 2	First read	69.2	39–91	98.7	93–100	90.0	56–100	95.1	88–99	0.75	65–83
	Second read	84.6	55–98	97.4	91–100	84.6	55–98	97.4	91–100		
Reviewer 3	First read	61.5	32–86	96.2	89–99	72.7	39–94	93.8	86–98	0.75	65–83
	Second read	53.9	25–81	93.6	86–98	58.3	28–85	92.4	84–97		

Diagnosis (Intraoperatively)

- Arthroscopic assessment
 - Historically underrecognized
 - Located in the posteromedial “blind spot” for standard anteromedial and anterolateral portals³

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Hidden lesions of the posterior horn of the medial meniscus: a systematic arthroscopic exploration of the concealed portion of the knee

Bertrand Sonnery-Cottet ¹, Jacopo Conteduca, Mathieu Thauvat, François Xavier Gunepin, Romain Seil

Am J Sports Med. 2014 Apr;42(4):921-6.

- 50 ramp lesions associated with ACL tears
 - **29 (58%)** visualized through a standard anterior portal
 - **21 (42%)** only seen with implementation of a posteromedial portal
 - Utilized for
 - Probing of the tear
 - Debridement of surrounding superficial soft tissue with a motorized shaver

Diagnosis (Intraoperatively)

- **Strategies for accurate arthroscopic diagnosis**

1. Implementation of a systematic arthroscopic exploration³
2. Gilchrist view²⁵
3. (modified) Gillquist maneuver^{26,27}
4. Use of an accessory posteromedial portal
 - To probe or visualize³
5. Probe the posterior horn of the medial meniscus
 - And possible debridement of superficial soft tissue/scar development with a shaver³
6. Implementation of a 70° arthroscope^{21,27}
 - When necessary for better visualization
 - (vs the standard 30° arthroscope used for the rest of the knee arthroscopy)

Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis

2. Gilchrist view²⁵

Identification and treatment of RAMP lesions in anterior cruciate ligament-injured knees

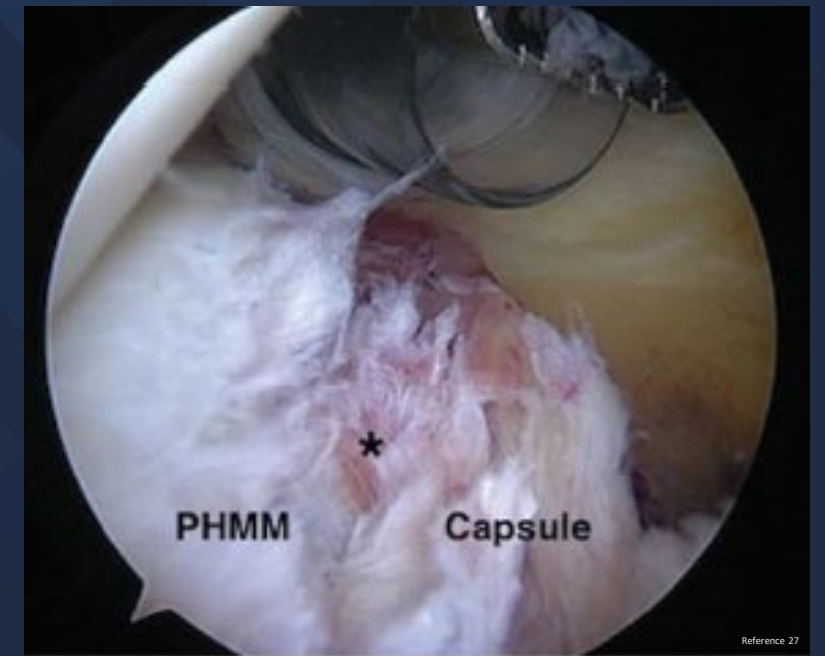
Thomas P. Pfeiffer, Conor I. Murphy, Justin W. Arner, Volker Musahl

Ann Joint 2017;2:17

- Arthroscope is inserted through the **anterolateral portal**
- Placed into the posteromedial compartment by pushing through the triangular space bordered by:
 - Superiorly: **PCL**
 - Medially: **femoral condyle**
 - Laterally: **tibial spine**
- This can be done under direct visualization



Figure 1 Gilchrist view through the anterolateral portal. The dashed line outlines the triangular space bordered by the PCL inferiorly, Femoral condyle medially, and the tibial spine laterally.



Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis

3. **modified Gillquist maneuver**^{26,27}

- **ORIGINAL** Gillquist maneuver
 - Arthroscope passed blindly through a portal in the patellar tendon
 - Push into the posterior compartment, still positioning the scope between the PCL and medial femoral condyle
 - Notchplasty sometimes required
 - **Reports of broken cameras and other damaged equipment**

Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis

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A Review of the Gillquist Maneuver: Modifications for a Safer and Easily Reproducible Approach for Knee Transintercondylar Notch Posterior Compartment Arthroscopy

Jia Ying Lee, M.B.B.S., M.R.C.S.,
Zi Yang Chia, M.B.B.S., M.R.C.S., M.Med., F.R.C.S., F.A.M.S., Lei Jiang, M.B.B.S., M.R.C.S.,
Benjamin Ang, M.B.B.S., M.R.C.S., M.Med., F.R.C.S., F.A.M.S., and
Paul Chang, M.B.B.S., F.R.C.S. (Edin.), F.A.M.S.



Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis

3. modified Gillquist maneuver^{26,27}

- **My preferred technique...**
 1. Remove the scope

Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis

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- **My preferred technique...**

1. Remove the scope
2. **Pass the blunt tip trocar/sheath through the anterolateral portal, and over into the medial compartment**

Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis

3. modified Gillquist maneuver^{26,27}

- **My preferred technique...**

1. Remove the scope
2. Pass the blunt tip trocar/sheath through the anterolateral portal, and over into the medial compartment
3. **Sweep across into the intercondylar notch**
 - Feel resistance from the PCL/tibial spine

Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis

3. modified Gillquist maneuver^{26,27}

- **My preferred technique...**

1. Remove the scope
2. Pass the blunt tip trocar/sheath through the anterolateral portal, and over into the medial compartment
3. Sweep across into the intercondylar notch
 - Feel resistance from the PCL/tibial spine
4. **Gently push the trocar through to the posteromedial compartment**

Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis

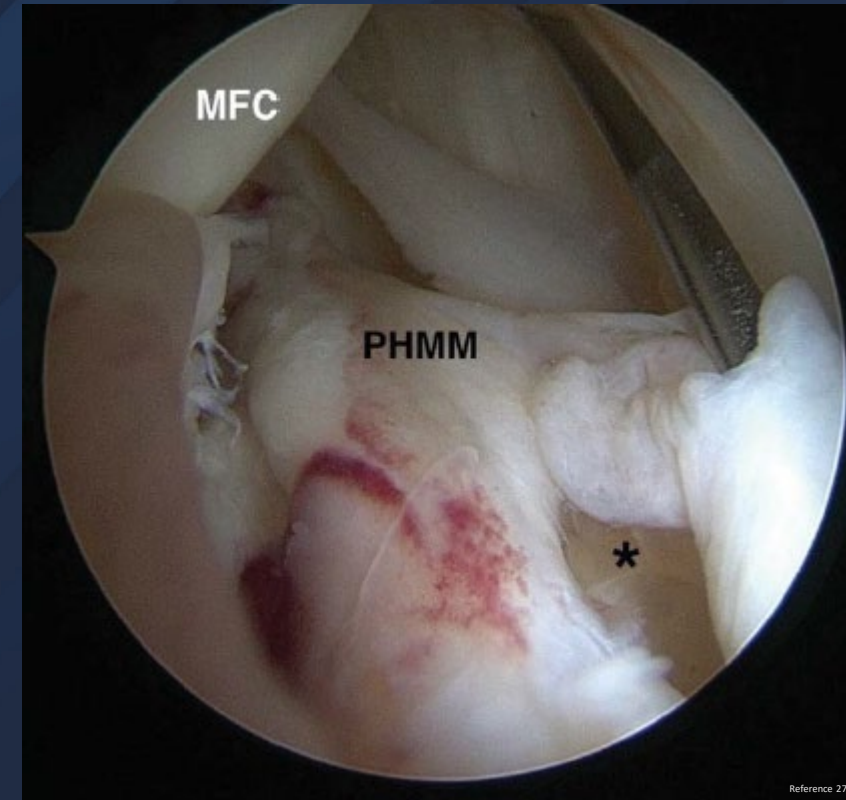
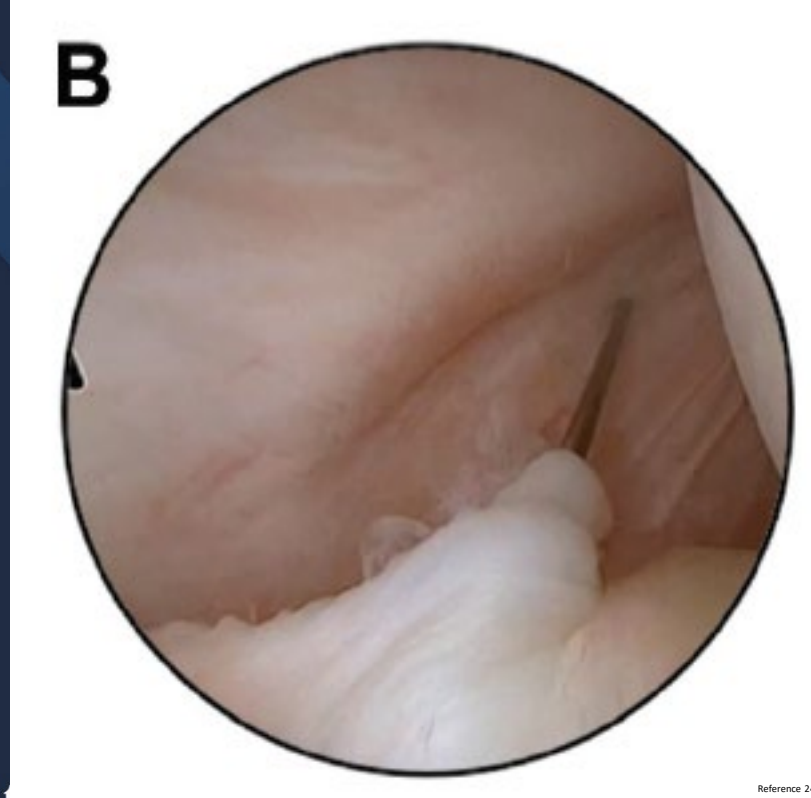
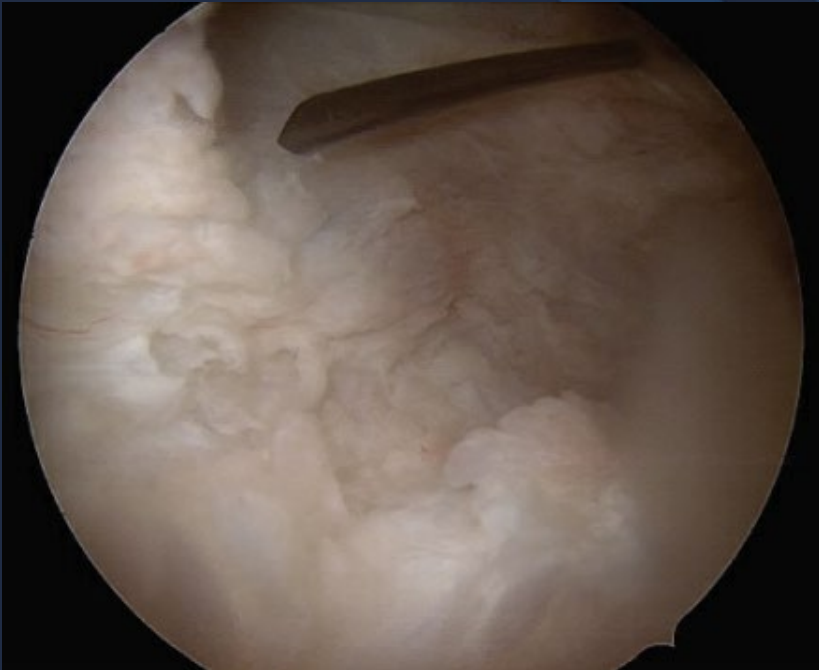
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3. Sweep across into the intercondylar notch
 - Feel resistance from the PCL/tibial spine
4. Gently push the trocar through to the posteromedial compartment
5. **Remove the trocar (leaving the sheath in place), and put the camera back in**

Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis
 4. Use of an accessory posteromedial (“Metcalf”) portal^{3,27}
 - To probe, debride, or to visualize



Diagnosis (Intraoperatively)

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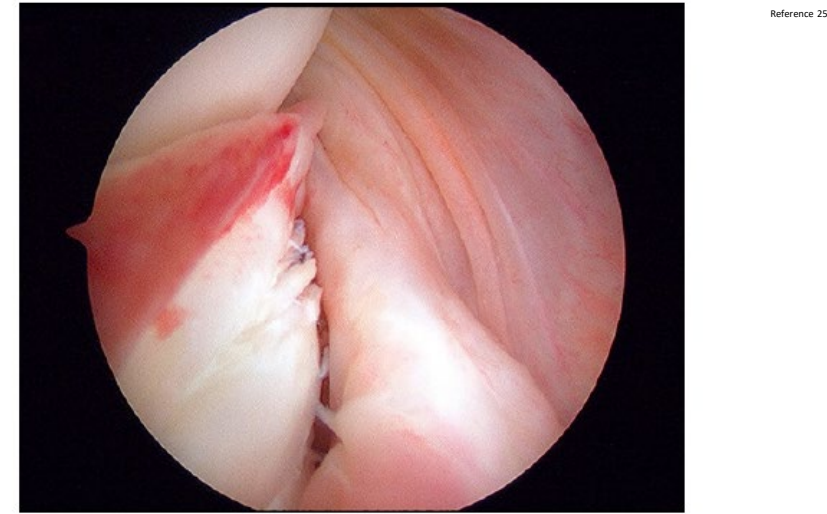
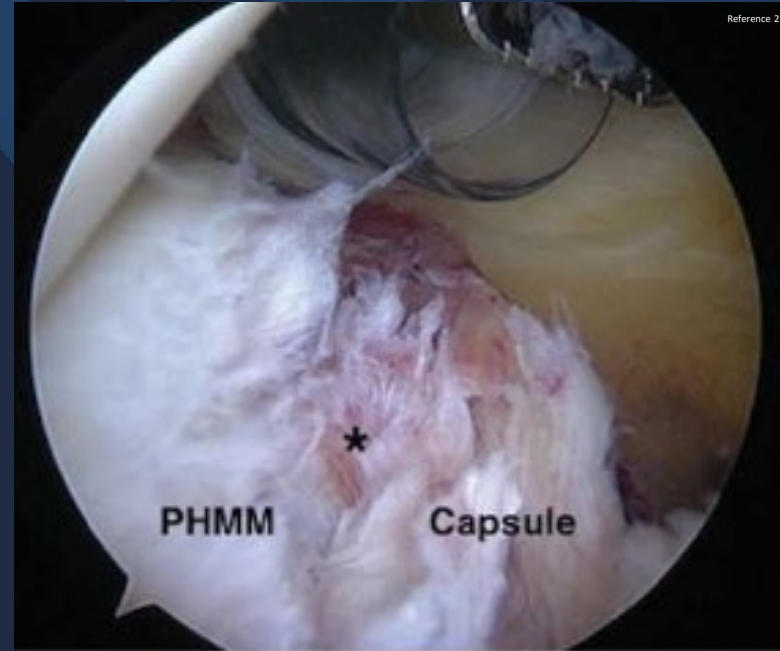
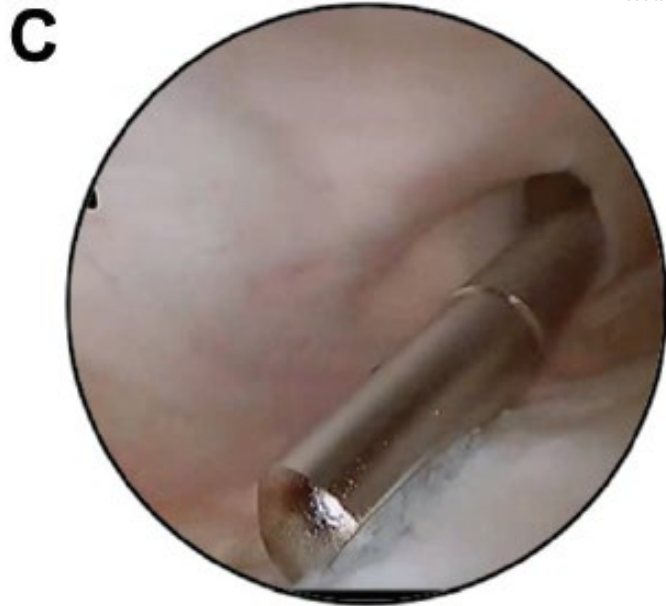


Figure 2 Meniscocapsular separation (meniscal ramp lesion) visualized during knee arthroscopy via the posteromedial portal.

- Established ~1cm proximal to the joint line, posterior to the MCL⁴⁰

Diagnosis (Intraoperatively)

- Strategies for accurate arthroscopic diagnosis

- 5. Probe the posterior horn of the medial meniscus³

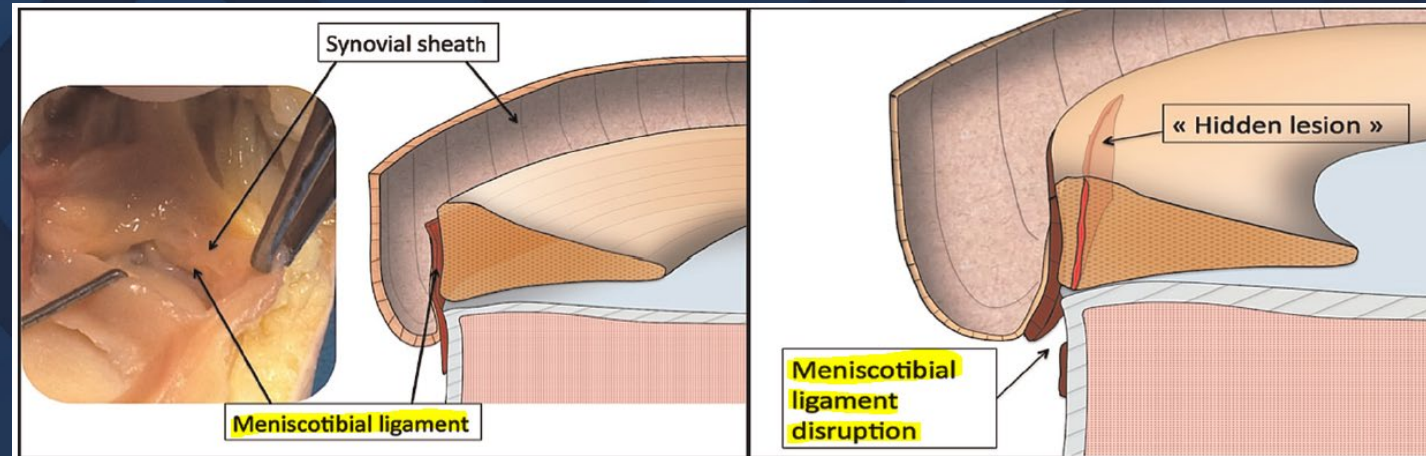
- And possible debridement of superficial soft tissue/scar development with a shaver

Hidden Lesions of the Posterior Horn of the Medial Meniscus

A Systematic Arthroscopic Exploration of the Concealed Portion of the Knee

Bertrand Sonnery-Cottet,^{*†} MD, Jacopo Conteduca,[†] MD, Mathieu Thauvat,[†] MD, François Xavier Gunepin,[‡] MD, and Romain Seil,^{§||} MD, PhD
Investigation performed at the Centre Orthopédique Santy and Hôpital Privé Jean Mermoz, Lyon, France

The American Journal of Sports Medicine, Vol. 42, No. 4



One can hypothesize that hidden lesions represent an injury to the meniscotibial ligament (Figure 4), which may be suspected but not confirmed from an anterior portal by visualization. Viewing the posteromedial structures and additional probing of the meniscosynovial region through a posteromedial compartment can help in assessing the integrity of this transitional zone and the amount

of proximal extension of the lesion in the meniscus. Without this thorough inspection and palpation, these lesions would otherwise easily remain undiagnosed and may progress over time.¹⁹

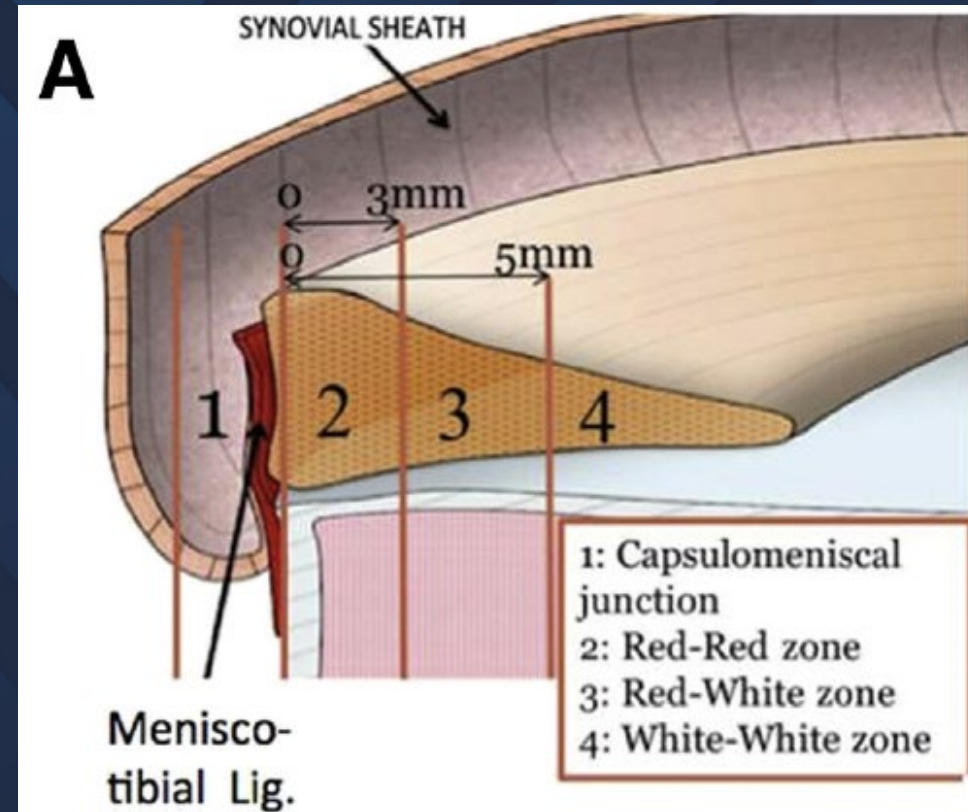
Diagnosis: Proposed Classification System²⁸

- **Type 1:** meniscocapsular lesions
 - Located very peripherally in the synovial sheath
 - Very low mobility with probing
- **Type 2:** partial superior lesions
 - Stable (low mobility at probing)
 - can therefore only be diagnosed by a trans-notch approach
- **Type 3:** partial inferior or hidden lesions
 - Not visible with a trans-notch approach
 - But can be strongly suspected from significant mobility with probing
- **Type 4:** complete tear in the red-red zone
 - Very high mobility with probing
- **Type 5:** double tear

Classification and Surgical Repair of Ramp Lesions of the Medial Meniscus

Mathieu Thaunat, M.D., Jean Marie Fayard, M.D., Tales M. Guimaraes, M.D., Nicolas Jan, M.D., Colin G. Murphy, M.D., and Bertrand Sonnery-Cottet, M.D.

Arthroscopy Techniques, Vol 5, No 4 (August), 2016: pp e871-e875



Diagnosis: Proposed Classification System

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- **Type 3: partial inferior or hidden lesions**

- Not visible with a trans-notch approach
- But can be strongly suspected from significant mobility with probing

- **Type 4: complete tear in the red-red zone**

- Very high mobility with probing

- **Type 5: double tear**

- **But.....**

- **May not be practical⁵**

- **May not dictate any change in treatment**

1. No reported differences in knee kinematics between meniscapular- and meniscotibial-based tears
2. Either type may create further instability to anterior tibial translation and knee rotation²⁹

Diagnosis: Proposed Classification System

- **Type 1:** meniscocapsular lesions
 - **STABLE**
- **Type 2:** partial superior lesions
 - **STABLE**
- **Type 3:** partial inferior or hidden lesions
 - **UNSTABLE**
- **Type 4:** complete tear in the red-red zone
 - **UNSTABLE**
- **Type 5:** double tear
 - **UNSTABLE**

i.e. does the meniscus **displace anteriorly** into the medial compartment **with probing**³⁰

Treatment

Treatment

- **No clear consensus³....**
- **Advocates for:**
 1. Nonoperative management
 2. Operative fixation
 - All-inside meniscal repair
vs
 - Inside-out meniscal repair

- Arguments for **Nonoperative Management**

1. Stable tear pattern^{3,5,28}
 - At least true for some variants

- Arguments for **Nonoperative Management**

1. Stable tear pattern^{3,5,28}
 - At least true for some variants
2. Located in a highly vascular zone⁵
 - Including both the capsule and red-red zone of the meniscus

- Arguments for **Nonoperative Management**

1. Stable tear pattern^{3,5,28}

- At least true for some variants

2. Located in a highly vascular zone

- Including both the capsule and red-red zone of the meniscus

3. Favorable biologic environment to heal³

- Especially in the setting of acute ACL reconstruction
- Successful management of other meniscal tear patterns without repair at time of ACLR^{31,32}

Treatment

• Arguments for Nonoperative Management

Non-treatment of stable ramp lesions does not degrade clinical outcomes in the setting of primary ACL reconstruction

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- Retrospective review
- 36: untreated stable ramps
- 67: no meniscal pathology
- Median follow up 2-years (range 1-5)
 - **No difference in reoperation rate**

Table 3 Reoperation for recurrent medial meniscus pathology and ACL re-rupture by group

	No MM tear	Stable ramp— untreated	Unstable ramp—partial meniscectomy	Unstable ramp— repaired
Reoperation for ACL re-rupture				
Yes	1 (1%)	2 (6%)	0 (0%)	2 (9%)
No	66 (99%)	34 (94%)	8 (100%)	21 (92%)
Reoperation for medial menis- cus tear				
Yes	1 (1%)	1 (3%)	1 (13%)	5 (22%)
No	66 (99%)	35 (97%)	7 (87%)	18 (78%)

Treatment

• Arguments for “Nonoperative” Management

Is It Necessary to Repair Stable Ramp Lesions of the Medial Meniscus During Anterior Cruciate Ligament Reconstruction?

A Prospective Randomized Controlled Trial

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- **73** cases with ACL tear + **stable** ramp lesion
 - Control group: **33** (abrasion and trephination)
 - Repair group: **40** (all-inside repair technique)
- Minimum follow-up: 2 years

1. No difference in patient reported outcomes:

- Lysholm score (P = 0.528)
- IKDC scores (P = 0.594)

2. No difference in objective stability measurements:

- Pivot-shift (P = 0.658)
- Lachman (P = 0.525)
- KT-1000 arthrometer side-to-side difference (P = 0.853)
- KT arthrometer grading (P = 0.738)

3. No difference in ramp healing rates

- Based on follow-up MRI (P = 0.543)
 - Control group: 29 fully healed, 2 partially healed, 2 nonhealed
 - Repair group: 38 fully healed, 1 partially healed, 1 nonhealed

- **Arguments for Operative Fixation**

1. Unstable tear patterns³⁴

- No studies proving that unstable peripheral tears to the PHMM will heal by stabilizing the injured ACL alone
 - Some studies report **higher failure rates** with **unrepaired (unstable) lesions**⁴¹
- Given the important function of the meniscus, priority should therefore be given to explore all possible means of repair
- Additionally, anatomic meniscal reduction/repair is thought to provide additional stability after ACL reconstruction and help support the graft

Treatment

• Arguments for Operative Fixation

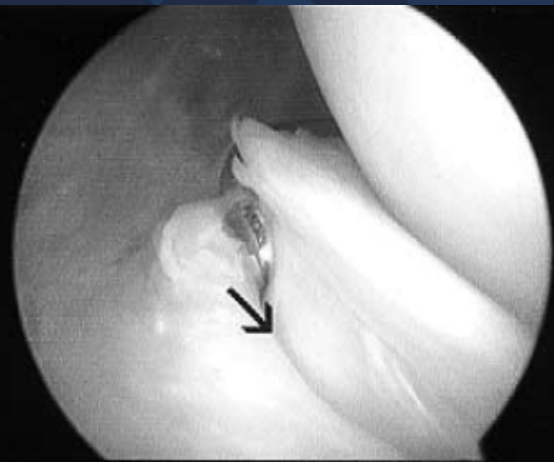
1. Unstable tear patterns

2. Hypermobility with knee range of motion

- movement with flexion and extension thought to be unlike that seen with other types of peripheral meniscal tears
- Hypothesized that this dynamic instability would not allow for healing³



Extension



Flexion



Extension



Flexion

- **Arguments for Operative Fixation**

1. Unstable tear patterns
2. Hypermobility with knee range of motion
3. Chronic ACL deficiency
 - Knee capsular tissue becomes attenuated
 - Repair allows for plication to restore appropriate tension²⁵

- **Arguments for Operative Fixation**

1. Unstable tear patterns
2. Hypermobility with knee range of motion
3. Chronic ACL deficiency
 - Knee capsular tissue becomes attenuated
 - Repair allows for plication to restore appropriate tension²⁵
4. Repair may more reliably restore rotational stability
 - At least in cadaveric biomechanical study comparing intact meniscus vs ramp vs repaired ramp in ACL deficient knee

• Arguments for Operative Fixation

Posteromedial Meniscocapsular Lesions Increase Tibiofemoral Joint Laxity With Anterior Cruciate Ligament Deficiency, and Their Repair Reduces Laxity

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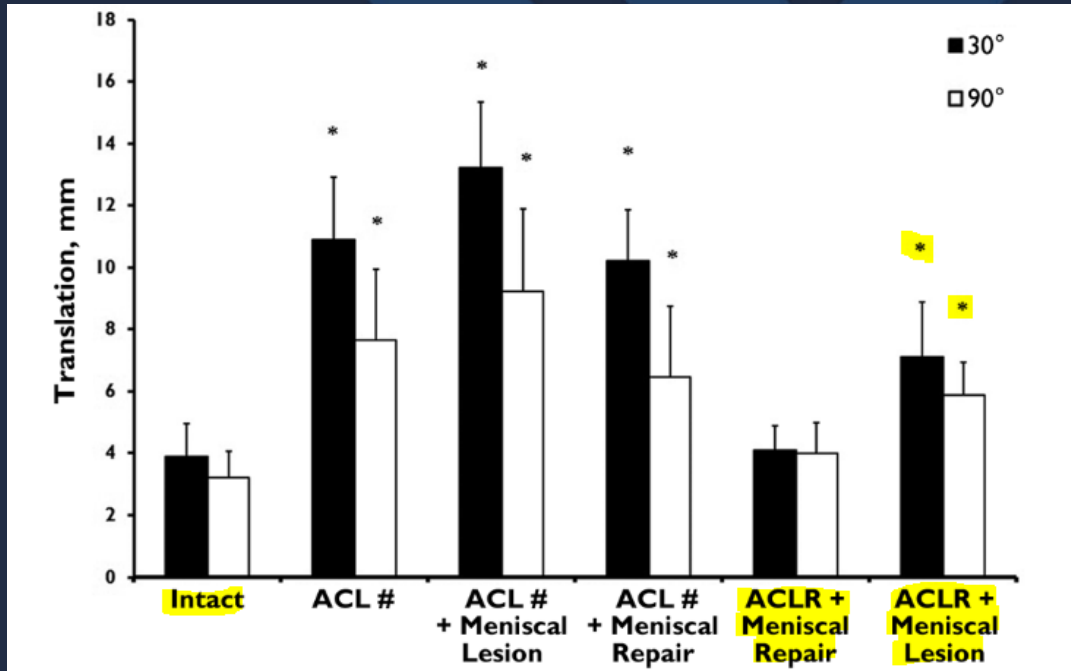
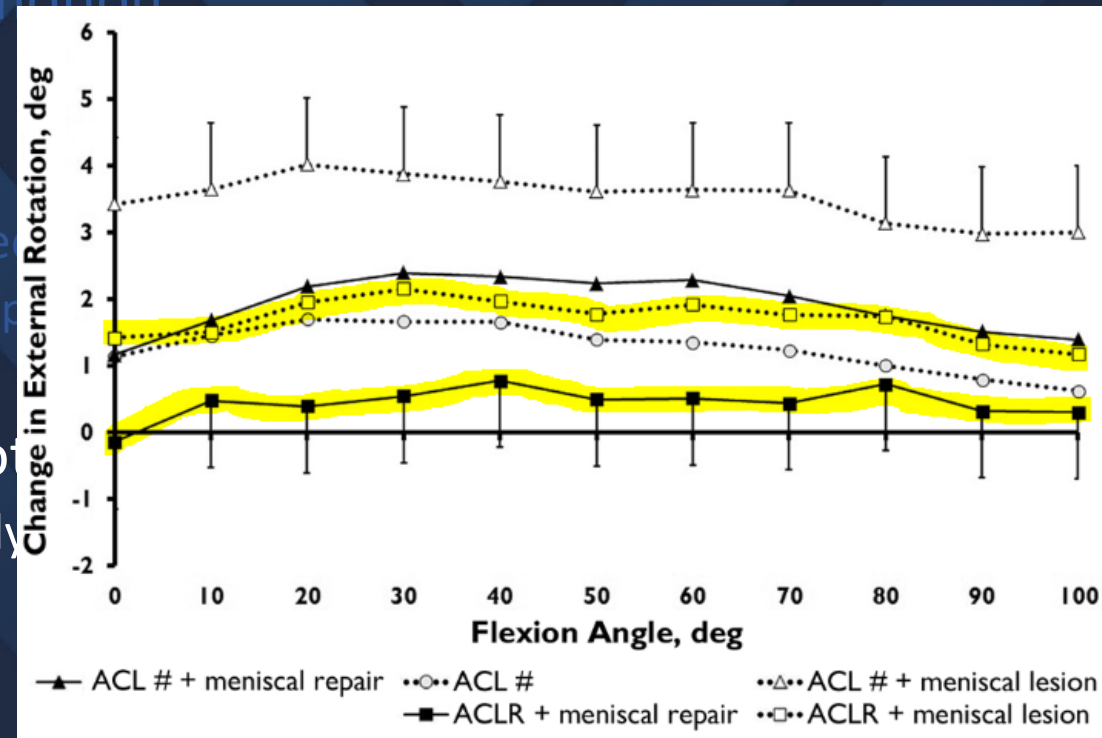


Figure 8. Rolimeter readings for anterior translation of the tibia (mean values \pm SD; n = 9). * $P < .05$ vs the intact laxity at each knee flexion angle. ACL, anterior cruciate ligament; ACLR, ACL reconstructed; #, transected.



Conclusions: What do I do in 2026?

• Diagnosis:

- Probe the medial meniscus for instability and anterior displacement through the anteromedial portal
- Employ modified Gillquist technique with every ACL tear to evaluate the posteromedial compartment
- Consider probing the meniscocapsular junction through a percutaneous posteromedial portal

• Treatment

- No intervention for stable lesions
 - Prefer not to debride and risk turning a stable, potentially healing lesion into an unstable one
- Repair unstable variants
 - Generally utilize an all-inside technique from the anteromedial portal
 - Reproducible technique that is not technically challenging or time consuming vs other repair techniques
 - Anatomic/histologic evidence suggests the meniscotibial and meniscocapsular attachments act as a single unit, with no qualitative differences in structure
 - Limited studies comparing repair techniques that might change this approach

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