



Knee Exam

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Goals

1. Describe the organization of a knee-centered physical exam
2. Demonstrate specific knee injury physical exam maneuvers
3. Comprehend standard method for communicating findings

History

- Mechanism of Injury
 - Position of extremity
 - Applied force
- Pain
- Ability to ambulate
 - Immediately following
 - Hours later or After game
- Prior Injury History

Physical Exam of the Knee

- Look
- Feel: Palpate anatomy
- Move: Special tests

Generalized Hypermobility, Knee Hyperextension, and Outcomes After Anterior Cruciate Ligament Reconstruction: Prospective, Case-Control Study With Mean 6 Years Follow-up

Christopher M. Larson, M.D., Asheesh Bedi, M.D., Mark E. Dietrich, M.D., Jennifer C. Swaringen, M.D., Corey A. Wulf, M.D., David M. Rowley, M.D., and M. Russell Giveans, Ph.D.

- $\geq 5^\circ$ hyperextension in 22% of ACL tears
- Graft failure after reconstruction
 - Hypermobile: 24.4% failure
 - Not hypermobile: 7.7% failure
- 5th MCP extension $> 90^\circ$ predictive of failure
 - Beighton Score



Pull little finger back beyond 90°
(One point for each side)



Pull thumb back to touch forearm
(One point for each side)



Bend elbow backwards beyond 10°
(One point for each side)



Bend knee backwards beyond 10°
(One point for each side)



Lie hands on the floor while keeping knees straight and bending forward at waist

Look

- Stance, posture
- Gait
- Alignment
- Limb Length
- Bruising

Feel

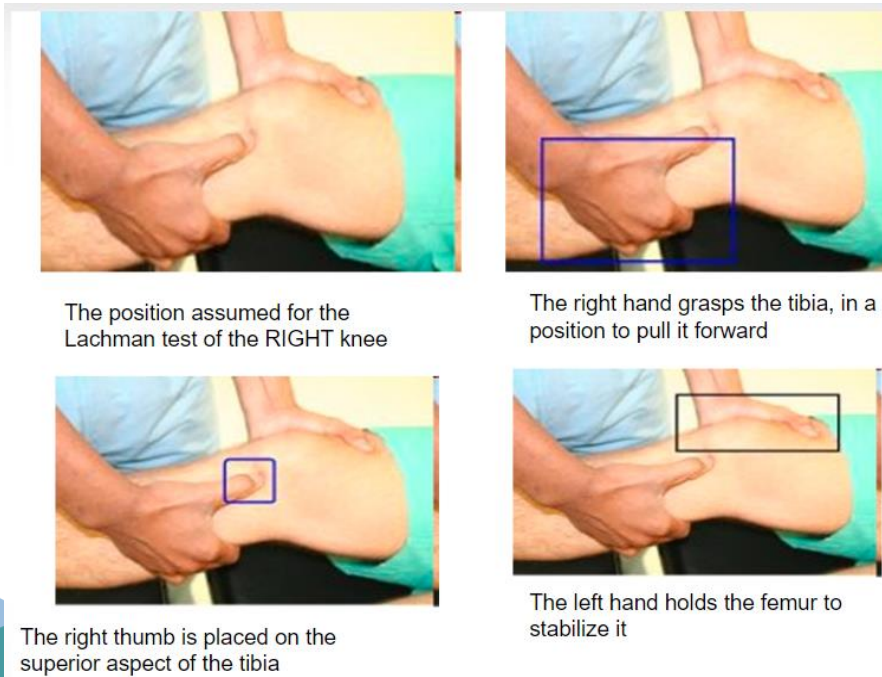
- Neurovascular exam
- Quad tone
- Effusion
- Tenderness to palpation
 - Extensor mechanism/Patellofemoral: (Plicae, Translation, Apprehension)
 - Medial structures: MCL, pes bursa, joint line
 - Lateral structures: LCL (FCL), joint line
 - Posterior structures: Baker's cyst, hamstrings, gastroc

Move

- ROM
- Lachman
- Varus/Valgus
- Anterior Drawer, Posterior Drawer
- McMurray
- Pivot Shift, Reverse Pivot Shift
- External Rotation-Recurvatum, External Rotation-Drawer
- Dial test

Physical Exam Maneuvers: Lachman

Test	Instability Pattern	Injury Pattern
Lachman (20°-30° flexion) <ul style="list-style-type: none"> ➤ < 20°F: PCL ➤ >45°F: collateral ligaments 	<ul style="list-style-type: none"> • Non-specific for rotatory 	ACL (> 95% specific)



Translation Grade	Operational Definition
I	< 5 mm translation
II	5 – 10 mm translation
III	> 10 mm translation
Endpoint Grade	Operational Definition
A	Firm, sudden endpoint to passive anterior translation of tibia on a fixed femur
B	Absent, ill-defined, or softened endpoint to passive anterior translation of tibia on a fixed femur

Physical Exam Maneuvers

Test	Instability Pattern	Injury Pattern
Valgus 30°F	<ul style="list-style-type: none"> • Non-specific • Rotational suggests ACL 	sMCL, dMCL, POL
Valgus 0°F	<ul style="list-style-type: none"> • Straight-medial 	PCL, sMCL, dMCL, POL, ACL ±
Varus 30°F	<ul style="list-style-type: none"> • Non-specific • Rotational suggests ACL 	ALL, FCL, PLC, ACL ±
Varus 0°F	<ul style="list-style-type: none"> • Straight-lateral 	PCL, FCL, ALL, IT band, ACL ±

Hughston Modification of the AMA Classification

Grade 1	Few fibers disrupted Associated pain	No laxity
Grade 2	More fibers disrupted With more generalized pain	No laxity
Grade 3	Complete disruption	Laxity +1 3-5mm +2 6-10mm +3 more than 10mm

Physical Exam Maneuvers

Test	Instability Pattern	Injury Pattern
Anterior Drawer (90°F)		
• Neutral Rotation	Anterolateral rotatory	PLC, ALL, FCL, ITB, ACL±
• External Rotation	Anteromedial rotatory	sMCL, dMCL, POL, ACL±
• Internal Rotation	Straight-anterior	ACL, PCL, ALL, FCL

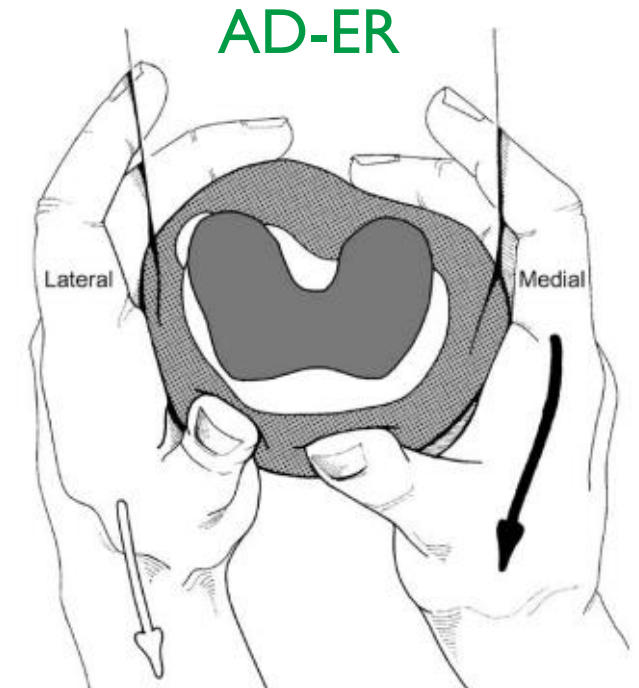
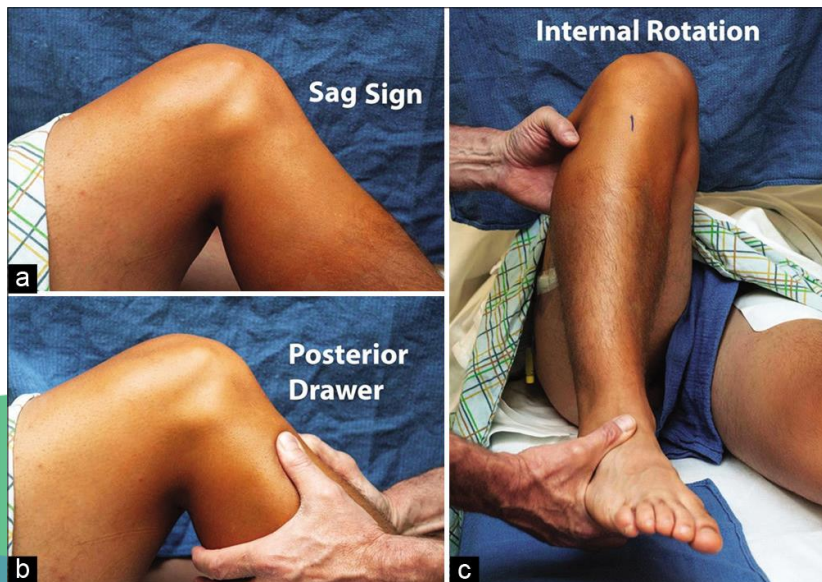


FIGURE 8. Anterior drawer test in external rotation is performed at 90 degrees of knee flexion. With anterior pull of the tibia (white and black arrows), the medial compartment may subluxate anteriorly (black arrow demonstrates rotation of the tibia in relation to the femur). (Reprinted with permission from Hughston JC. *Knee Ligaments: Injury and Repair*. Columbus, GA: The Hughston Sports Medicine Foundation; 2003.)

Physical Exam Maneuvers

Test	Instability Pattern	Injury Pattern
Posterior Drawer (90°F)		
• Neutral Rotation	Straight-posterior	PCL, ACL ±
• External Rotation	Posterolateral rotatory	ALL, FCL, PFL, popliteus, (PLC), PCL
• Internal Rotation	Straight-posterior	POL, PCL, ACL ±



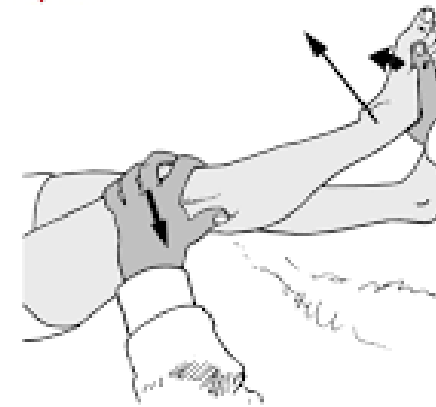
Physical Exam Maneuvers

Test	Injury Pattern
McMurray	
<ul style="list-style-type: none">External Rotation, Medial Compression	Medial Meniscus (Paradoxically lateral)
<ul style="list-style-type: none">Internal Rotation, Lateral Compression	Lateral Meniscus (Paradoxically medial)

Medial McMurray Test



Lateral McMurray Test

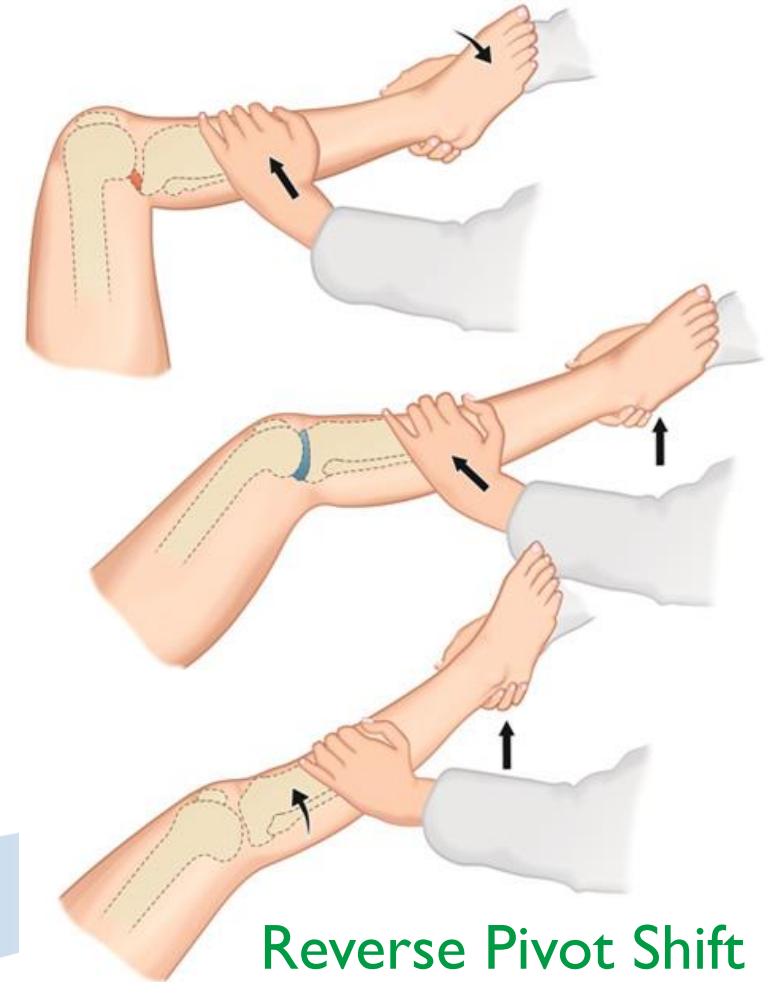
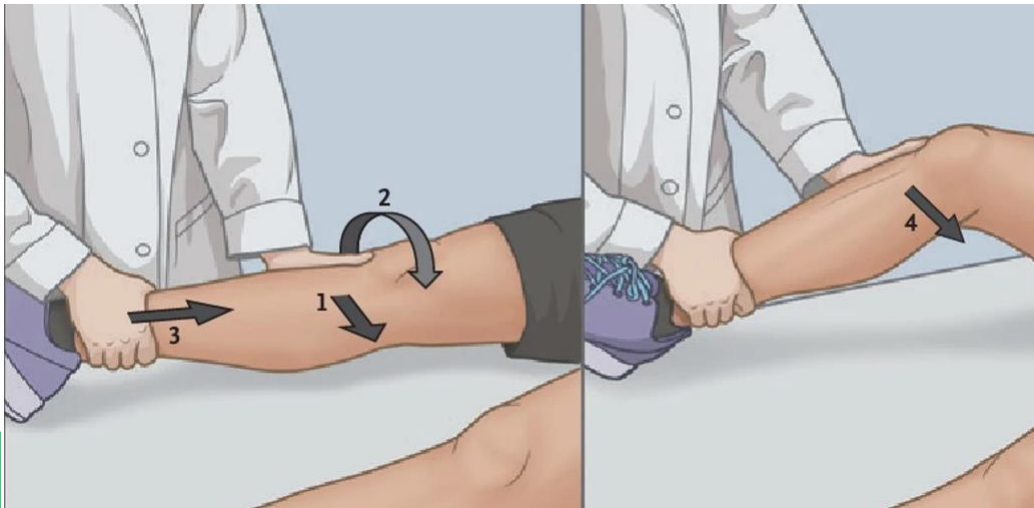


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Physical Exam Maneuvers

Test	Instability Pattern	Injury Pattern
Pivot shift	<ul style="list-style-type: none"> • Anterolateral rotatory 	Deep IT Band (Kaplan), ALL, ACL
Reverse Pivot shift	<ul style="list-style-type: none"> • Posterolateral rotatory 	(PLC): FCL, PFL, Popliteus ACL±, PCL ±

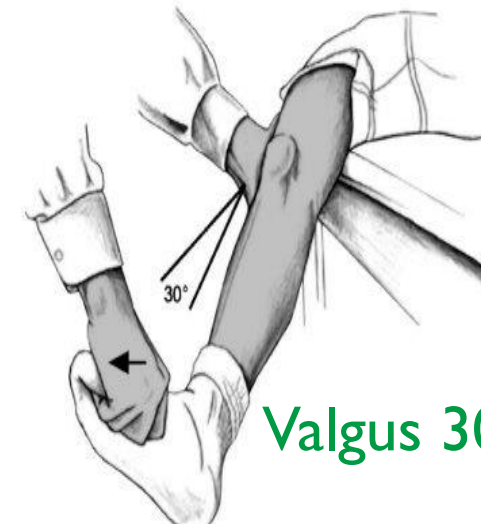
Pivot Shift



Reverse Pivot Shift

Physical Exam Maneuvers

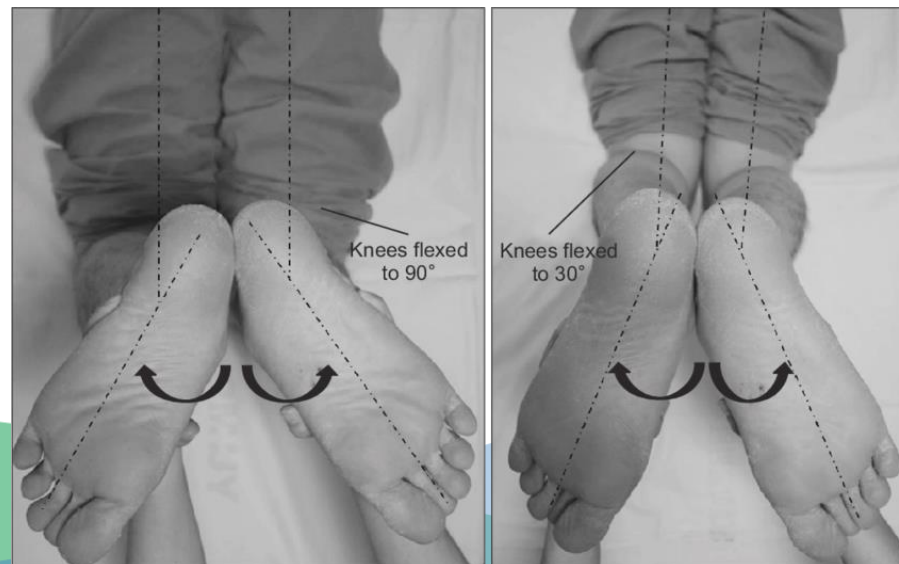
Test	Instability Pattern	Injury Pattern
External Rotation-Recurvatum	<ul style="list-style-type: none"> Posterolateral rotatory 	FCL, PFL, Popliteus (PLC)
Valgus 30° stress in ER	<ul style="list-style-type: none"> Anteromedial rotatory 	POL, SM, medial capsule (PMC)



Valgus 30° Stress in ER

Physical Exam Maneuvers

Test	Instability Pattern	Injury Pattern
Dial External Rotation		
<ul style="list-style-type: none"> • 30°F 	<ul style="list-style-type: none"> • Posterolateral rotatory 	(PLC): FCL, PFL, Popliteus ALL?
<ul style="list-style-type: none"> • 90°F 	<ul style="list-style-type: none"> • Posterolateral rotatory • Straight-posterior 	PCL + (PLC): FCL, PFL, Popliteus, ALL



Key Take-Aways

1. Look, Feel, Move
2. A systematic approach is critical for reproducibility
3. Flexion and rotation make maneuvers pattern specific



Thank you