

**American College of Physicians - Internal Medicine Meeting 2024  
Boston, MA**

**Diagnosis-Driven Physical Examination of the Knee**

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## The Diagnosis-Driven Physical Exam of the Knee Checklist

Maneuver	Notes
<b>Inspection</b>	
<ul style="list-style-type: none"> <li>• Abnormal gait</li> </ul>	
<ul style="list-style-type: none"> <li>• Alignment deformity (varus, valgus, neutral)</li> </ul>	
<ul style="list-style-type: none"> <li>• Bony abnormalities</li> </ul>	
<ul style="list-style-type: none"> <li>• Quad atrophy</li> </ul>	
<ul style="list-style-type: none"> <li>• Erythema</li> </ul>	
<b>Palpation – Knee extended</b>	
<ul style="list-style-type: none"> <li>• Effusion</li> </ul>	
<ul style="list-style-type: none"> <li>• Quad tendon</li> </ul>	
<ul style="list-style-type: none"> <li>• Patellar tendon</li> </ul>	
<ul style="list-style-type: none"> <li>• Tibial tubercle</li> </ul>	
<ul style="list-style-type: none"> <li>• Patellar facet</li> </ul>	
<ul style="list-style-type: none"> <li>• Patellar grind (Quad apprehension) test</li> </ul>	
<b>ROM</b>	
<ul style="list-style-type: none"> <li>• 0 - 135 degrees</li> </ul>	
<ul style="list-style-type: none"> <li>• crepitus</li> </ul>	
<b>Palpation – Knee flexed at 90 degrees</b>	
<ul style="list-style-type: none"> <li>• Medial joint line tenderness</li> </ul>	
<ul style="list-style-type: none"> <li>• Medial collateral ligament (MCL)</li> </ul>	
<ul style="list-style-type: none"> <li>• Pes anserine bursa</li> </ul>	
<ul style="list-style-type: none"> <li>• Lateral joint line</li> </ul>	
<ul style="list-style-type: none"> <li>• Lateral collateral ligament (LCL)</li> </ul>	
<ul style="list-style-type: none"> <li>• Iliotibial band - Noble Compression test</li> </ul>	
<b>Provocative testing</b>	
<ul style="list-style-type: none"> <li>• Anterior drawer (ACL at 90)</li> </ul>	
<ul style="list-style-type: none"> <li>• Posterior drawer (PCL at 90)</li> </ul>	
<ul style="list-style-type: none"> <li>• Lachman's test (ACL at 30)</li> </ul>	
<ul style="list-style-type: none"> <li>• Valgus stress (MCL)</li> </ul>	
<ul style="list-style-type: none"> <li>• Varus stress (LCL)</li> </ul>	
<ul style="list-style-type: none"> <li>• McMurray (medial and lateral compression)</li> </ul>	
<ul style="list-style-type: none"> <li>• **Thessaly test</li> </ul>	
<ul style="list-style-type: none"> <li>• **Squat test</li> </ul>	

\*\* Tests performed if you suspect meniscal pathology and patient doesn't have significant OA which would cause pain with weight bearing maneuvers

## Description of Tests

### Inspection

Varus deformity: bowlegged. Valgus deformity: knocked knees.

Quad atrophy: decreased bulk of quad muscle compared to contralateral side.

### Palpation – Knee extended

Effusion: Milk the fluid into the supra-patellar pouch and then compress down into the knee. Palpate the sides of the knee for a fluid wave. With a large effusion you can ballot the patella up and down by pressing on it.

Patellar and Quadriceps tendon: Palpate the superior and inferior pole of the patellar where the quadriceps and patellar tendons attach.

Patellar facet tenderness: palpate the medial and lateral facets of the patella for tenderness.

Patellar grind: press down on the patella and have the patient tighten the quad muscle. Pain behind the knee cap is a positive grind test.

### Range of Motion

Range of Motion: Have the patient extend their knee fully and then bend as much as they can. Normal is approx 0-140.

Crepitus: Cracking or popping sensation felt over the patella with knee flexion/extension.

### Palpation – Knee flexed at 90 degrees

Medial joint line: palpate along the joint line from anterior all the way around to back of joint.

MCL: Palpate medial femoral condyles and medial tibial plateau.

Pes anserine bursa: palpate the medial aspect of the proximal tibia just below the medial joint space. This bursa protects from friction by the conjoined tendon (sartorius, gracilis, and semitendinosus tendons).

Lateral joint line: palpate along the joint line from anterior all the way around to back of joint.

LCL: Palpate lateral femoral condyles and lateral tibial plateau.

IT Band: Palpate ITB at lateral femoral condyle (Noble Compression test) and Gerdy's tubercle (lateral proximal tibia) while flexing/extending the knee.

### Provocative Tests

Anterior drawer test for ACL (not as sensitive or specific as the Lachman): place the knee flexed to 90 degrees and foot resting on the table. With thumbs resting over the joint line, apply an anterior force fingers behind proximal tibia. Assess for anterior displacement.

Posterior drawer test for PCL: place the knee flexed to 90 degrees and foot resting on the table. With thumbs resting over the joint line, apply a posterior force with palms on the proximal tibia. Assess for posterior displacement.

Lachman's test for ACL: Patient must be relaxed. Flex the knee to 30 degrees. Stabilize the femur with one hand and use the other to pull the proximal tibia anteriorly. Assess for anterior displacement and whether there is an endpoint.

Valgus stress test for MCL: Push on lateral aspect of knee while pulling ankle away from midline. Perform in 0 degrees (full extension) and 30 degrees flexion to try to isolate the medial collateral ligament

Varus stress test for LCL: push on medial aspect of knee while pulling ankle towards midline. Perform in 0 degrees (full extension) and 30 degrees flexion to try to isolate the lateral collateral ligament.

McMurray's - Medial: Place the fingers over joint line. Fully flex the knee and externally rotate the leg. Then apply valgus stress and extend the knee. Pain and click indicate medial meniscal damage.

McMurray's - Lateral: Place the fingers over joint line. Fully flex the knee and internally rotate the leg. Apply varus stress and extend the knee. Pain and click indicate medial meniscal damage.

### Standing Tests

\*\* Tests performed if you suspect meniscal pathology and patient doesn't have significant OA which would cause pain with weight bearing maneuvers

Thessaly test for Meniscus: Patient stands on one leg, knee flexed to 20 degrees, then pivots to rotate femur on tibia medially and laterally. Foot stays planted. If medial pain when pivot medially then concern for medial meniscus tear. If lateral pain when pivoting laterally then concern for lateral meniscus tear.

Squat test for Meniscus: Patient stands while the examiner holds their hands for balance. The patient squats down as low as is comfortable. The test is positive for a meniscal tear if there is pain at the medial or posterior joint line or a feeling of locking during knee flexion.

# DIAGNOSIS-DRIVEN PHYSICAL EXAMINATION OF THE KNEE

ACP Musculoskeletal Medicine Teaching Group  
ACP National Conference 2024

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## OBJECTIVES

1. Organize the knee musculoskeletal exam
2. Identify key historical factors in a patient with knee pain
3. Palpate key anatomical structures of the knee
4. Perform key provocative maneuvers of the knee exam and interpret towards likely diagnosis

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## MUSCULOSKELETAL ORGANIZATIONAL SCHEME

- History
- Inspection
- Palpation
- Range of motion
- Provocative tests

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## COMMON PRIMARY CARE KNEE CONDITIONS

- Essential
  - Patellofemoral syndrome (PFPS)
  - Meniscus tear
  - Osteoarthritis (OA)
- Bonus
  - Anterior cruciate ligament (ACL) tear
  - Medial collateral ligament (MCL) tear
  - Pes anserine bursitis
  - Iliotibial band (ITB) syndrome

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**KEY KNEE HISTORY:  
MOST COMMON DIAGNOSES IN PC**

	Patellofemoral pain syndrome (PFPS)	Meniscus tear	OA
<b>Demographic</b>	Younger/female	Young- middle age	Older
<b>Activity</b>	Overuse injury	Acute or degenerative	Acute or overuse
<b>Swelling</b>	Soft tissue (no effusion)	+/- effusion	+/- effusion
<b>Locking</b>	May endorse but usually crepitus	If bucket handle tear	May endorse but usually crepitus
<b>Instability</b>	Pain may lead to this esp. down hills/ stairs	Not usually	Preceded by pain

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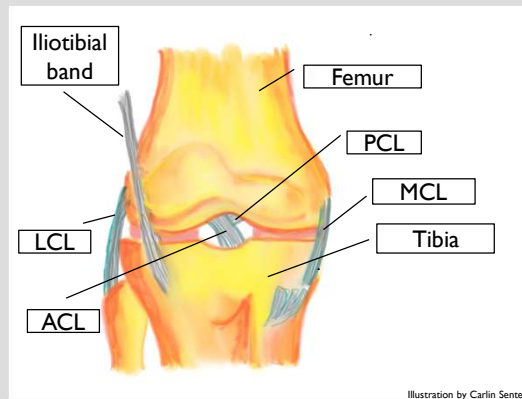
**BONUS CONDITIONS**

	ACL tear	MCL tear	Pes anserine bursitis	ITB syndrome
<b>Demographic</b>	Usually under 40	Any age	Middle/Upper age	Any age
<b>Mechanism of injury</b>	Traumatic/twisting injury (noncontact)	Valgus force to the knee	Overuse/limping	Running, overuse
<b>Swelling</b>	Yes, within an hour	Yes, medially	Yes	No
<b>Locking</b>	No, unless concomitant bucket handle meniscal tear	No	No	No
<b>Location of pain</b>	Nonlocalizable, possibly lateral	Medial knee	Anteromedial aspect of the proximal tibia	Lateral knee
<b>Instability</b>	Yes	No, unless high grade tear	No	No

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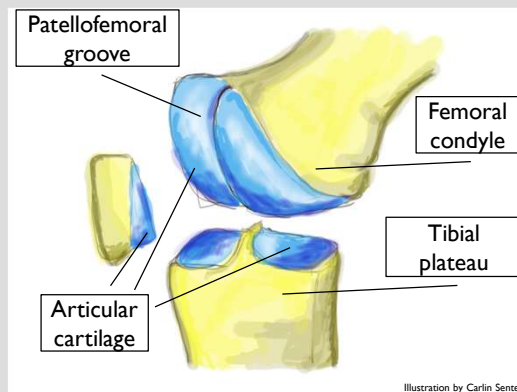
## KNEE ANATOMY – 4 LIGAMENTS

1. ACL
2. PCL
3. MCL
4. LCL



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## 3 SURFACES



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## MENISCUS

- Medial and lateral
- Shock absorber
- Stabilizer



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## KNEE BURSAE

1. Suprapatellar bursa
2. Prepatellar bursa  
*“housemaids knee”*
3. Infrapatellar bursa
4. Pes Anserine bursa



[http://www.aidmybursa.com/\\_img/prepatellar-bursitis.jpg](http://www.aidmybursa.com/_img/prepatellar-bursitis.jpg)

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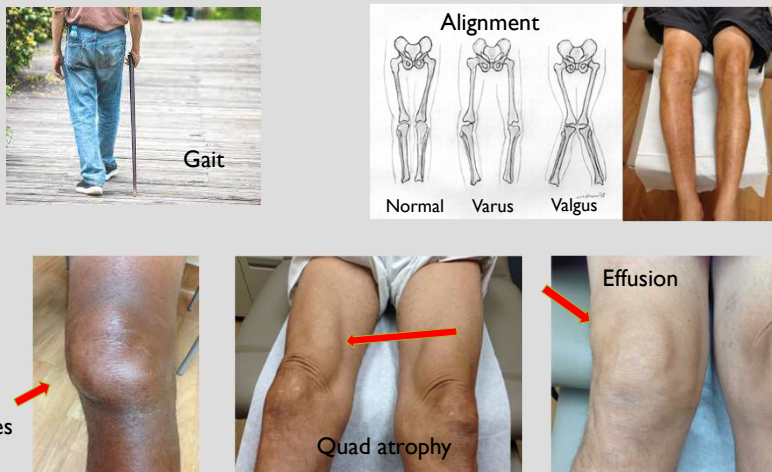
## KNEE EXAM

- Inspection
  - Abnormal gait
  - Alignment: Varus, valgus, neutral
  - Bony abnormalities
  - Quad atrophy
  - Erythema
- Palpation with knee extended
  - Evaluate for effusion
  - Quad, patellar tendons, tibial tubercle
  - Patellar facets
  - Patellar grind test
- Range of motion
- Crepitus
- Palpation with knee flexed 90 degrees
  - Joint lines, bony prominences
  - MCL, LCL tenderness
  - ITB, Gerdy's tubercle
  - Pes anserine bursa
- Provocative Tests
  - Ligaments
    - Anterior/Posterior drawer (ACL/PCL) – 90 degrees
    - Lachman (ACL) – 30 degrees
    - Varus stress (MCL)
    - Valgus stress (LCL)
  - Meniscus
    - McMurray
    - Thessaly\*\* - standing
    - Squat\*\* - standing

\*\* Standing tests done if suspect meniscal tear and patient doesn't have significant knee OA

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## INSPECTION



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## PALPATION WITH KNEE EXTENDED

- Evaluate for effusion
- Quad, patellar tendons, tibial tubercle
- Patellar facets
- Patellar grind test

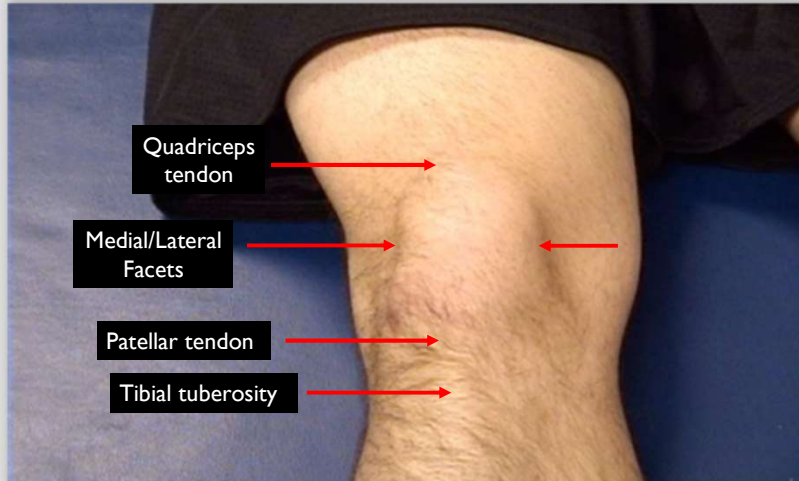
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## EFFUSION



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## PATELLA



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## PALPATION OF PATELLAR FACETS



Note: There is no audio accompanying this video

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## PATELLAR GRIND TEST

Examiner positions hand at superior pole of patella to 'trap' patella then asks patient to gradually and gently contract the quadriceps muscle. Anterior knee pain with this motion is (+) patellar grind test indicating patellofemoral joint pathology.



Note: There is no audio accompanying this video

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## KNEE RANGE OF MOTION

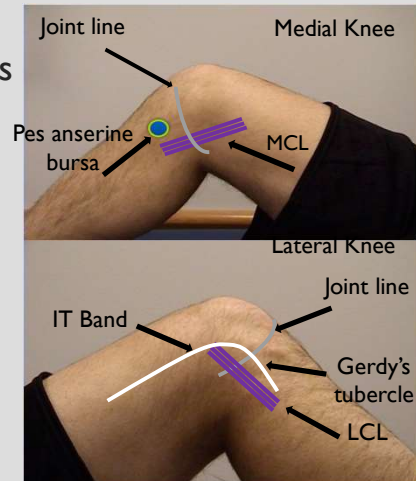
- ROM: normal 0-135
  - Feel for crepitus
  - Determine if knee is locking or if ROM is limited due to:
    - effusion
    - pain/guarding/stiffness
  - Locking: think bucket handle meniscal tear
    - Urgent xrays, MRI
    - Urgent referral to sports surgeon for arthroscopy



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## PALPATION WITH KNEE FLEXED 90 DEGREES

- Joint lines, bony prominences
- MCL, LCL tenderness
- ITB, Gerdy's tubercle
- Pes anserine bursa



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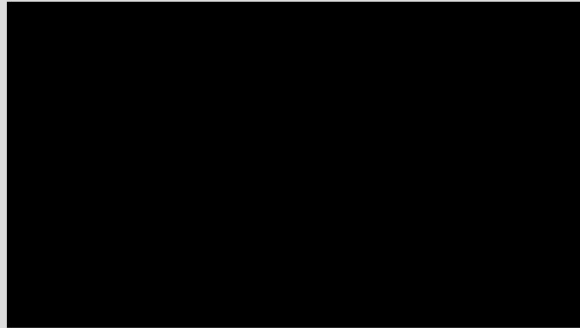
## PROVOCATIVE TESTS

- Ligaments
  - Anterior/Posterior drawer (ACL/PCL) – 90 degrees
  - Lachman (ACL) – 30 degrees
  - Varus stress (MCL)
  - Valgus stress (LCL)
- Meniscus
  - McMurray
  - Thessaly\*\* - standing
  - Squat\*\* - standing

\*\* Standing tests done if suspect meniscal tear and patient doesn't have significant knee OA

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## ANTERIOR DRAWER FOR ACL



This is a normal exam (no laxity)

*Low sensitivity 48% and specificity 87% compared to Lachman's test for ACL*

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## POSTERIOR DRAWER FOR PCL



This is a normal exam (no laxity)

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## LACHMAN TEST FOR ACL

This is a negative Lachman test: there is an endpoint to the anterior tibial translation.



Note: There is no audio accompanying this video

*Sensitivity 75-100%, Specificity 95-100%*

Magee, DJ. Orthopaedic Physical Assessment, 5<sup>th</sup> ed. 2008.

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## POSITIVE LACHMAN



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## VALGUS STRESS FOR MCL AND VARUS STRESS FOR LCL



This is a normal exam (no laxity)

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## MENISCUS: MCMURRAY TEST

Lateral meniscus:  
Internally rotate the  
tibia and extend  
Medial meniscus:  
Externally rotate  
the tibia and extend

Pain and/or  
snap/click at the  
joint line =  
concerning for  
meniscus tear

*Sensitivity medial 65%, Specificity medial 93%*

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## MENISCUS: THESSALY TEST

Medial Meniscus:  
Pain medially  
when pivot  
medially  
Lateral Meniscus:  
Pain laterally  
when pivot  
laterally



Note: There is no audio accompanying this video

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## MENISCUS: SQUAT

Deep squat increases compression on posterior horn meniscus. Patient stands flat-footed while examiner holds their hands for balance, and the patient goes as low as possible. (+) if knee medial or posterior joint line pain reproduced or feeling of locking during knee flexion (while knees are bent).



**Sensitivity 75-77%, Specificity 36-42%**  
**(Snoeker BAM et al. JOSPT, 2015)**

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